APPENDICES

FINAL SUPPLEMENTAL ENVIIRONMENTAL IMPACT STATEMENT

PHOTOGRAPH - COURTESY OF CHAUTAUQUA LAKE PARTNERSHIP

APRIL 2018

APPENDIX A: SEQR DOCUMENTATION FOR FSEIS

A1. Resolution: Accepting DSEIS as Complete

A2. Notice of Completion of DSEIS

A3. Public Hearing Notice

A1. Resolution: Accepting DSEIS as Complete

TOWN OF ELLERY

The Town Board of Ellery, New York, hereby resolves:

WHEREAS, the Town Board is proposing to apply for a permit from the New York State Department of Environmental Conservation ("NYSDEC") to apply herbicides to areas of Chautauqua Lake bordering its jurisdiction and has concluded that the application of herbicides is considered a Type I action under the State Environmental Quality Review Act, Article 8 of the Environmental Conservation Law, and its implementing regulations ("SEQRA"); and

WHEREAS, the Town Board is serving as Lead Agency for the SEQRA process; and

WHEREAS, on December 11, 2017, the Town Board issued a Positive Declaration and required a supplement environmental impact statement ("SEIS") be prepared to study the application of herbicides to target areas of Chautauqua Lake and the lake-wide effects of the application of herbicides to target areas of Chautauqua Lake; and

WHEREAS, after conducting public scoping, the Town Board issued a final scoping document on January 11, 2018;

WHEREAS, as Lead Agency, the Ellery Town Board, has the authority to determine the completeness and adequacy of a draft SEIS for public review and to issue a draft SEIS ("DSEIS") that describes the proposed action, analyzes the potential impacts, and provides mitigations and alternatives set forth in the final scoping document; and

WHEREAS, the Town Board has reviewed the DSEIS and verified that the information required in the final scoping document has been included in the DSEIS and thereby concluded that the DSEIS is adequate for public review;

We RESOLVE, therefore:

- To issue the attached DSEIS;
- To notify all Involved and Interested Agencies (as those terms are defined in 6 NYCRR § 617.2) and interested parties of the issuance of the DSEIS;
- To publish the DSEIS as required under 6 NYCRR § 617.12;
- To submit a notification of the issuance of the DSEIS to the Environmental Notice Bulletin;
- To call for a public meeting to receive comments on the DSEIS on 3/1, 2018 at 7:30 PM at Ellery Town Hall;

- To publish a notice of the public meeting to receive comments on the DSEIS in a newspaper of general circulation as required under 6 NYCRR § 617.12;

- To accept written comments on the DSEIS from February 9, 2018 to March 12, 2018 at 4:00 PM;

- To consider information obtained during the process of drafting the SEIS in preparing a permit application to the NYSDEC for a permit to apply herbicides to Chautauqua Lake; and

- After completion of the final SEIS and the SEQRA Findings, to consider the final SEIS and SEQRA findings to make a determination whether to approve a resolution to apply herbicides to Chautauqua Lake.

ADOPTED, this 8th day of February, 2018 at a meeting of the Town of Ellery Town Board following a motion made by Councilman Schlemmer and seconded by Councilman Wasp, and accrued with the following Roll-Call vote:

Mr. Wasp - Aye
Mr. Cusimano - Aye
Mr. Schlemmer - Aye
Mr. Miller - Aye
Mr. Johnson - Aye - Motion Carried

A2. Notice of Completion of DSEIS

TOWN of ELLERY
P.O. Box 429
Bemus Point, New York 14712
(716) 386-3465

NOTICE
SEQR: COMPLETION OF DSEIS and PUBLIC MEETING ON DSEIS

TOWN OF ELLERY
TOWN BOARD

February 8, 2018

This notice is filed pursuant to the State Environmental Quality Review Act ("SEQRA"), codified as amended at Article 8 of the Environmental Conservation Law, and its implementing regulations, codified at Part 617 of the Compilation of Codes, Rules, and Regulations of the State of New York.

The Ellery Town Board is to apply for a permit to apply herbicides to Chautauqua Lake:

Name:	Town of Ellery P.O. Box 429 Bemus Point, New York 14712
Contact Person:	Rebecca Haines, Town Clerk
Phone:	716-386-3465 x200
Regarding:	Chautauqua Lake Herbicide Treatment

Description & Location of Action:

As Lead Agency in the State Environmental Quality Review Process, the Town Board issues a Draft Supplemental Environmental Impact Statement (DSEIS) regarding the application of herbicides to targeted areas of Chautauqua Lake. Copies of the DSEIS without the Appendices are being provided via regular mail to the attached mailing list. The DSEIS and the Appendices are available for review at the Town Hall and on the Town of Ellery's website (http://www.elleryny.org/default.html).

The Town Board also calls for a public meeting to accept comments on the DSEIS on March 1, 2018 at 7:30PM at the Fluvanna Fire Hall, 3536 Avenue Road, Jamestown, NY 14701. The Town Board will accept written comments on the DSEIS. Written comments should be sent to Ms. Rebecca Haines at PO Box 429 Bemus Point, NY 14217 or ellerytc@windstream.net. Comments must be received before 4:00 P.M. on Monday, March 12, 2018.

For more information, please contact Ms. Haines at the address or phone number above.

cc: See Mailing List

Involved Agencies:

New York State Department of Environmental Conservation
Town of Busti
Town of Ellery
Town of Ellicott
Town of North Harmony
Village of Bemus Point
Village of Celoron
Village of Lakewood

Potential **Interested** Agencies:

Ashville Fire Department
Bemus Point Central School District
Chautauqua County
Chautauqua County Department of Health and Human Services
Chautauqua County Planning Board
Chautauqua County Sheriff's Office
Chautauqua County Soil & Water Conservation District
Chautauqua Lake Central School District
Chautauqua Utility District
City of Jamestown
Dewittville Fire Department
Ellery Center Volunteer Fire Company
Fluvanna Volunteer Fire Station
Jamestown Public Schools
Lakewood-Busti Police Department
Maple Springs Volunteer Fire Station
New York State Department of Agricultural and Markets
New York State Department of State
New York State Department of Transportation
New York State Office of General Services
New York State Office of Parks, Recreation, and Historic Preservation
New York State State Police
Panama Central School District
Southwestern Central School District
Town of Busti Fire Department
Town of Chautauqua
Town of Ellicott Police Department
Town of Pomfret
Town of Stockton
Village of Bemus Point Volunteer Fire Department
Village of Celoron Volunteer Fire Department
Village of Lakewood Fire Department
Village of Mayville

Mailing List

Ashville Fire Department
Audubon Community Nature Center
Bear Lake Association
Bemus Point Central School District
Cassadaga Lakes Association
Chautauqua County
Chautauqua County Department of Health and Human Services
Chautauqua County Planning Board
Chautauqua County Sheriff's Office
Chautauqua County Soil & Water Conservation District
Chautauqua Fishing Alliance
Chautauqua Institution
Chautauqua Lake & Watershed Alliance
Chautauqua Lake Association
Chautauqua Lake Central School District
Chautauqua Lake Fishing
Chautauqua Lake Partnership
Chautauqua Utility District
Chautauqua Watershed Conservancy
City of Jamestown
Dewittville Fire Department
Ellery Center Volunteer Fire Company
Fluvanna Volunteer Fire Station
Jamestown Public Schools
Lakewood-Busti Police Department
Maple Springs Volunteer Fire Station
New York State Department of Agricultural and Markets
New York State Department of Environmental Conservation
New York State Department of State
New York State Department of Transportation
New York State Office of General Services
New York State Office of Parks, Recreation, and Historic Preservation
New York State State Police
Panama Central School District
Roger Tory Peterson Institute of Natural History
Southwestern Central School District
Town of Busti
Town of Busti Fire Department
Town of Chautauqua
Town of Ellicott
Town of Ellicott Police Department
Town of North Harmony
Town of Pomfret
Town of Stockton
Village of Bemus Point
Village of Bemus Point Volunteer Fire Department
Village of Celoron
Village of Celoron Volunteer Fire Department
Village of Lakewood
Village of Lakewood Fire Department
Village of Mayville

A3. Public Hearing Notice

TOWN OF ELLERY
NOTICE OF PUBLIC MEETING AND ACCEPTANCE OF WRITTEN COMMENTS
ON
DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE APPLICATION OF HERBICIDES TO CHAUTAUQUA LAKE

Be advised that the Town Board of the Town of Ellery will hold a public meeting at 7:30 P.M. on Thursday, March 1, 2018 at the Fluvanna Fire Hall, 3536 Fluvanna Avenue, Jamestown, NY 14701 on the Draft Supplemental Environmental Impact Statement (DSEIS) for the application of herbicides to Chautauqua Lake. The DSEIS is available online at the Town Hall, 25 Sunnyside Avenue, Bemus Point, NY 14712, and on the Town of Ellery website (http://www.elleryny.org/html/legals.html). The Town Board will accept written comments on the DSEIS. Written comments should be sent to Ms. Rebecca Haines at PO Box 429 Bemus Point, NY 14217 or ellerytc@windstream.net. Comments must be received before 4:00 P.M. on Monday, March 12, 2018.

Please contact Rebecca Haines at 716-386-3465 ext. 200 or ellerytc@windstream.net for more information.

The Post-Journal - Legals Print Ad Proof

ADNo: 164938 Customer Number: LT2379
Customer Name: REBECCA HAINES Company: TOWN OF ELLERY
Address: PO BOX 429
City/St/Zip: BEMUS POINT ,NY 14712
Phone: (716) 386-3465 Solicitor: 097
Category: 10 Class: 2 Rate: L-0 Start: 2-10-2018 Stop: 2-10-2018
Lines: 52 Inches: 5.06 Words: 162

Credit Card: Expire:
Order Number:
Cost: 23.40 Extra Charges: .00 Adjustments: .00
Payments: .00 Discount: .00
Balance: 23.40

LEGAL NOTICE

TOWN OF ELLERY
NOTICE OF PUBLIC MEETING AND ACCEPTANCE OF WRITTEN COMMENTS ON DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE APPLICATION OF HERBICIDES TO CHAUTAUQUA LAKE

Be advised that the Town Board of the Town of Ellery will hold a public meeting at 7:30 P.M. on Thursday, March 1, 2018 at the Fluvanna Fire Hall, 3536 Fluvanna Avenue, Jamestown, NY 14701 on the Draft Supplemental Environmental Impact Statement (DSEIS) for the application of herbicides to Chautauqua Lake. The DSEIS is available online at the Town Hall, 25 Sunnyside Avenue, Bemus Point, NY 14712, and on the Town of Ellery website (http://www.elleryny.org/html/legals.html). The Town Board will accept written comments on the DSEIS. Written comments should be sent to Ms. Rebecca Haines at PO Box 429 Bemus Point, NY 14217 or ellerytc@windstream.net. Comments must be received before 4:00 P.M. on Monday, March 12, 2018.

Please contact Rebecca Haines at 716-386-3465 ext. 200 or ellerytc@windstream.net for more information.

164938 Feb 10, 2018

APPENDIX B: COMMENTS RECEIVED ON DSEIS

1. Involved and Interested Agencies
2. Interested Parties and Community Organizations
3. General Public (Letters and E-Mails)

B1. Involved and Interested Agencies

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Permits, Region 9
270 Michigan Avenue, Buffalo, NY 14203-2915
P: (716) 851-7165 | F: (716) 851-7168
www.dec.ny.gov

March 20, 2018

Ms. Rebecca Haines, Town Clerk
Town of Ellery
P.O. Box 429
Bemus Point, New York 14712

Dear Ms. Haines:

Proposed Chautauqua Lake Herbicide
Treatment - Draft Supplemental
Environmental Impact Statement

This letter provides the comments of the New York State Department of Environmental Conservation (the Department) on the Draft Supplemental Environmental Impact Statement for the proposed Chautauqua Lake Herbicide Treatment.

The Department takes the ecological health of the lake very seriously. When considering the issuance of Aquatic Pesticide Permits, the Department must follow the provisions of the Environmental Conservation Law; the relevant regulations, including 6NYCRR Part 327 "Use of Chemicals for the Control or Elimination of Aquatic Vegetation"; and Department policy to protect aquatic and terrestrial life, public and domestic water supplies as well as recreational, agricultural and other water uses.

Aquatic pesticide permits for the treatment of invasive species, if issued, would not allow:

- Chemical concentrations at water supply intakes to exceed New York State Department of Health drinking water standards.
- Treatment of entire bays, lengthy stretches of shoreline, or undeveloped shoreline.
- Treatment near sensitive species, fish spawning locations or regulated wetlands.

Please correct Table 3-6: Potential Rare Plants / Animals:

- Blackchin Shiner - Not endangered in New York. Considered uncommon or rare.
- Spiny Soft-Shell Turtle – Listed as a New York State Species of Special Concern
- Kindeyshell Mussel – Not endangered. However, all mussels are protected under Article 11 of the Environmental Conservation Law.

The Department recommends that the DSEIS be clarified to address the length of time that the proposed herbicide treatment would be conducted. In addition, the DSEIS should address the maximum acreage of treatment that would be proposed for each treatment zone for any given year. Finally, the DSEIS should include an estimate of the increase in phosphorous that will result from herbicide treatment and elimination of vegetation. This estimate can be calculated based on existing plant surveys and literature.

Thank you for the opportunity to comment on the proposed Chautauqua Lake Herbicide Treatment Draft Supplemental Environmental Impact Statement.

Respectfully,

David S. Denk
Regional Permit Administrator

DSD

cc: Mr. Paul McKoewn, NYSDEC Natural Resource Supervisor
Mr. Michael Clancy, NYSDEC Fisheries Unit
Mr. Michael Nierenburg, NYSDEC Pesticide Unit
Maureen Brady, Esq., NYSDEC Regional Attorney
Anne Bowling, Esq., Rupp, Baase

March 8, 2018

Town of Ellery
P.O. Box 429
Bemus Point, NY 14712
Attn: Rebecca Haines, Town Clerk

Subject: Comments on Draft Supplemental Environmental Impact Statement for

I am writing on behalf of the New York State Office of Parks, Recreation, and Historic Preservation (NYS Parks) to provide comments on the Draft Supplemental Environmental Impact Statement (DSEIS) for Chautauqua Lake Herbicide Treatment. As you are aware, NYS Parks owns and operates two important State Parks along the eastern shore in the northern section of Chautauqua Lake – Long Point State Park and Midway State Park. We have reviewed the DSEIS and offer the comments listed below for your consideration.

Pages 73-74 of the DSEIS discuss the proposed treatments' potential to release substantial amounts of nutrients into the water column which may provide additional nutrients for algal growth at the beginning of the summer. Page 74 indicates that nutrients are expected to be released at a rapid rate in areas treated with Aquathol which is proposed for use on either side of Long Point State Park and adjacent to Midway State Park. While we understand the argument that treatment early in the season will result in less biomass being treated and thus less nutrients being released, we are nonetheless very concerned about the potential for increased early season Harmful Algal Blooms (HABs) at our parks as a result of these treatments.

Chautauqua Lake is one of the 12 lakes being addressed this year through Governor Cuomo's HAB's initiative. The Western New York HABs Regional Summit is scheduled for March 26 in Rochester. At this summit experts from all over the country and the state will convene to discuss and begin to develop a HABs Action Plan for Chautauqua Lake. Since the relationship between the macrophytes and algae in this lake are so complex we believe that any decisions about herbicide treatment should be postponed until after the HABs summit and development of the HABs Action Plan for the Lake. The Chautauqua Lake Herbicide Treatment plan should be developed in tandem with the Chautauqua Lake HABs Action Plan to best address all of the concerns and needs of all of the stakeholders on the lake and within the watershed.

Additional concerns:

Pp 40-42 indicates that some surveys were conducted of the mussel population (Racine Johnson 2016). However, it is unclear where those surveys occurred and whether any surveys were conducted along the shoreline of Long Point and Midway State Parks where the endangered Kidneyshell Mussel had been identified as recently as 2008. Page 81 indicated that freshwater mussels are vulnerable to acute toxicity from the use of Navigate. Navigate is proposed for use on both sides of Long Point State Park and in front of Midway State Park. Mussel surveys should be required along these areas of shoreline prior to any treatments with Navigate. We are also concerned about the potential presence of the Spiny Softshell Turtle in the Sunset Bay area. Impacts to these animals need to be better addressed within the EIS.

Under Recreational impacts, the potential for increased frequency of HABs closing more bathing beaches and restricting recreation on the lake also needs to be considered.

Thank you for your consideration of these comments.

Sincerely,

Ron Rausch
Director, Division of Environmental Stewardship and Planning

cc: J. Bailey
K. Terbush
D. Denk (NYS DEC)
S. Kishbaugh (NYS DEC)
R. Gorney (NYS DEC)
E. Wiegert (NYS DEC)

CHAUTAUQUA COUNTY
DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH – ENVIRONMENTAL HEALTH UNIT

GEORGE M. BORRELLO
County Executive

CHRISTINE SCHUYLER
Director of Health & Human Services
(Commissioner of Social Services/Public Health Director)

March 16, 2018

Town of Ellery
c/o Rebecca Haines, Town Clerk
PO Box 429
Bemus Point, NY 14712

Re: Comments – Draft SEIS - Chautauqua Lake Herbicide Treatment

Dear Ellery Town Council:

Thank you for the opportunity to comment on the draft Supplemental Environmental Impact Statement (SEIS) for applying herbicides to Chautauqua Lake. The Chautauqua County Department of Health and Human Services (CCDHHS) - Environmental Health Division oversees or regulates several lake related activities that could be affected by herbicide application such as public bathing beaches and drinking water. We respectfully submit the following comments for consideration in preparing the final SEIS.

General Comments:

- If a DEC permit is to be issued for herbicide application, CCDHHS agrees that application during the first part May offers the lowest threat to public health, since contact recreation at that time would be minimal.
- Please prepare a check and balance process to ensure full compliance with the details of the water use restrictions listed on each herbicide label. CCDHHS requests that a summary table be included in the final SEIS listing the setback or restriction for each herbicide for the following uses: potable water supply intakes, swimming/contact recreation, crop irrigation, livestock/animal watering, fishing/fish consumption. Since these restrictions can depend on the size of the area being treated and/or concentration of the herbicide, summary tables should be prepared for each application area that includes the herbicide(s) used, target concentration and area.
- Include a discussion about any restrictions that might be needed for dogs that could come into contact with the water and include in the summary table discussed above.
- CCDHHS requests that the public water supply raw and finished water be tested for the active ingredient in each herbicide (2,4-D, triclopyr and endothall) as a further mitigation measure to protect potable water. Samples must be collected before, during and after herbicide application and rapid lab turnaround for results is needed for this mitigation measure to be effective.
- CCDHHS requests that a Quality Assurance Program Plan be prepared for water sampling and NYSDOH - ELAP certified labs are used for water quality analyses and the sampling protocols/locations be provided for review to the CCDHHS for comment in enough advance notice to allow for adequate review.

- If a permit is issued for a June or July application CCDHHS requested that the closest permitted bathing beach to each application area be sampled for the active ingredient in each herbicide (2,4-D, triclopyr and Endothall).
- CCDHHS requests to be involved in the development of your communication plan and lake water sampling plan.

Specific Comments:

- Section 3.1.1 p21, second paragraph – the last sentence is not accurate, there are drinking water wells surrounding almost the entire lake, not just in aquifers shown in Figure 3-1.
- Section 3.7.1 p61 – Chautauqua Heights Water District is incorrectly named – it is "Chautauqua Water District #2" – correct this in entire document.
- 3.7.1 – Point Chautauqua no longer has a potable water intake in the lake.
- Table 3-16 does not include all facilities with SPDES permitted discharge (e.g. Chautauqua Escapes, Camp Chautauqua, etc.). Check this and correct/clarify.
- The Aquathol K label provided in Appendix L is not the most current NYS approved label and it does not include corresponding Special Local Need labels.
- Section 4.1.1 p68 – the MCL for endothall is wrong – it should be 0.050 ppm not 0.005 ppm.
- Section 4.2.2 p74 – the units for the NYS MCL for triclopyr are missing – it should read 0.050 ppm.

Thank you in advance for addressing these issues in the final SEIS. Please continue to include the Chautauqua County Department of Health and Human Services throughout the SEQR process. As mentioned above, we would also like to be involved in the development of your communication plan and lake water sampling plan.

Should you have any questions about this correspondence, feel free to contact me at 716-753-4772.

Sincerely,

William T. Boria

William T. Boria, PG
Sr. Water Resource Specialist

CC: Ms. Abby Snyder, NYSDEC Region 9
Ms. Anita Bonamici, NYSDOH Western Region (email)

CHAUTAUQUA UTILITY DISTRICT
P. O. Box M, Chautauqua, NY 14722 · 716-357-5865 · cud@windstream.net

February 27, 2018

Rebecca Haines, Town Clerk
Town of Ellery
P.O. Box 429
Bemus Point, NY 14712

RE: DSEIS

Dear Rebecca:

The following comments from the Chautauqua Utility District (CUD) express our extreme concern for the protection of our water source (Chautauqua Lake).

Please consider our comments to the Draft Supplemental Environmental Impact Statement (DSEIS) and incorporate the changes and answers into the Final Supplemental Environmental Impact Statement.

Point One: The DSEIS is not specific as to what chemicals will be used in what areas and when those chemicals will be applied. The DSEIS generically states "Any application of herbicides would be in accordance with the permits received from the NYS DEC and in accordance with the New York State Product Labels." An intention to use these products simultaneously, and in conjunction with one another, is clearly expressed on page 104 under Section 4.9 "Cumulative impacts" which states "These products have been used together in treatment and treatments at other lakes, and there have been no accumulative effects. No negative effects were observed as a result of the use of both Aquathol K and Navigate in Bemus Bay in 2017." The New York State Product Label for Aquathol K specifically states that the herbicide should not be used in conjunction with any other chemicals. When used together, what chemical or chemicals are created? Is there any available information?

Point Two: The deterioration of the intended use chemicals from full concentration to harmless levels varies dramatically with water temperature, oxygen content, and other factors. The literature states that it may take months for water treated with 2, 4D to become potable. Due to the low rate of turnover of the upper Chautauqua Lake basin, it is reasonable that 2, 4D could be present at the Chautauqua Utility District water intake and in unacceptable concentrations.

P. O. Box M, Chautauqua, NY 14722 · 716-357-5865 · cud@windstream.net

This is especially true if water is driven by wind. What is the ½ life of 2, 4D in the treated areas?

Point Three: Per the DSEIS, the application of herbicides relative to the CUD water intake will be much closer than the "test" application made in 2017. The conclusion in the DSEIS that water tests near the CUD water intake were negative in 2017 are, therefore, of no value to the future proposed application.

Point Four: Even if the likelihood for 2, 4D and Endothall to get into the CUD water system in dangerous levels is remote, the consequences thereof are high. Approximately 10,000 people per day rely upon the CUD for potable water. The CUD water system is not designed to remove herbicides.

Point Five: Because there is a delay in receiving water test results, thousands of people may ingest chemicals at an unacceptable level for days prior to the determination that those chemicals exist at the water inlet.

Thank you,

E. Thomas Cherry
Superintendent
Chautauqua Utility District

B2. Interested Parties and Community Organizations

From: J Regis Thompson <drmuskie@aol.com>
Sent: Monday, March 12, 2018 11:31 AM
To: ellerytc@windstream.net
Cc: region9@dec.ny.gov; abby.snyder@dec.ny.gov; julie.foster@dec.ny.gov; david.denk@dec.ny.dec.gov; maureen.brady@dec.ny.gov; michael.todd@dec.ny.gov; michael.niernenberg@dec.ny.gov; paul.mckeown@dec.ny.gov; michael.clancy@dec.ny.gov; justin.brewer@dec.ny.gov; Basil.seggos@dec.ny.gov; kenneth.lynch@dec.ny.gov; kathy.moser@dec.ny.gov; james.tierney@dec.ny.gov; tony.wilkinson@dec.ny.dec; FW.Habitat@dec.ny.gov; fwfish@dec.ny.gov; fw.information@dec.ny.gov; DOWinformation@dec.ny.gov
Subject: DSEIS is a Recipe for a Chautauqua Lake Fishery Disaster

Chautauqua Fishing Alliance

"Where Water Quality has a Serious Fishery Connection"

Office Locations: P.O. Box 41, Ashville, New York 14710 and Albany, New York

To: Town of Ellery, Ms. R. Haines, Town Clerk

March 12, 2018

RE: **Draft SEIS Comments**

DSEIS is a Recipe for a Chautauqua Lake Fishery Disaster

We have seen this story before where well intended herbicide solutions pose a high risk to a lake's sensitive ecological balance and an even greater risk of destroying a famous fishery. The Chautauqua Fishing Alliance (CFA) is an independent group of local, in-state & out-of-state citizens from multiple towns around the lake and others who fish it regularly and who are all deeply concerned for the fishery's future. Many have fished our lake for 40-60 years. The CFA mission is to perform research and engage in educational advocacy for a high quality Chautauqua Lake Sport Fishery, and to support all lake conservation & environmental protection organizations. We are affiliated with a wide area network of North American professional fishing guides (who are "on the water" every day), fishing chapters or clubs, aquatic conservation & fishery officials, academic centers of scientific excellence, and other lake protection interests spanning nine northern States & southern Canada. We've seen some catastrophic failures in pure strain musky lakes due to herbicides and some clear successes on lakes where strict controls were enforced. We understand the delicate balance of essential protection & conservation required, but we see no evidence of either in this latest DSEIS.

1. This DSEIS fails to provide the essential controls necessary to protect a diverse, world class fishery. This is always the case when proprietary interests are allowed to operate without strict herbicide process controls, shoreline distance & depth limits & special protections for seasonal spawning & post spawning periods. The CFA's recommended 5-point ***"Fish Friendly Safety Standards for Herbicide Use"*** are listed in #7 below.

2. This DSEIS fails to even acknowledge the importance of achieving a Healthy Balance between herbicide use and fish friendly mechanical weed harvesting, or to recognize the potential for serious lake damage when herbicide treatments are not well coordinated with a fish friendly mechanical weed harvesting program. Our research studies reveal success only where "in-lake maintenance" (in all waters >1,000 acres) contains an EIS which clearly defines what areas of a lake are best managed by each method, and where all of the important herbicide process controls above are carefully followed. We find this omission to be blatantly irresponsible

given that fish friendly mechanical harvesting methods are the Primary tool across all larger northern U.S. waters wherever in-lake maintenance involves both harvesting and herbicide use for aquatic weed control.

3. This DSEIS fails to address how it will protect critical native weeds serving as important fish habitat, and apparently expects "blind faith" that somehow all will be fine in the "long term". Chautauqua Lake cannot afford this reckless posture, as the uncontrolled overuse of herbicides has not only destroyed Webster Lake, IN and others for entire seasons (from dangerous dissolved oxygen (DO) depletion), but in the process eradicated so many native weeds from deeper water weed beds that an even worse invasive weed problem emerged in subsequent years! This DSEIS fails to address any contingency plan for "off shore" herbicide use that results in the dangerous re-growth of new invasive weeds like the "Starry Stonewort" – a biomass that even herbicides cannot kill off according to Michigan officials who've observed this development in the very same latitude range as Chautauqua Lake, NY. According to some, herbicides can only "burn off the top" of this "steel wool like" invasive – the catastrophic result reported in other waters where the over zealous eradication of curly leaf pondweed (which is largely gone by July 1st) was replaced by the far less desirable Starry Stonewort that lasts entire seasons! While herbicides clearly add to the lake's sedimentary biomass from large scale weed decomposition (i.e., rotting stinking weeds), special protections are needed to retain important native Chautauqua Lake *potamogetons* (i.e., pondweeds) located in waters deeper than 4-5 feet (and which are often interspersed with "invasive species" like curly leaf pondweed or milfoil that have been a normal part of the Chautauqua Lake aquaculture for over 100 years! These deeper water "off shore" plants are nearly always better controlled via fish friendly mechanical weed harvesting methods on larger waters like Lake Chautauqua, as this is also common practice even on smaller or mid-size lakes in the 3,000 to 6,000 surface acre range.

4. This DSEIS reflects a serious lack of understanding of a "Whole" 13,000+ acre lake, since Chautauqua Lake is a diverse world class fishery requiring detailed insight and a very special attention to its unique needs. It hosts national and multi-state fishing tournaments, and its outstanding musky fishing is well known throughout North America. Our lake demands careful and knowledgeable professional care, and must not be disregarded by a small company whose only claim is it has treated small lakes & ponds of less than 1,200 acres like Waneta, Lamoka, or Cazenovia "lakes", and "spot treated" others – for it is high risk enough that Solitude has no experience in any lake as large as Chautauqua, let alone as complex with such a diverse and nationally renowned fishery. Whether the Town's casual disregard is because its weed surveys were taken at the wrong time of year or because outside proprietary interests unfamiliar with our great lake simply chose to overlook key elements is unclear? But its naive suggestion that herbicides can be "*started at the shore and extend outward into deeper water while fish are free to escape*" (presumably to even deeper waters) reveals a disingenuous cynicism and careless neglect of critical game fish habitat -- not unlike telling residents of a burned out neighborhood they are welcome to flee to homeless shelters – except there are no "shelters" that remain when fish are required to roam like nomads around deep, weed less middle lake areas in search of native habitat without seriously depleted oxygen! We asked Solitude how they can magically kill invasive weeds without also killing all native habitat growing throughout the same area? We got no answer, just silence – revealing an attitude of complete insensitivity to the fact that fish friendly mechanical weed harvesting is a superior method of weed control outside "near shore" limits. Any serious "*Save the Fishery*" effort must first recognize that important musky fisheries in PA, IN, & Michigan have already been destroyed for whole seasons or worse due to this very same casual indifference! Surely the **NYSDEC** must realize there is no such thing as saving a fishery when deeper water weed beds are destroyed in the naïve hope that "all will be well in the long run", especially when the clear likelihood of getting new native plants to grow back is severely diminished when the emergence of even more invasive weeds is nearly always the case?

5. This DSEIS is riddled with flaws in logic, statistics, methodologies, and misidentified macrophytes. It lacks sufficient scientific insight and reflects an astonishingly **premature quantum leap** from a mere 30 acre "experiment" in 2017 to a huge 700 acres in 2018 (in a single year) with only a superficial understanding our lake's special ecological character at best. It clearly fails to consider the serious implications to fish, wildlife, waterfowl, and sensitive underwater habitat in this dynamic lake and Outlet. This DSEIS simply ignores critical elements as if pretending something does not exist or denying its importance will make it so!

The Town of Ellery's proposal for herbicide use as a solution in any "off shore" area is flawed from the beginning. Page 36 fails to acknowledge that it is Irrelevant that a majority of the adult muskies are stocked.

For it is Dangerously Unwise to threaten the very same spawning areas used by all of our top game fish – bass, walleye, and muskies – under any scenario because no matter how low the natural musky spawning level is, the fact remains that the yield rate to adulthood (i.e., for muskies) is still far higher than hatchery raised musky (Hanson, et. al., American Fisheries Society Special Publication 15, Bethesda, 1986). This is precisely why the current DEC Prendergast Hatchery efforts to raise larger fry before stocking exist!

We still don't know the full extent of any long term damage to the single most productive spring spawning season musky netting area in the lake was last year when it was exposed later to Aquathol K and Navigate in a "Bemus Bay experiment" – another example of unintended consequences when the result was not only dangerous suffocation and stress to the musky, bass, and walleye fishery, but the well documented sudden death of a 51-52 inch trophy musky the "morning after" herbicide treatments when it suddenly floated to the surface (i.e., photos available upon request).

Environmental conservation officials in at least 5 States where herbicides are used in musky waters report "when (during & after herbicide application) depleted dissolved oxygen (DO) levels are allowed to drop below a fish healthy DO level, serious fish stress and suffering occurs not only with sensitive pure strain musky and other species, but also to new young-of-the-year (including last fall's stocked fry) and other large fish as well". The NYSDEC's own Bureau of Habitat warns of this very danger on its official website. Further research indicates these prolonged post-treatment periods of suffocating stress (short of actual fish kills) literally shut down fishing activity for entire summer seasons due to the "lack of on site DO monitoring with critical field adjustments made to application protocols". When management focus ignores this "DO Danger Zone" by simply following a manufacturer's labeled concentration instructions to avoid a DO Kill Zone (which does not occur until an even lower threshold is reached (below 4ppm (mg/L)), sport fishing and the tourism it brings is lost for an entire remaining fishing season... The CFA believes a mandatory metered DO monitoring requirement is critically essential to avoiding this problem on Lake Chautauqua whenever herbicides of any kind are used in waters greater than 4 feet in depth. Nearby Lake Arthur, PA and some other Midwestern musky waters where season long fishery shut downs have occurred lacked this critically important control.

. This DSEIS completely ignores the fact that pure strain muskies are "Cool water fish" that require a higher level of dissolved oxygen than warm water bass lakes in order to thrive! States like Michigan & others with Minimum 7ppm Cold water DO/ 5ppm Warm water requirements often require a Minimum of 6.0ppm DO in lakes where pure bred musky populations exist. These fish are NOT tiger musky, norlunge, pickerel or pike!

7. Any serious DSEIS effort to protect a fishery must avoid this far longer lasting seasonal impact by treating inactive sick or suffocating fish as equally important to avoiding the more obvious catastrophic public relations scene of floating dead fish, making support for adopting a ***"Fish Friendly Safety Standards for Herbicide Use"*** critically important for Lake Chautauqua. For the very lack of such protections is one reason herbicide use is rare or avoided altogether in many top North American fisheries. **Smarter Herbicide Use** must be highly selective, carefully monitored and well controlled if serious protection of our fishery is to be considered second only to protecting our children's health thru a balance of both strictly controlled chemical use and more fish-friendly mechanical weed harvesting solutions. **We specifically request the NYSDEC to impose the following five (5) fishery, wildlife, and native aquatic weed protections:**

- **No use of herbicides prior to the End of June** to provide essential protection for spawning, late spawning, and new young-of-the-year fish (who are very susceptible to toxic herbicides). Avoiding last year's fish kill which went below the "DO Danger Zone" to an actual suffocating "Kill Zone" should be reason enough.

- **Restricted Herbicide Use to Near Shore Areas Only**, specifically limited to water Not exceeding 4 feet in depth or a Maximum of 200 feet from the shoreline. This provides a critical balance between the preservation of quality deeper water fish habitat and the important need for near shore clean up in the most impaired areas. Weed growth in such deeper water areas are far better controlled by fish friendly mechanical weed harvesting (the primary method in any well balanced fish friendly habitat solution supported by numerous State Environmental Conservation departments across the northern U.S.).

- **Mandatory metered monitoring** of dissolved oxygen (DO) levels in all permitted locations before, during, and at weekly intervals for a period of six (6) weeks after any herbicide treatments, with NYS DEC enforcement of Required field adjustments to treatment protocols to maintain a fish healthy Minimum DO standard of at least 6 ppm (mg/L) in Chautauqua Lake at all times. Such field adjustments must require the temporary suspension of all herbicide applications to any area showing readings below the above standard, with resumption only after subsequent water testing.

- **No Use of herbicides** off any Undeveloped Shoreline area and All State-owned Shoreline areas (to protect wildlife and critical ecological habitat as well as fish).

- **No Use of herbicides** anywhere density of invasive weeds Does Not Exceed 50%.

8. Any DSEIS for Chautauqua Lake must include critically sensitive Chautauqua Musky Habitat Areas requiring special protections. These are areas greater than four (4) feet in depth in the following off shore locations:

South Basin (Lower Lake): Center lake outer north side of Burtis Bay-to-The Crib Shoals-to-Grass Island and 500 yards northward in the center lake. Herbicide use should be prohibited within a 200 yard radius surrounding The Crib Shoals (marked by buoys) and Grass Island (also marked by buoys), and the entire center lake area between them. **Off shore** areas (defined as greater than 200 feet from shore) include Greenhurst-to-Stockholm Pt.-to-Driftwood-to-Belleview (White Wall), Lakewood Yacht Club to Lakewood Bar and Sherman's Bay, Vukote-to-Ashville Bay-to-Blys Bay and Cheney's Point to Quigley Park and Hadley Bay, Arnolds Bay to Bemus Creek).

North Basin (Upper Lake): **Off shore** areas include both undeveloped sides of Tom's Point, Entire Bemus Bay from Lawson Center-to-Bayview-to-Long Point State Park Marina, Victoria-to-Woodlawn, Long Point-to-Warner Bar–to-Sunset Bay-to-Maple Springs (No use of herbicides should be permitted within 200 yards of the Warner Bar), Camp Chautauqua (Swedish Camp) to-Magnolia-to-Whitney Bay-to-Prendergast Point boat launch, Midway Park-to-Viking Club-to-Chedwell, Dewittville Bay YMCA Camp-to-Point Chautauqua, Hartfield Bay-to-Mayville Flats, Chautauqua Institution Bell Tower (north shore)-to-Wahmeda and Irwin's Bay-to-Lighthouse Point.

9. The timing of this DSEIS is seriously flawed as Chautauqua Lake's **#1 Impairment** is NOT invasive weeds, but **ALGAE** (e.g. See figures 3.2 & 3.3 on P. 25-26). Any early season or widespread use of herbicides would severely **worsen** the lake's Algae Impairment. It is totally counterproductive to risk actually accelerating the growth of Algae at the very same time that New York State is spending $65 Million to REDUCE Algae in Chautauqua Lake (and 11 other upstate waters)! It is hard to believe that anyone at the NYSDEC would allow herbicides to risk accelerating more algae growth in one of the Governor's 12 targeted "Algae Impaired Lakes".

A final observation: For over 20 years, this author analyzed the scope & depth of SEIS input under SEQRA for hundreds of New York State & Local government transportation capital projects impacting waterways from chemicals and other hazards (on bridge, highway storm water drainage, railroad, and airport projects) while at the New York State Dept of Transportation headquarters. My job duties included communicating solutions to the State Legislature, five NY Governor executive staffs, six Commissioners, numerous Regional Directors, and others from various State Agencies concerning a project's impact on lakes, rivers, & stream habitat. Our agency spent literally hundreds of millions of dollars annually to insure no harm would negatively impact fish spawning grounds, fish & wildlife habitat, sea shell, native plant and other environmental threats under the very strictest of process controls. I have seen SEIS drafts which served only the very narrow interests of a few, while ignoring the interests of many... Experience has taught me to recognize the potential for serious unintended short & long term consequences from oversimplified & uninformed, however "well intended" solutions. I have never seen such a disregard for a lake's fishery, spawning grounds, wildlife and critical ecological habitat in any other DSEIS. This one appears to serve only the interests of recreational boaters. It is scientifically deficient, weak, and does not come anywhere close to representing other lake user interests or the interests of a "Whole Lake" population. Mostly, it represents a dangerous environmental threat no matter how well intended.

We have seen this same ***Recipe for a Fishery Disaster*** elsewhere in several other northern States, with all of its false assurances of "no harm or damage to the fishery". We can only hope that our own **New York DEC leadership** is better than the political interests of a few because we can now only pray that the lake's legal owner is strong enough to either reject this DSEIS entirely, in deference to one which represents the entire ake, or to otherwise greatly improve upon it with focused courage and more serious integrity by imposing strict controls and far better limitations over the process.

We thank the Town for the opportunity to provide such mission critical input for protecting our fishery, and hope it agrees that the recommended herbicide safety protections herein are good for everyone who enjoys our lake. Please include this letter in your final environmental impact report to the NYS DEC.

Sincerely yours,

J. Regis Thompson, Executive Director

Chautauqua Fishing Alliance

Email: DRMUSKIE@aol.com

March 16, 2018

Ms. Rebecca Haines
P.O. Box 429
Bemus Point, NY 14217

Re: Comments on Draft Supplemental EIS

Dear Ms. Haines:

The Chautauqua Institution (the "Institution") hereby submits the following comments on the Draft Supplemental Environmental Impact Statement ("DSEIS") prepared by the Town of Ellery as to the application of herbicides to Chautauqua Lake. The Institution has engaged the scientific experts at Ramboll to review the DSEIS, and they have prepared the attached memorandum containing the results of that scientific review. That memorandum is incorporated by reference into the Institution's comments. If you have any questions regarding the issues raised in these comments, please feel free to contact me.

Sincerely,

CHAUTAUQUA INSTITUTION

John L. Shedd, AIA
Vice President of Campus Planning and Operations

Attachment

C: NYDEC Region 9

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RAMBOLL

ENVIRONMENT
& HEALTH

MEMO

Job 1690007484
Client **Chautauqua Institution**
Memo no. **1**
Date **03/15/2018**
To **John Shedd, Chautauqua Institution**
From **Mary Sorensen, Principal, CE and Lisa Yost, Senior Managing Consultant, MPH, DABT**

Date 08/03/2018

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Review of the Draft Supplemental Environmental Impact Statement for Chautauqua Lake Herbicide Treatment

On behalf of the Chautauqua Institution, Ramboll conducted a review of the Draft Supplemental Environmental Impact Statement (DSEIS) for Chautauqua Lake Herbicide Treatment. The DSEIS was prepared by Rupp Baase Pfalzgraf Cunningham, LLC and the Chautauqua Lake Partnership and submitted to the Ellery Town Board on February 5, 2018.

In addition to a review of the DSEIS and appendices, the following additional documents were considered in preparation of these comments:

- Chautauqua Lake Management Commission. 2017. Chautauqua Lake Macrophyte Management Strategy, March, 2017
- Scientific Review of the document "Aquatic Macrophyte Control at Bemus Bay, Chautauqua Lake, June, 2017 Survey Report" Prepared by SOLitude Lake Management." Conroe, Nystrom, & Brower. 2017.
- Aquatic Plant and Herbivore Monitoring of Chautauqua Lake. Racine-Johnson. 2017. 2016
- Fall Plant Monitoring of Chautauqua Lake. Racine-Johnson. 2017.
- Spring Plant Monitoring of Chautauqua Lake. Racine-Johnson. 2017
- Chautauqua Lake Management Commission. 2010. Chautauqua Lake Watershed Management Plan, September 2010.

We understand additional background documents have been requested from the Town under Freedom of Information, but not yet provided; to the extent anything significant is in those documents, these comments may be supplemented.

Comments are organized into three categories and comments are numbered within each section. General comments are offered first. These are followed by specific comments regarding potential impacts on human health or human use. Finally, comments regarding potential ecological effects, and comments regarding analyses of alternatives are provided. The review focused on identifying any substantive comments in the DSEIS that may affect the overall conclusions and recommendations of the DSEIS.

1. General Comments

1. Overall, the DSEIS lacks sufficient detail to reach a conclusion about the likelihood of impacts to environmental resources or human health from the

proposed action; therefore, the DSEIS does not satisfy SEQRA requirements.

2. Comments on human health focus on potential drinking water impacts related to lake water and groundwater and comments on human uses focus on impacts on recreational and irrigation uses. Estimated concentrations of herbicides in the lake are too general and do not account for concentrations expected at drinking water intake areas or recreational areas.
3. Similarly, specific discussion of the toxicity of the herbicides needs to be clarified for native ecological species, spawning areas, rare, threatened and endangered species, and sensitive areas. There is contradictory information of product safety or information is lacking. Specific details are provided in Section 3 of this review summary.
4. The evaluation of alternatives is limited and appears a biased rationale for the selected methods, rather than an impartial assessment of all alternatives, described in more detail in Section 4 of this review summary. For example:
   a) The use of herbicides is not supported as a reasonable short-term decision because, among other things, there is no quantitative comparison of the amount of time and effort herbicide use will save compared to the time and effort of mechanical harvesting.
   b) There is no discussion of the potential combination of herbicide application and continued mechanical harvesting, particularly in sensitive resource areas where threatened or endangered species habitat and fish spawning is identified and potential adverse effects may occur.
   c) A discussion of further actions to reduce inputs of nutrients into the lake in comparison to herbicide use on Chautauqua Lake is not provided. The "no action alternative" discussion essentially dismisses the use of voluntary actions and mechanical harvesting from the onset of the alternatives analysis. There is no acknowledgement of benefits of voluntary action or the degree of voluntary actions that may already be occurring in the watershed. It also appears that there is only a single sentence about the benefits of mechanical harvesting.
5. Mitigation measures can and should be expanded upon, examples are provided in Section 5 of this review summary.

2. Specific Comments Regarding Human Health or Human Uses of the Lake

This review identified potential unresolved issues and concerns regarding use of lake surface water for drinking water or irrigation and potential for effects on groundwater.

2.1.1 Potential to Impact Chautauqua Lake Water Use as Drinking Water

Chautauqua Lake is a Class A potable waterbody and the DSEIS identifies known instances of surface water use for drinking water, but the text provided suggests there is considerable uncertainty about how many private residences may be using lake water for drinking water. Page 61 states that "The number of private residences using surface water as a drinking water supply is unknown and likely dwindling." The lack of clarity regarding surface water use as drinking water makes the evaluation of the magnitude of this potential exposure pathway challenging. Nevertheless, it is clear that there is some surface water use as drinking water.

Discussions regarding drift in Section 4.2.2 on Pages 74-76 include a screening calculation to estimate concentrations in the lake basins relative to the drinking water standards. Little documentation is provided for these calculations and it is notable that in the south Basin, concentrations estimated for the entire South Basin are nearly at the drinking water standard for Renovate of 50 ppb (i.e., 0.049 ppm or 49 ppb). Table 2.2.1 provides a comparison of estimated concentrations with USEPA MCLs, NYSDH MCLs and regional screening levels for the active ingredients as identified by USEPA (2018).

Table 2.2.1: Comparison of Estimated water Concentrations from DSEIS Table Compared with Criteria

Herbicide	Active Ingredient	Application Rate[a]	South Basin Conc.	Both Basins Conc.	NYDH MCL Drinking Water[b]	USEPA MCL[c]	USEPA RSL Residential Tapwater[c]
Renovate 3	Dipotassium salt of endothall	2.0 - 2.5	0.0499	0.0146	0.05	0.1	0.38
Navigate	2,4-D	2.0 - 4.0	0.0099	0.0033	0.05	0.07	0.17
Aquathol® K	Trichlopyr	0.75 - 1.5	0.0347	0.0095	0.05	NA	NA

All concentrations are presented in units of parts per million. a. From from Table 4-1 of DSEIS; b. Value is available for 2,4-D, and value for "unspecified organic pollutants" is applied for endothall and trichlopyr (NYDH

1991) c. USEPA 2017 MCL: maximum contamination limit. NA: not available RSL: residential screening level USEPA: United States Environmental Protection Agency

The calculations in the DSEIS regarding surface water are not well documented and cannot be fully evaluated. Presumably complete mixing is assumed, which may or may not occur prior to the time any herbicides may reach drinking water intakes in the lake. This section does not describe the time-frame for when these concentrations would be reached. It also does not describe concentrations at any active drinking water inlet locations. Drift calculations should also take into account concentrations for human health exposure areas. However, the "drift analysis" in the DSEIS provides limited information about where the herbicides will travel in this lake, the concentrations expected to be present in key human use areas, or a comparison to relevant human health criteria relative to those areas. Table 4-1 provides dilution concentration over the basin wide areas. That is inadequate.

Sampling proposed to evaluate residual concentrations in surface water is summarized in Section 4.2.2 and in Table 4-2. No rationale is provided for the proposed sampling density, no water depths are indicated, and no description is provided of how the proposed target water concentrations will be reached within the target water area. These data are not adequate to evaluate the potential for impacts on Chautauqua Lake water use as drinking water.

2.1.2 Potential Impact on Groundwater Used as Drinking Water

Groundwater use as drinking water is discussed and dismissed as a potential concern, but the DSEIS does not provide adequate information to evaluate this conclusion. There are an uncertain number of groundwater wells used for drinking water near the lake. Page 63 states that:

> "Dozens of individual registered wells are located within close proximity of the Lake. According to the NYSDEC Well Mapping data, within approximately 2,000 feet of the Lake, there are approximately nine wells in the Town of Ellicott, seventy-two wells in the Town of Ellery, thirty-seven wells in the Town of Chautauqua, and twenty-one wells in the Town of North Harmony. There are numerous additional wells that are not registered with the NYSDEC."

While this discussion follows the discussion of use of Chautauqua Lake surface water as drinking water, it appears to be referring to use of groundwater as a drinking water source.

Later discussions in the DSEIS dismiss without adequate justification any potential concern about groundwater use as drinking water. Section 4.2.3 indicates that "Outflows to Chautauqua Lake do not recharge groundwater – in other words, water generally flows from groundwater into the Lake." This section references (Bergman Associates 2010), which is not one of the attached appendices so cannot be reviewed. In addition, because the location, depth, and use of private wells is either uncertain, or not documented in the DSEIS, this DSEIS does not provide enough information to evaluate whether groundwater sources used as drinking water could be impacted by herbicide application.

The final discussion of groundwater in the section regarding any needed mitigations on Page 106 states:

> "Groundwater impacts primarily relate to the potential impact to private wells and public water supply systems that utilize the aquifers in the region of the Lake. <u>Due to the nature of the Lake, the depth and location of the aquifers, the concentrations of the herbicide treatments and fate of the product in the aquatic environment, there should be no impacts to the aquifers in the area and therefore no impacts to public or private wells</u>. No mitigations are needed. " (Emphasis added.)

The DSEIS does not provide adequate discussion in the text or attachments to support these statements.

2.1.3 Limitations on Fishing and Swimming

The DSEIS indicates recommended restrictions from swimming for 3-24 hours and for fishing for 24 hours related to use of Navigate. No calculations or references are provided for these conclusions. No indication is provided about how big an area swimmers should avoid or how all area users might be alerted to the use of herbicides. Similarly, Section 4.8.5 indicates that the impacts related to human uses of the lake are limited to the restrictions related to swimming or fishing (Pages 103-104), but also does not provide calculations or references. Restrictions are identified as lasting from 3-24 hours depending on the herbicide used. The citation for these conclusions is the 2000 Draft EIS, which does not appear to be an attachment to this DSEIS. No details are provided on why these restrictions are protective or how they will be protective in this setting. The lack of information about key assumptions in the cited reference and the lack of precision in assumptions about water concentrations following use together result in inadequate data to support the conclusion that the planned uses will be acceptable.

Page 54 of the DSEIS states "although the lake is primarily utilized during the summer months…." This statement is not supported by any reference. The population that utilizes this lake should be identified and timeframes associated with the population that uses the lake during these timeframes should be clearly identified.

2.1.4 Potential Effects on Surface Water for Irrigation

Section 4.4 Agricultural Resources states the following:

> "There are no known agricultural water users with a NYS DEC permit on Chautauqua Lake. Farmers and other property owners may be drawing lesser amounts of water for irrigation purposes, especially downstream of the Lake. I<u>f these users exist, they may be far enough downstream that the concentrations of herbicides would fall below the minimum levels required for irrigation."</u> [Emphasis added.]

Section 4.2, discusses sampling planned to evaluate when areas meet the target concentrations, but does not provide any discussion about how water users might be notified if concentrations exceed levels allowed for irrigation. Section 5.0 Mitigation Measures and specifically, Section 5.3 Agricultural Resources,states.

> "There are no direct impacts to agriculture but one potential indirect impact is the use of herbicide treated water for irrigation. No farmers are withdrawing water in amounts that require a DEC permit, although there may be farmers that withdraw smaller volumes. Due to the proposed timing of the treatment (in early spring), there would be little or no expected use of waters for irrigation. The treatment strategy, focusing on selective application areas rather than a larger application block, also helps to mitigate irrigation restrictions, since smaller plots dilute herbicide concentrations more quickly. Herbicide concentration testing will be performed to facilitate removal of irrigation restrictions.. Since there are no farms on the lake, any farmers will be located downstream of the outlet. Herbicide levels in these locations will be low. <u>If farms are found in these downstream areas, they will be notified of the treatments</u>." [Emphasis added.]

If agricultural intake locations are unknown it is unclear how those individuals could be reliably contacted or for any potential impacts to be evaluated and mitigated.

2.1.5 Figures 4-1 to 4-10

Figures 4-1 to 4-10 show the planned treatment areas. It would be helpful to show approximate water depths in treatment areas on these figures. In addition, locations of drinking water intakes, irrigation intakes, and public beaches, and sensitive ecological habitats should also be added to these figures. Similarly, the various bays and extent of the bays described on Page 32-35 – are not shown on any maps in the DSEIS document. These should be clearly shown on a map.

3. Potential Ecological Impacts

This section below provides comments related to the potential for ecological effects that are needed in the DSEIS and information needed to make determinations of impacts for herbicide use are identified. These are focused on mapping, potential impacts to fish spawning areas, potential impacts for rare threatened and endangered species, potential impacts to birds, potential impacts to invertebrates, potential effect of drift, and potential effects of low dissolved oxygen.

3.1 Mapping

Potential impacts to fish spawning areas and rare threatened and endangered species (RTE) are discussed in Section 4.3.2 of the DSEIS. Table 4-6 of the DSEIS presents a tabular summary of the overlap between proposed treatment zones and fish spawning, fish rearing and endangered species zones, and wetlands, but a figure or series of figures is needed to clearly illustrate extent and degree of overlap and areas of potential impacts to threatened and endangered species and spawning habitat. This information should be added to Figures 4-2 to 4-10.

3.2 Potential Impacts to Fish Spawning Areas

The text and Table 4-6 states that there are 10 treatment areas and 6 of the areas overlap with fish spawning. The text also states that the treatment areas overlap with approximately 25% of the identified fish spawning and/or rearing areas for the lake (Page 85). This is a substantial amount of overlap with spawning areas for Lake Chautauqua and therefore, warrants specific quantitative discussion about potential toxicity to the spawning areas in the DSEIS. Since this information is lacking in the DSEIS, the

DSEIS lacks adequate information to make a determination of the safety of the products in spawning beds. Conclusions in the DSEIS are based on assumptions which appear logical in part, but there are also parts we do not agree with (see Section 3.2.1) and the toxicity information provided in the DSEIS suggests that the granular BEE in the spawning area could be toxic (see Section 3.2.2). Tangible suggestions of the information needed to make a determination one way or the other are provided.

3.2.1 Presumed Approval of Herbicide Use in Spawning Areas as Explained in the DSEIS

The DSEIS states at Page 85 that "*herbicide product labels do not specifically address fish spawning, and the NYSDEC regularly approves permits for herbicide applications during typical spawning periods. This reflects recommended application timing language…apply in spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing.'*"

- While label timing instructions for spring and summer during spawning season in general is an application per label instruction and should indicate safe application, we disagree on the premise that this means placement itself in spawning areas is safe.
- <u>Needed in DSEIS to make a determination of safety for spawning areas</u>: Some evidence of product label information about the use of Navigate BEE in spawning areas or information about use as labelled pertaining to the toxicity for larval fish is needed to support this assumption of safety in spawning areas, particularly in light of other toxicity information presented in the DSEIS (discussed in Section 3.2.2). Also, the DSEIS describes the application of Navigate "should occur" using buffer lanes 50 to 100 feet wide and that treatment lanes will be equally as wide. Clarify if this is how it "will be" applied for Chautauqua Lake, as this could be beneficial for the spawning areas.

- While NYSDEC placement of herbicides in spring or summer during spawning season implies safety during spawning season, we disagree on the premise that this means NYSDEC routinely approves placement in spawning areas. In addition, the DSEIS states that NYSDEC (1981) states that certain esters of 2,4-D are toxic to certain fish species but the NYSDEC allows use of granular formations for Eurasian watermilfoil and other species as long as the lakes are large and that whole bays are not treated to avoid fish toxicity

- <u>Missing from DSEIS to make an adequate determination of safety for spawning areas</u>: If there is recent information (e.g., the last 10 years) that shows NYSDEC routinely approves placement of granular BEE in spawning beds, then state when and where this is approved and whether any toxicity was actually observed following application in a spawning bed. Otherwise, this should be qualified that the authors do not know if NYSDEC currently approves such application for use in spawning beds and acknowledge the uncertainty that exists. As such, perhaps a pilot study in spawning beds should be conducted or phased applications over time for the 5 spawning beds where Navigate is planned could be discussed as potential mitigation measures, for example. If this issue of potential toxicity in spawning beds can be resolved via quantitative information as discussed in Section 3.2.2, then mitigation measures such as a pilot study may not be necessary at all.

3.2.2 Toxicity Information Explained in the DSEIS

There is insufficient information in the DSEIS about the concentrations of Navigate granular BEE concentrations in spawning areas and what is available suggests that the granular BEE will be toxic. Navigate (2,4-D) is the focus of this discussion because it is planned for 5 of the 6 spawning areas. The DSEIS states on Page 84 that "the previous information illustrates that there will be minimal toxicity impact to fish from the application of these three herbicides under the proposed treatment." This statement is not supported with the information provided in the DSEIS because the concentrations of granular BEE in the spawning areas is not provided or discussed. Specifically:

- The DSEIS states on Page 81 that NYSDEC (1981) states that certain esters of 2,4-D are toxic to certain fish species. Table 4-6 indicates Navigate will be applied at a rate of 2 parts per million [ppm] to 4 ppm. Table 4-5 presents a summary of the Navigate toxicity benchmarks, presented as lethal concentrations that affect 50 percent of organisms tested (LC50s). LC50s are appropriate for use in the DSEIS. However Table 4-5 indicates that LC50s for fish exposed to granular BEE are 0.6 ppm (bluegill), 2 ppm (trout), 2.5 ppm (fathead minnow), and 0.6 to 4.3 ppm for salmon/trout. Table 4-1 indicates the application rate is 2 to 4 mg/L, which exceed the LC50s. Table 4-1 indicates application concentrations in the basin once diluted and those are estimated to be lower than the LC50s (0.0033 ppm to 0.0099 ppm). However, the DSEIS does not provide any estimate of application concentrations at the point of the granular BEE application in spawning areas where concentrations will be highest as the granular material dissolves and

RAMBOLL

dissipates. Estimates at the point of granular material placement are needed where placement is planned in spawning areas so that a decision of safety one way or the other can be made.

- Missing from DSEIS to make an adequate determination of safety for spawning areas: Include and consider estimates of concentrations of granular BEE planned in spawning areas and compare to the LC50s provided in the DSEIS Table 4-5.

3.3 Rare, Threatened and Endangered (RTE) Species

RTE species and individual organisms within the species warrant special consideration due to their vulnerable status. A variety of RTE species are discussed in the DSEIS and most are adequately addressed in terms of the support for conclusions of the DSEIS regarding the lack of toxicity with herbicide use. However, Page 82 of the DSEIS says that "due to the persistence and mobility of 2,4-D, freshwater mussels are vulnerable to acute toxicity and 2,4-D may cause demineralization of freshwater mussel shells". Page 85 of the DSEIS mentions that herbicide application in Bemus Bay has potential overlap with kidneyshell mussel. Page 103 states that mussels are found in less than 20% of the proposed treatment areas. The DSEIS states that this mussel was not found in the 2016 mussel survey, so no mitigations are proposed.

- Needed in DSEIS to make a determination of safety for mussels: It is good that the DSEIS states that mussels are found in less than20% of the proposed treatment areas. However, the DSEIS should also add information about what percent of the mussel area will have herbicide application. For example, if it is 100% of the mussel habitat, then there could be potential concerns but if it is 10% of the mussel habitat, then there would be less potential concern. The DSEIS lacks the information about overall habitat to make this determination. Since only Bemus Bay is identified with overlap of kidneyshell mussel past presence, it is likely this is not an issue but there is no information to make this determination.

The DSEIS mentions that the proposed project may have impact on the Potomageton hillii (Hills pondweed) plants but not the seeds (Page 108). The DSEIS (Page 108) states that "*There are three treatment areas where Aquathol k is proposed and Hill's Pondweed was found in 2017; Bemus Bay, Sunset Bay and Stockholm/Greenhurst (Appendices D and E). Treatment of the lake is planned for May, before the vegetative portions of the plant are present in the water column, so impact to Hill's Pondweed is not expected.*" Table 4-6 identifies only Burtis Bay with the footnote that presence is based on 2007 and 2017 data.

- Missing from DSEIS to make an adequate determination of safety for pondweed: Clarify why the narrative on Page 108 identifies 3 areas but the table identifies 1 area (different from the 3 identified on Page 108). Logic for this may be present in the report somewhere, but it was not found even with effort to find it.
- The DSEIS states that Aquathol does not impact pondweed seeds. There is insufficient information in the DSEIS to support this statement or judge potential adverse impacts. Provide a citation for this claim that indicates the concentration range for which this statement applies and demonstrate that it is applicable to the concentration planned applied at Lake Chautauqua.
- The DSEIS states that the pondweed is present from mid-June through fall and that application in May will occur before the pondweed is present in the water column. Provide a more complete discussion of the life cycle that supports this statement with citation(s).
- Indicate what will happen if the May time-frame is missed. Would herbicide be applied in later months and if so, clearly explain the possible impacts.

3.4 Potential Effects of Drift on Sensitive Habitats

Similar to that described for human health, the herbicide dilution and drift discussion is qualitative rather than quantitative in Section 4.2.2. This section refers to "diluted concentrations" and states that modelling using the NYSDEC dilution model will be done as part of the permit process. Concentration estimates are provided for the application itself (Table 4-1) but there are no estimates of drift concentrations and what concentrations might be present in sensitive areas including wetlands. Concentration estimates are provided but methods used to derive the estimates are not provided. Also, the concentrations provided in Table 4-1 are based on broad based, simplistic basin estimates.

- Missing from DSEIS to make an adequate determination regarding drift: A simple table showing application concentrations, drift concentrations, drift areas estimated, and ecologically relevant metrics (such as the lethal dose range) would be helpful to simplify the discussion and allow readers to evaluate the potential ecological effects from drift. Near this table, the explanation of how the concentrations and areas are estimated should be provided.

Wetlands are discussed in Section 3.2.3 of the DSEIS and mapped on Figure 3-9. Four wetland areas attached to the lake are identified on Table 3-7 and are illustrated in Figures 4-1, 4-4, 4-5, and 4-9. Section 4.3.3 provides a discussion of potential impacts to the wetlands. This discussion mentions drift: "Any drift of herbicides into a wetland area will not impact any emergent or woody species from in-water contact." The text then discusses woody species. However, there is no discussion of the emergent or submerged species (if any). Section 4.3.3 of the DSEIS states that "Those wetlands adjacent to the Lake, and located in proximity to planned application areas will be protected by not applying the herbicide within the wetland or the 100' designated adjacent area." Why is 100 feet considered protective? No explanation of this is provided. The basis of protectiveness for 100 feet needs to be explained and cited. The explanation may be that the characteristics of each wetland are such that the explanation about woody species provided in the DSEIS is sufficient. Table 3-7 identifies the NYSDEC classifications, but there is no description of what those classifications mean. Those descriptions may be in an appendix, but if so, some brief reference to where in an appendix and a sentence or two about each should be added at least for the wetlands adjacent to the lake. The explanation now is not sufficient for a reader to agree that 100 feet and knowledge of only impacts on woody species is sufficient. Concentrations expected in the wetlands would help a reviewer understand and agree (or not) that applications would be safe to the wetlands. A description of topography that may provide a barrier (if any) between the lake and the wetlands is needed if such conditions exist.

- <u>Missing from DSEIS to make an adequate determination of safety for wetlands regarding drift:</u> Table 4-6 should be updated to include wetlands adjacent to the lake. Mitigation measures need to be clearly stated as they regard to the wetlands (i.e., 100 feet from the wetlands). The basis of protectiveness for 100 feet needs to be explained and cited. A description of wetlands classifications in Table 3-7 is needed (or cross reference where they can be found). Estimated concentrations expected in the wetlands should be added. A description of topography that may provide a barrier (if any) between the lake and the wetlands is needed if such conditions exist.

3.5 Potential Effects of Oxygen Depletion on Fish

The DSEIS is premised on the concept that the herbicides will not be detrimental if used as labelled. A review of the label information for Navigate (active ingredient 2,4-D) provided in Appendix L suggests that herbicide application may require special consideration in areas of dense vegetation, including application in lanes separated by untreated strips to avoid impacting fish from oxygen depletion due to decaying weeds. The label states:

> **ENVIRONMENTAL HAZARDS**
> Fish breathe dissolved oxygen in the water and decaying weeds also use oxygen. When treating continuous, dense weed masses, it may be appropriate to treat only part of the infestation at a time. For example, apply the product in lanes separated by untreated strips that can be treated after vegetation in treated lanes has disintegrated. During the growing season, weeds decompose in a 2 to 3 week period following treatment. …Waters having limited and less dense weed infestations may not require partial treatments.

The DSEIS has a discussion of the consumption of oxygen by decay of plants but states the relatively small size of the application area compared to the size of the entire lake is small. Also, application in spring will minimize impacts because it is early in the plant growth cycle and cooler temperatures (e.g., Page 102 and 20). However, there is not a discussion of the dissolved oxygen depletion provided with regard to impacts on spawning areas. The DSEIS refers to treatment will be coordinated with NYSDEC to minimize potential effects with NYSDEC's annual collection of muskellunge eggs from the lake in the first week of May (e.g., Page 109), but it is unclear if eggs are collected over a large area or small focused area and it is unclear if this is related to toxicity (direct effects) or low dissolved oxygen (indirect effects).

- <u>Needed in DSEIS to make a determination of indirect effects for fish from oxygen depletion</u>: Add a discussion of how the dissolved oxygen depletion on spawning areas is being considered. Also, add a discussion of what type of coordination with NYSDEC fish collection is expected and over what area of the lake.

3.6 Use of 2,4-D on Submergent Vegetation

The DSEIS refers to herbicide safety based on use as labelled. Page 72 mentions that NY state law dictates that 2,4-D is only to be used on emergent species, but that in a January, 2017 Memo, NYSDEC wrote 2,4-D use on Eurasian watermilfoil, which is submergent vegetation, may be allowed under language in 6 NYCRR Part 327.7.

- Missing from DSEIS to make an adequate determination regarding use on submerged vegetation: Additional detail regarding this memo or language in the regulation should be provided to justify why use on this submergent vegetation is allowed. This text explains a regulatory basis for precedent of use but it does not address the safety of use. There may be safety information in the regulatory language cited but that should be in the DSEIS if it exists.

4. Evaluation of Alternatives

The following observations and suggestions are provided, as the DSEIS does not evaluate a range of alternatives that might reasonably address macrophytes in the lake and instead improperly treats herbicide use as the only major method that can address the established issues with aquatic plants.

1. The no action alternative, involving no herbicide treatment and no weed harvesting, is dismissed in the DSEIS as not feasible. Further exploration of the no action alternative should be included. Mechanical removal is discussed but no quantitative information is provided to allow for a comparison of effectiveness of mechanical removal versus herbicide use (Section 6.2.1). For example, how many hours of mechanical harvesting is needed to match the vegetation reduction of the herbicide application?
2. The alternatives evaluation should consider a combination of herbicides and mechanical harvesting – which would potentially be the best way to mitigate potential impacts to T&E and spawning areas.
3. Management of input of nutrients in the lake is described in numerous locations as both being critical to addressing the problem of macrophytes in the lake and as requiring 'decades' to implement (pg 49). Similar comments are made in the DSEIS on Page 28 – first paragraph "watershed plan is part of a long-term strategy that will take many decades to implement and is unlikely, on its own, to produce the required results" The DSEIS authors should consider the contrasting findings that were presented in 2016 by the Chautauqua Institution, which indicated that construction of wetlands, rain gardens, weirs, and erosion control elements, along with creating and enforcing stormwater management requirements for homeowners, have resulted in measured reductions in phosphorus and nitrogen. Examples of effective management techniques included establishment of no-mow zones near the lake shore, use of semi-pervious pavers to replace impervious pavers, forest management activities, shoreline and channel stabilization, and stormwater park development. Phosphorus and nitrate reductions over time were measured from 2011 to 2016 in areas where green infrastructure was implemented (Chautauqua Institution 2016). The preliminary findings included that green infrastructure installations on the golf course and Club Creek had beneficial impact on water quality and the Club discharge meets Total Maximum Daily Load goals. The study was conducted as some of the projects were implemented, so the full benefits of some of those projects were not likely realized in 2016 (e.g., rain gardens and other changes take some time to grow). This study and these findings are mentioned because they indicate that voluntary controls can contribute to addressing the problem and should not be summarily dismissed, as appears to be done in the DSEIS.

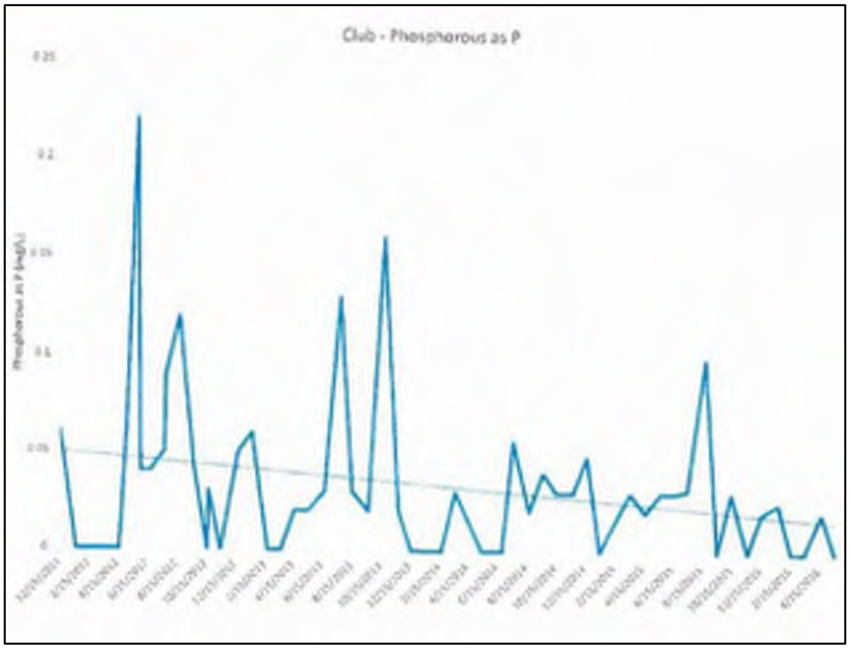

Figure 1. Phosphorus Measures Over Time from Club Location for 2011 to 2016.

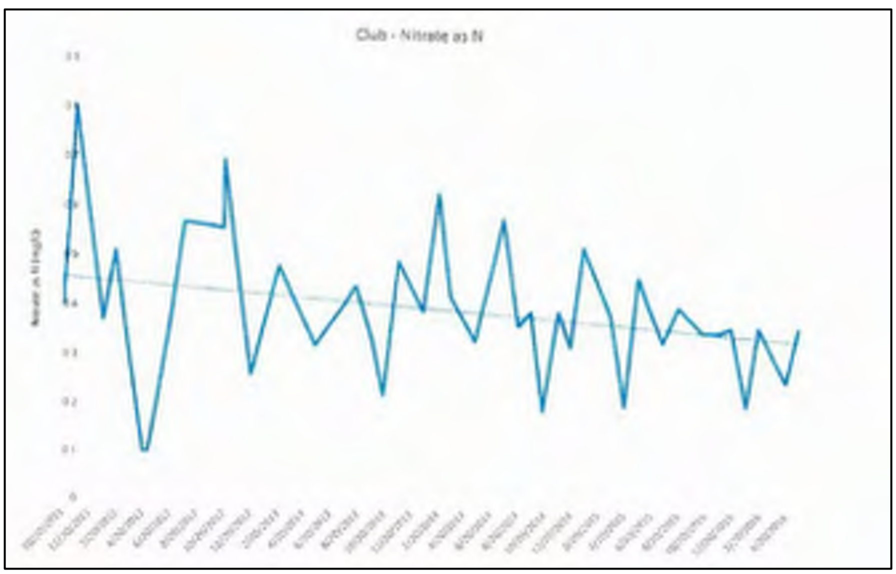

Figure 1. Nitrate Measures Over Time from the Club Location for 2011 to 2016.

a) Section 3.7.2 describes wastewater discharge to the lake from both private and public sources and indicates these are a source of nutrient loading to the lake and Section 3.8.2 identifies the Integrated Sewage Management Plan for Chautauqua Lake – 2014 as a plan to reduce this input, but the DSEIS does not discuss the degree to which this has been effective or is expected to be effective in reducing nutrient loading. *"The MMS fully acknowledges that the "ongoing mechanical harvesting program, biological control methods (e.g. moths) and the U.S. Army Corps of Engineers Aquatic Weed Study are positive efforts that are needed" to continue supporting the goal of making the Lake a desirable destination for those residents and tourists that are seeking water based recreation. However, none of these efforts "*<u>*address the underlying problem of*</u>

<u>*nutrient contamination from lands surrounding the Lake, which is the primary driver*</u>*" of the growth of submerged aquatic vegetation in the Lake. (EcoLogic, 2017)*."

b) Section 4.4 indicates it will take 'It will take decades of cooperation, education, and coordination with area farmers to fully implement the recommendations made in the 2010 *CLWMP and TMDL.* " No support is provided for this statement either in terms of what those recommendations were, or why implementation will take decades.

c) The NYSDEC (2005) document entitled "A Primer on Aquatic Plant Management in New York State discusses use of herbicides as an option for addressing macrophytes and states: " As with other in-lake weed management strategies, herbicides address neither the cause nor the source of the problem.," NYSDEC 2005 goes on to identify management of sediments and nutrients to the lake as a key element of aquatic plant control management. Given the long-term importance of reducing nutrient and sediment inputs into the lake, this option should be further evaluated. Actions to reduce loading of both nutrients and sediments via storm water management and active buffer management should be further explored. This is one of the alternatives provided in the NYSDEC Primer on Aquatic Plant Management, yet the DSEIS does not discuss reduced loading in any quantitative way. For example, steps individuals can take to reduce loading from residential yards could be emphasized in any mailings provided regarding planned activities.

5. Mitigation Measures

Mitigation measures are discussed in Section 5 of the DSEIS and this is one page of text. For proposed treatment zones that overlap with sensitive areas, additional measures may be needed to avoid adverse impacts. There are potential mitigation measures explained elsewhere in the DSEIS that can and should be added to this section to explain some degree of effort that is planned. For example, the following :

- The DSEIS identifies that "treatment will be planned in conjunction with the NYSDEC to minimize any effects on the NYSDEC's annual collection of muskellunge eggs from the Lake the first week in May" (Page 109). Explain what this means. Will the herbicides be applied after NYDEC collects eggs?
- Will the Navigate be placed in buffer strips, as the label says "should occur"? If so, this should be stated as it likely mitigates toxicity to some extent (though see the comments on fish spawning areas, as concentrations around the granules in spawning areas need to be identified).
- Add a discussion of whether or not some of the mixed alternatives could avoid impacts to sensitive areas, like the spawning areas.

6. Conclusions

The DSEIS should include further documentation of potential impacts on human health human uses and impacts to ecological resources. Concentrations of herbicides expected to be present in water need to be clearly estimated for key human use areas and sensitive ecological habitats and these concentrations should be compared with relevant guidelines. Without further documentation the DSEIS does not provide enough information to support the conclusions regarding minimal impact. Efforts were made to identify the types of information needed to understand the potential effects (or not) of the herbicide application. In addition, the alternatives analysis should be expanded to include discussion of other alternatives including measures to reduce nutrient and sediment inputs into the lake and a combination of herbicide and mechanical removal as an alternative.

7. Documents Reviewed/Cited

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Racine-Johnson. 2017. 2016 Aquatic Plant and Herbivore Monitoring of Chautauqua Lake's Aquatic Plant Community with Freshwater Mussel Survey.

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TRC. 2017. Supplemental Environmental Impact Statement for the State of Washington Aquatic Plant and Algae Management. Submitted to the Washington State Department of Ecology. Publication No. 17-10-020. SEPA No. 201704291.

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USEPA. 2017. Regional Screening Levels. United States Enviornmental Protection Agency. Available at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-november-2017

Chautauqua Lake Association, Inc.

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March 1, 2018

Town of Ellery
PO Box 429
Bemus Point, New York 14712

Re: Draft Supplemental Environmental Impact Statement Regarding The Application of Herbicides To Targeted Areas of Chautauqua Lake

The Executive Committee of the Board of Directors of the Chautauqua Lake Association, Inc. intends to comment upon the DSEIS and is currently in the process of forming its comments. Analysis of the document is requiring a significant amount of time given the intricacies of the subject matter. The comment preparer is finding that given the multitude of issues that are involved that an inadequate amount of time is being provided for the filing of comments. The Chautauqua Lake Association therefore requests that the comment filing deadline be extended by at least thirty (30) days.

Further, the CLA Executive Committee would like to share its draft comments with the full Board of Directors and receive back any suggested revision guidance before issuing them. The current comment deadline will not allow for such to happen. Extending the comment deadline will thus allow for more persons to be able to comment on this important matter.

Respectfully,

Douglas E. Conroe

Douglas E. Conroe
Executive Director

cc: NYSDEC

Chautauqua Lake Association, Inc.

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March 16, 2018

Rebecca Haines, Town Clerk
Town of Ellery
PO Box 429
Bemus Point, New York 14712
ellerytc@windstream.net

Re: Comments Concerning Chautauqua Lake Herbicide Treatment – Draft Supplemental Environmental Impact Statement, February 2018

This is to supplement and follow-up upon comments given at the March 1, 2018, Public Hearing as was stated would occur.

At the Public Hearing we requested that at least a 30 day extension of the comment period be granted. Other groups requested a longer extension period. The importance of this undertaking requires such in order to frame the best document that is possible. A four day extension was subsequently granted. We need to report that the resultant March 16 deadline has been woefully inadequate in allowing adequate time to review the DSEIS, to research needed information and to frame comments. Therefore, please do not construe these comments as identifying all concerns that we have regarding the draft document. We remain disappointed that the Town of Ellery is taking such a rushed approach on this action and not otherwise involving public input in the document drafting process as was done for the 1990 SEIS. The Chautauqua Lake Association has long advocated for the development of new SEIS, a SEIS that involves the public and critically affected organizations' involvement at every step of its drafting and that it is not rushed to conclusion thus allowing that all issues are fully vetted in addressing public and organizational input. To date such has not happened and therefore we cannot endorse the process that is occurring.

Before proceeding further we need to take exception to the introductory background comments that were made by the Hearing Officer. If those comments are to be a part of the permanent record and the Town Board's thinking in regard to evaluating the DSEIS, then it needs to be known that we take exception to the description of the lake's condition that was given and request that citation be provided for the alleged facts that were presented. For example, Racine-Johnson reports document macrophyte growth facts that are contrary to the allegation. Citations need to be provided for all of the allegations.

We do not dispute that Chautauqua Lake is without problems or concerns. The DSEIS is not the venue to address such. The DSEIS is to address the use of herbicides in Chautauqua Lake, including the identification of alternative actions that would be less environmentally impactful on the lake. The DSEIS fails to adequately address alternative actions that could be better management practices – see USEPA guidance as a starting point. Failure to fully address the role of herbivores in affecting Eurasian water milfoil and the effect of herbicides upon the herbivores is further evidence of this shortcoming.

A major problem and public health threat facing Chautauqua Lake is the presence of Harmful Algal Blooms (HABs). The DSEIS fails to comprehensively address the impact that herbicides will have upon lake conditions which affect the formation of HABs, especially in regard to how herbicide impacts on the macrophyte community will affect the formation of HABs. The DSEIS also needs to add addressing the role that the macrophyte community in general serves in affecting HAB conditions.

HABs form as a direct result of the presence of over-abundant nutrient levels. The document fails to correctly discuss how herbicide treatments will affect nutrient levels in Chautauqua Lake. Moreover, the document addresses nutrients in such a convoluted manner that the discussion is illogical and fraught with non-documented facts and conclusions. The document also fails to discuss less environmentally intrusive alternative actions that can be taken in place of any perceived benefit caused by herbicides. One example of an alternate action would be a onetime investment in green infrastructure instead of incurring multi-year expense for herbicide treatments. The impact of green infrastructure on HABs and macrophyte communities is not addressed at all in the DSEIS. Nor is the TMDL adequately discussed. Further, Section 3 incorrectly describes the 303(d) listing process by failing to note that once a TMDL is in place that the waterbody is removed from the listing and placed on a different listing which nonetheless keeps the impairment alive until TMDL goals are met. The DSEIS additionally fails to address that the presence of a TMDL requires that any SPEDES permits that are issued must take into consideration phosphorus mitigation and stipulate conditions which will address such. NYS has classified pesticide permits as also being SPEDES permits. The impact of herbicide use upon phosphorus mitigation is not addressed in the DSEIS.

Although the DSEIS does discuss macrophytes, for the most part it does so inaccurately. The writers incorrectly interpret Racine-Johnson data. They confuse presence with abundance. Although Eurasian watermilfoil is present throughout the lake its presence is greatly diminished in density from past years and is present currently in generally less than nuisance densities. In this discussion the document also utilizes SOLitude data that should not be utilized. Such data was not collected in an industry accepted method nor have its results been openly published nor been made available for peer review. Proper scientific method/vetting is therefore absent. The reports/data should not be utilized for decision making by the Town until such happens. The DSEIS also fails to address the impact of herbivores on Eurasian watermilfoil and how such can be an alternative to herbicide treatment.

The DSEIS fails to recognize the entire macrophyte community that exists in Chautauqua Lake which is critical to know when considering the impact of herbicides on the macrophyte community. For example, Table 4-3 lists only 14 macrophyte species while Racine-Johnson has identified 24 species that currently exist in Chautauqua Lake. Part 4.3.1 incorrectly identifies invasive areas as "nearly monotypic" which Racine-Johnson data contradicts.

The "nearly monotypic" and other descriptions of the macrophyte community and lake conditions that occur throughout the DSEIS over-state reality and lead the reader towards incorrect perceptions of lake conditions. Documentation needs to be provided to support such assertions. By objective measurement macrophyte conditions have not worsened over the past 25 years, albeit one or two exceptional years, and Chautauqua Lake today exhibits less use obstructing conditions than in past years. Eurasian watermilfoil rarely reaches the surface while 40 years ago such was a regular occurrence. Curly leaf pondweed naturally dies off before the bulk of the recreational season, a fact that is not reported in DSEIS Section 1.4 and which needs to be taken into consideration when deciding whether or not to treat the plant with herbicide.

Other DSEIS conclusions about the impact of herbicides on native plant species and the ability of such to repopulate are incorrect. In fact, DSEIS contradicts itself about such. Data and discussion needs to be included in the DSEIS about such on a site-by-site basis given the varied plant communities, herbicide products to be utilized and varied herbicide dosage to be utilized.

Impacts upon fish, waterfowl and mussels also need to be further detailed. Section 3.2.2 indicates that the common loon presence has not been documented since 2005 based upon a Natural Heritage Program (NHP) communication. This writer has observed the Spring and Fall presence of loons on the lake annually as recent as 2017. It is commonly understood that Natural Heritage Program records are very limited and do not adequately represent current data. Follow-up communications with NHP need to be undertaken to obtain accurate and up to date species information which then needs to be documented. Consideration also needs to be given to impacts upon Chautauqua Lake's osprey and bald eagle populations along with the species diverse duck populations.

Section 3.2.2 is additionally incorrect suggesting that Racine-Johnson has not published zebra mussel findings. Section 4.8.4 statement that "mussels are found in less than 20%of the proposed treatment areas" needs to have a source citation identified.

Impacts upon fish, especially Muskellunge, Bass and Walleye need to be greatly expanded. Post-treatment dissolved oxygen level expectations need to be provided that are tied to products, concentrations, and water volumes affected. Dissolved oxygen levels protection recommendations and implementations need to be provided. Habitat protection actions need to be provided for each treatment area. Further explanation in Section 3.2.1 of NYSDEC's authorizations to allow for herbicide treatment during spawning time needs to be provided along with specifically addressing impacts upon the muskellunge community. A listing of permits issued along with related particulars also should be provided.

2017 water sampling data collected is utilized in the DSEIS to justify water flow assumptions and thus herbicide dispersal conclusions. No specific water flow data was presented. Private potable water withdrawals were treated lightly as was ground water withdrawal. Greater attention needs to be given in the DSEIS to potable water users. Sub-surface and surface water flow models need to be provided for each treatment site. Specific human use advisories that are intended to be utilized need to be identified. Given the nature of contact use activity that occurs on Chautauqua Lake, intended methods of public noticing needs to be provided evidencing that that all lakeside residents and visitors will receive notice.

Lastly, many corrections need to be made to the various maps that are exhibited throughout the document. Missing public parks need to be identified. Community names need to be corrected. For example, Maple Springs in the Town of Ellery is incorrectly labeled as Sunset Bay.

Finally, the document abounds with speculative undocumented conclusions and assertions. All such items that are treated as fact need to be source cited. Authors of the document need to be disclosed and their credentials listed. Sections written by the Town of Ellery; Rupp Baase Pfalzgraf Cunningham LLC; the Chautauqua Lake Partnership; SOLitude Lake Management; Wendel; DK Water Resource Consulting LLC; and others need to be identified. Source funding for the document needs to be disclosed. Transparency of this undertaking is critical for community acceptance and document integrity.

In conclusion, the document as it exists in draft form should not be adopted. Significant revision and expansion is needed. The apparent predisposition towards wide-scale herbicide implementation needs to be transformed into an analysis of the action that is absent bias and thoroughly explores impacts and alternative options. We rely upon the Town of Ellery Board to direct the document's revision in such a manner. Given the voluminous corrections and significant additional information that needs to be added to the document we also request that the Town consider the rewritten document to be a draft document which is then released for further public review and comment.

Respectfully,

Douglas E. Conroe
Executive Director

cc: CLA Board
NYSDEC
Chautauqua County Executive

Comments on the

DRAFT SUPPLEMENTAL IMPACT STATEMENT for the

Proposed Chautauqua Lake Herbicide Treatment

By: Chautauqua Watershed Conservancy

Date: March 1, 2018

The Chautauqua Watershed Conservancy's mission is to preserve and enhance the water quality, scenic beauty and ecological health of the lakes, streams and watersheds of the Chautauqua region. The Conservancy owns waterfront nature preserves at several locations on Chautauqua Lake. These preserves contain wetlands and near-shore fish and wildlife habitats that may be negatively affected by the proposed herbicide treatments.

We explained our concerns in a January 5th letter to the Town of Ellery during the SEIS scoping process. We made requests that various items be included in the SEIS, and have the following additional comments:

1. The time provided for review and analysis of this very important evaluation is not sufficient. We request that the Draft SEIS comment period be extended to at least 90 days. This would be consistent with other complex and controversial projects going through the SEQR process.

2. The Draft SEIS does not address the potential for herbicide treatments to significantly reduce the mass uptake of nutrients from the lake water column by plants, potentially resulting in these nutrients fueling algae blooms sooner in the growing season and potentially fueling more intense algae or cyanobacteria (harmful algae blooms/HABs) in or near treatment areas. The proposed treatment areas need to be minimized in areal coverage to minimize this potential impact. Harmful algae blooms are a serious health hazard to humans, dogs and other animals. While rooted aquatic plants may interfere with recreation—harmful algae blooms shut down recreation.

3. In our January Scoping comments, we requested that formal consultation with the NYSDEC Natural Heritage program be made regarding the presence of rare, threatened and endangered species. While we acknowledge that the Town of Ellery did consult with the Natural Heritage Program, the review of potential impacts and mitigations on the species identified was far from thorough. The SEIS should be supplemented to include on-site surveys and studies, which are necessary to fully assess potential impacts for each species. Herbicides should not be applied in the habitats of these species.

4. Chautauqua Lake has wind-driven currents as well as an outflow current from the Fluvanna and Burtis Bay to Celoron locations downstream through the outlet. Product and treatment site selection must consider wind and gravity current transport to avoid offsite impacts. The Draft SEIS did not consider impacts to the submergent and emergent aquatic plants living in the lake and Outlet in proximity to the "terrestrial" wetlands and dismisses any impacts on the wetlands.

   We ask that dispersion modeling and current/flow modeling be completed and that the **treatment zones** and **proposed herbicide products** be modified based on the model results to ensure that adequate safety zones for dilution are provided to avoid potential negative impacts on water supplies, sensitive species, fish spawning areas, emergent vegetation and macrophytes and shoreline vegetation.

5. We request that the herbicide treatment proposals be refined to <u>fully comply</u> with the zone recommendations of the Chautauqua Lake Macrophyte Management Strategy, which was prepared as mandated by the State of New York as a guide to future herbicide treatments. Preparation of this Strategy was a significant expense to the taxpayers of Chautauqua County, State of New York and participating private and public organizations and individuals.

6. We request that the SEIS thoroughly consider the benefits of the "no action" treatment alternative and fully explain this option of allowing herbivores to build strong populations to have the opportunity to control milfoil.

As SEQR Lead Agency and applicant, and members of other municipal boards who are the permit applicants, it is your responsibility to consider potential impacts and to change or refine your proposed action to avoid and minimize those impacts as much as possible through the SEQR Environmental Impact Statement process. We ask that you strongly consider these and other potential impacts and mitigation to avoid those impacts and incorporate changes to avoid and minimize them.

We thank you for considering these concerns. We will be submitting a more detailed response in writing. We request that the Town and Village Boards take our comments and those of others into serious consideration when determining where, what and how these herbicide treatments will be made. We invite municipal leaders to contact us to further discuss this and future lake and watershed management proposals to better manage, protect and enhance the Chautauqua Lake environment.

Presented by: Claire Quadri, Conservationist
Chautauqua Watershed Conservancy

Ellery Town Clerk

From: Claire Quadri <claire@chautauquawatershed.org>
Sent: Friday, March 16, 2018 12:59 PM
To: 'Ellery Town Clerk'
Cc: 'John Jablonski III'; 'Jonathan Townsend'
Subject: Overlay Maps of Sensitive Species
Attachments: NARROWS Proposed Herbicide Application and MMS Eco Imp Habitat.jpg; OUTLET Proposed Herbicide Application and MMS Eco Imp Habitat.jpg; OVERVIEW Proposed Herbicide Application and MMS Eco Imp Habitat.jpg; OVERVIEW Proposed Herbicide Application and MMS Env Sens Area.jpg; Proposed Herbicide Application and CWC Preserves.jpg; Proposed Herbicide Locations.jpg

Dear Mr. Johnson,

Thank you for your interest in the location of rare, threatened and endangered species in relation to the proposed herbicide application areas. Attached, please find some rough overlay maps, which were made by superimposing the herbicide treatment areas on existing maps from the Macrophyte Management Strategy document. We also included a map of showing the CWC preserves, for your reference.

We hope you will find these helpful.

Please note that the NYSDEC Division of Wildlife and Natural Heritage Program should be consulted for updated locations.

We would be happy to answer any questions you may have, as these maps are in a draft form without full legends, citations, etc.

Sincerely,

Claire Quadri

Conservationist

Chautauqua Watershed Conservancy

413 North Main Street, Jamestown, NY 14701

Phone: 716-664-2166

www.chautauquawatershed.org
claire@chautauquawatershed.org

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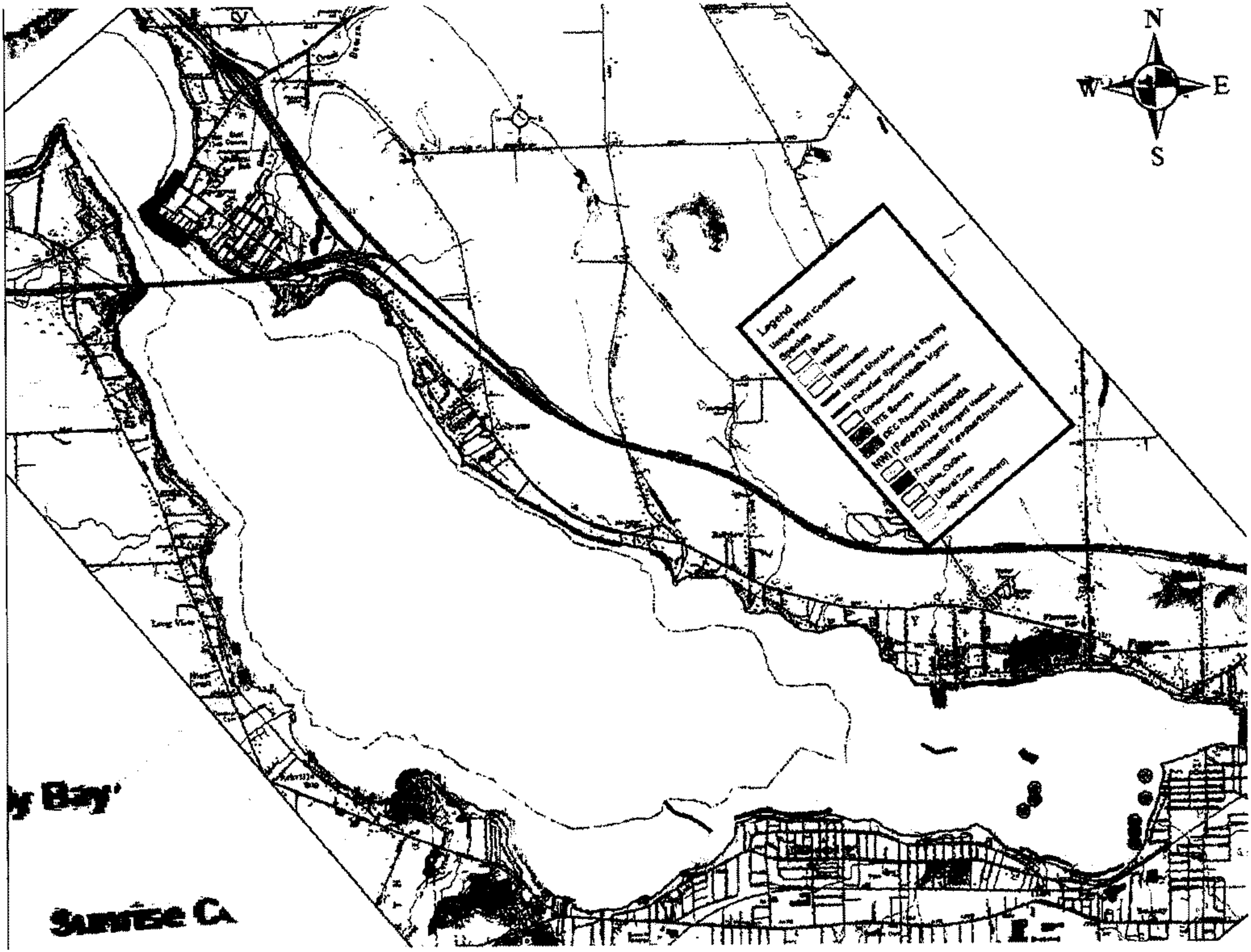

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Freshwater Forested/Shrub Wetland
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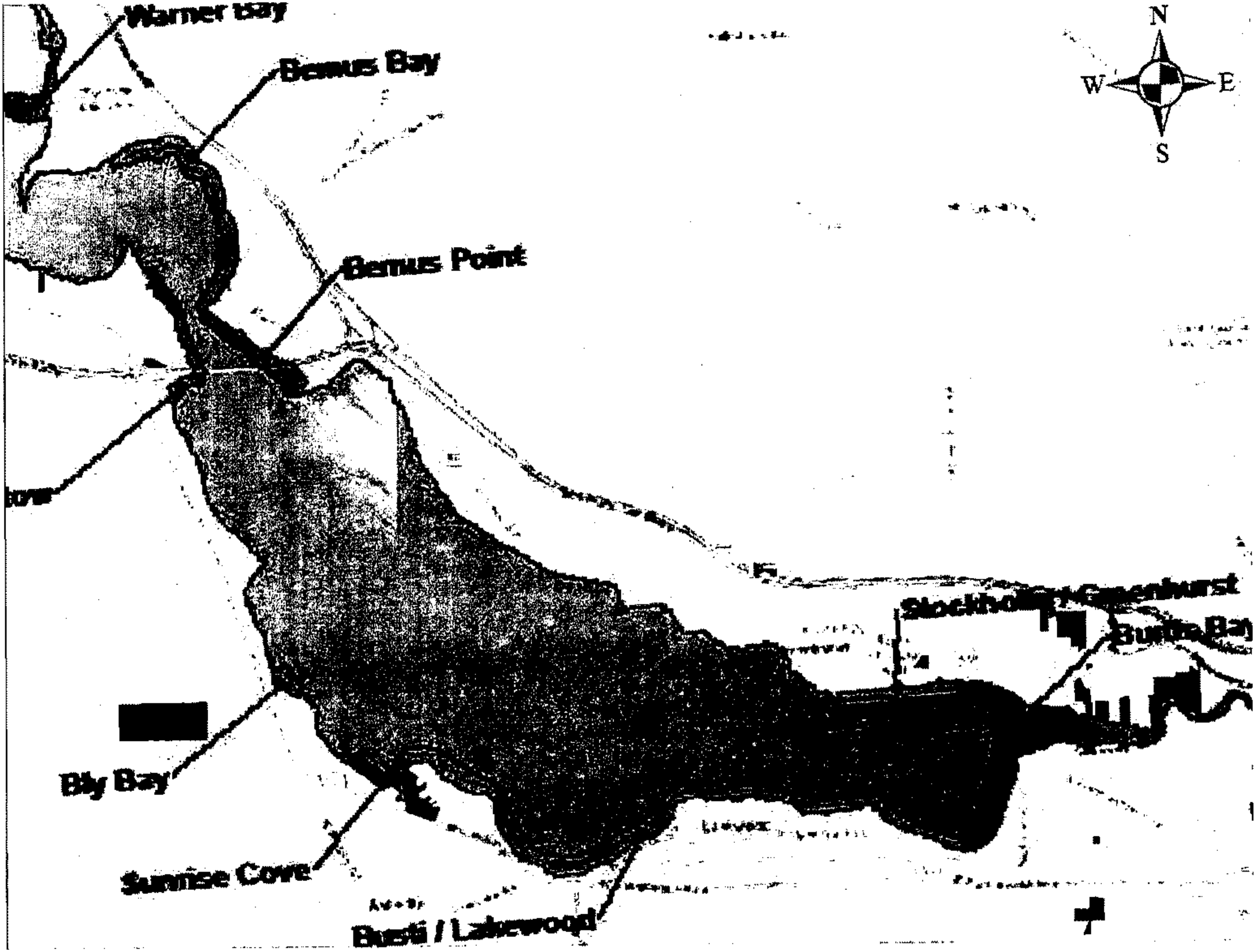
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Waterlily
Waterwillow
Natural Shoreline
Fisheries: Spawning & Rearing
Conservation/Wildlife Mgmt
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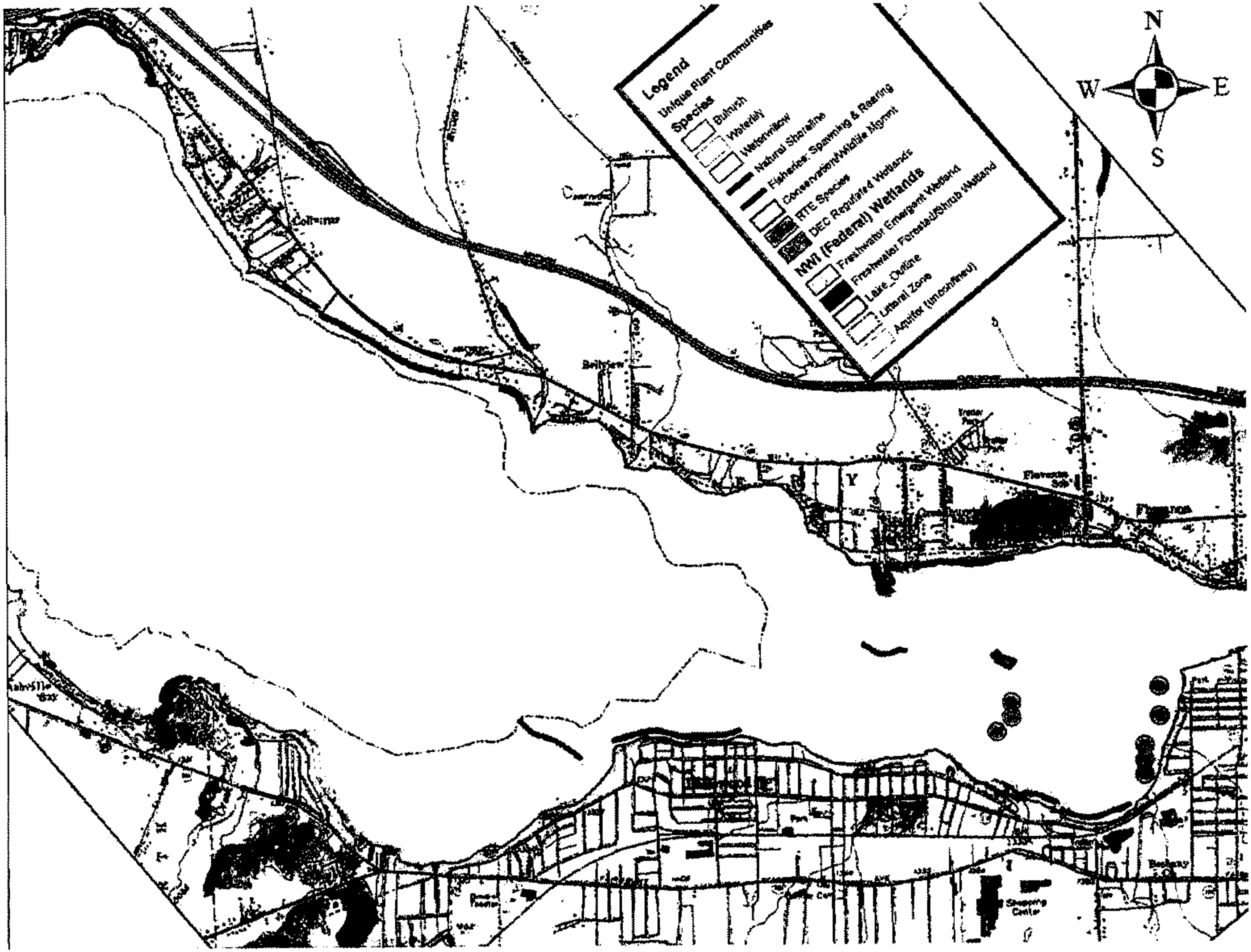
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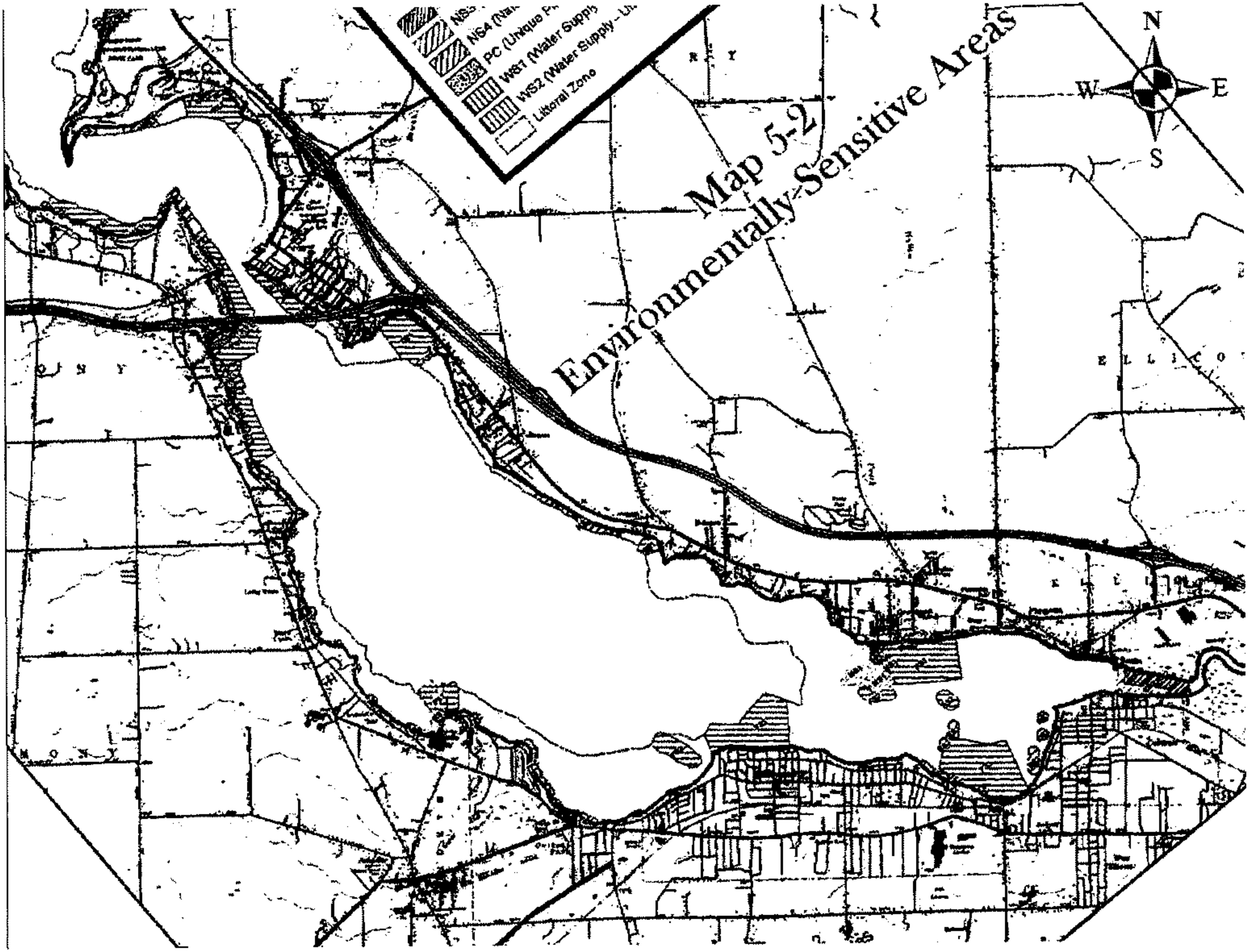
Map 5-2
Environmentally-Sensitive Areas
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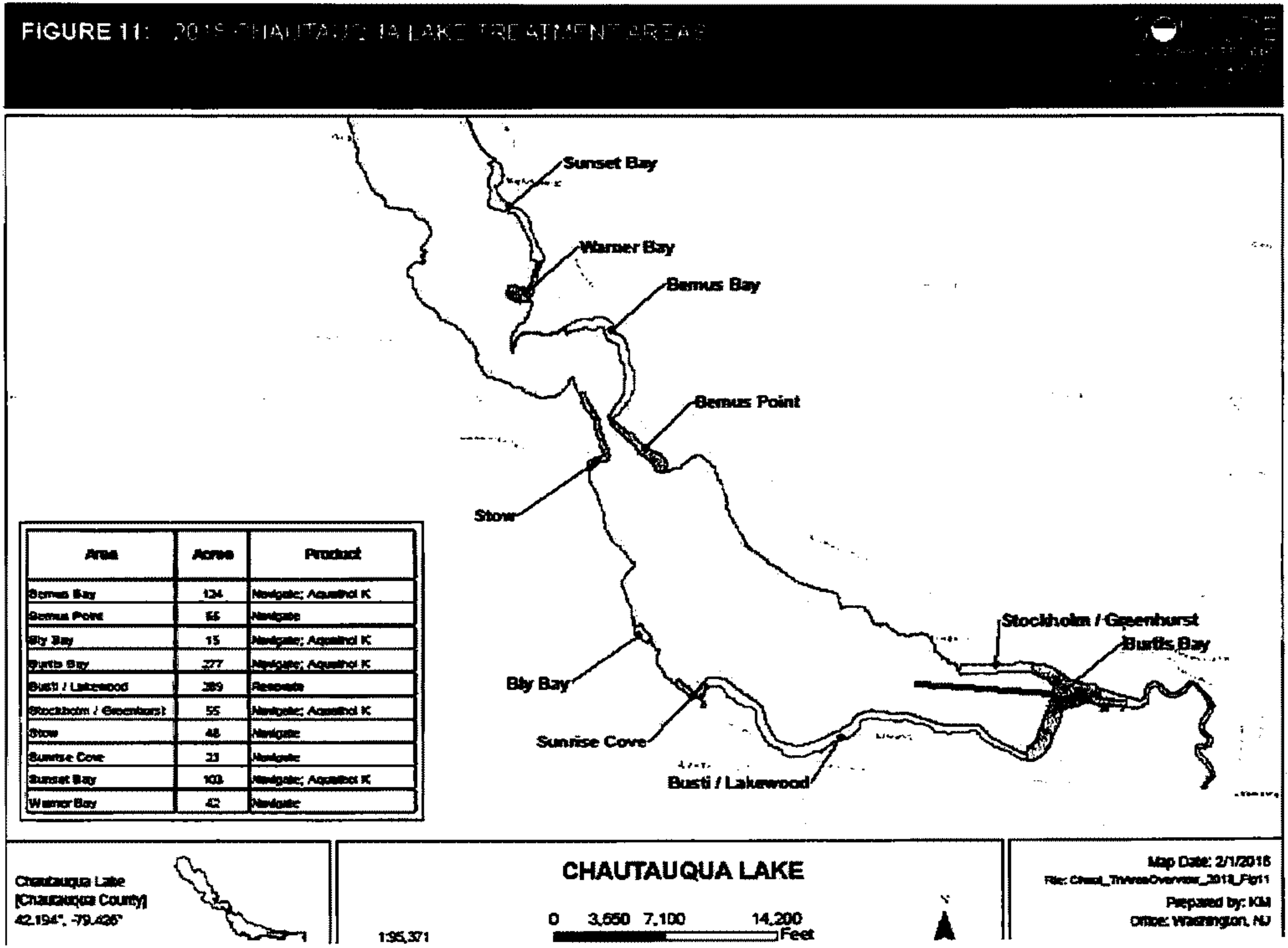
Figure 1-5. Proposed Target Areas



Area	Acres	Product
Bemus Bay	124	Navigate; Aquathol K
Bemus Point	66	Navigate
Bly Bay	15	Navigate; Aquathol K
Burtis Bay	277	Navigate; Aquathol K
Busti / Lakewood	289	Renovate
Stockholm / Greenhurst	55	Navigate; Aquathol K
Stow	48	Navigate
Sunrise Cove	23	Navigate
Sunset Bay	103	Navigate; Aquathol K
Warner Bay	42	Navigate

CHAUTAUQUA WATERSHED CONSERVANCY

413 North Main Street
Jamestown, NY 14701
716-664-2166

www.chautauquawatershed.org
info@chautauquawatershed.org

Preserving and enhancing the water quality, scenic beauty and ecological health of the lakes, streams and watersheds of the Chautauqua region.

March 16, 2018

Ms. Rebecca Haines, Town Clerk
Town of Ellery
P.O. Box 429
Bemus Point, New York 14712

Re: Comments on the Draft Supplemental Environmental Impact Statement Proposed Chautauqua Lake Herbicide Treatment

Dear Ms. Haines:

The Chautauqua Watershed Conservancy's mission is to preserve and enhance the water quality, scenic beauty and ecological health of the lakes, streams and watersheds of the Chautauqua region. The Conservancy owns waterfront nature preserves at several locations on Chautauqua Lake. These preserves contain wetlands and near-shore fish and wildlife habitats that may be negatively affected by the proposed herbicide treatments.

We explained our concerns in a January 5th letter to the Town of Ellery during the SEIS scoping process, and now offer the following comments on the Draft SEIS:

1. The time provided for review and analysis of this very important evaluation is not sufficient. While we appreciate the 4-day extension that was provided, we again request that the Draft SEIS comment period be extended to at least 90 days. This would be consistent with other complex and controversial projects going through the SEQR process. Since this short review period has not given us time to thoroughly research the killing efficacy of the proposed herbicides by concentration on beneficial native plants, we ask the Town(s) and NYSDEC to require the applicant to provide sufficient peer-reviewed research with these chemicals to determine the proper dosage concentrations to ensure that non-target beneficial and rare submergent pondweeds (Potamogetons) and emergent plants will not be killed along with targeted Eurasian watermilfoil.

2. The Draft SEIS does not address the potential for herbicide treatments to significantly reduce the mass uptake of nutrients from the lake water column by plants, potentially resulting in these nutrients fueling algae blooms sooner in the growing season and potentially fueling more intense algae or cyanobacteria (harmful algae blooms/HABs) in or near treatment areas. This potential impact should be included in the DSEIS and specific mitigations discussed. The proposed treatment areas need to be minimized in areal coverage to limit this potential impact. Harmful algae blooms are a serious health hazard to humans, dogs and other animals. While rooted aquatic plants may interfere with recreation—harmful algae blooms shut down recreation.

3. In our Scoping comments, we requested that formal consultation with the NYSDEC Natural Heritage program be made and that all correspondence with them, as well as a thorough review of potential impacts of the proposed herbicide program on the species identified in this consultation, be included in the SEIS. While we acknowledge that the Town of Ellery consulted with the Natural Heritage Program, the correspondence was not included in the Draft SEIS and the review of potential impacts on the species identified was far from thorough. We independently obtained a copy of the NY Natural Heritage program response, which indicates that rare and stat-listed animals and plants and significant natural communities have been documented *at the project site and (within the proposed herbicide application zones)*. The NY Natural Heritage Program response letter specifies:

"Depending on the nature of the project and the conditions at the project site, confirmation from on-site surveys or other sources may be required to fully assess impacts on biological resources." The Final SEIS should include a copy of all correspondence with the NYSDEC Natural Heritage Program, and should include documentation of consultation with the NYSDEC Division of Wildlife regarding the on-site surveys and studies needed to fully assess impacts for each species. Herbicides should not be applied in the habitats of these species unless the applicant can clearly demonstrate that the proposed chemical and concentration will not negatively affect said species of concern. Note: to assist you with your review, we have sent separately some rough overlay maps showing the proposed herbicide application areas and the environmentally sensitive areas designated in the Chautauqua Lake Macrophyte Management Study. Fish spawning and rearing areas should be avoided completely to ensure the continued successful fish spawning and recruitment in these areas.

4. Chautauqua Lake has wind-driven currents as well as a lake outflow current from the Fluvanna/Burtis Bay areas to Celoron locations downstream through the Outlet to Jamestown. Product and treatment site selection must consider wind and gravity current transport (drift) to avoid offsite impacts. We ask that dispersion modeling and current/flow modeling be completed and that the treatment zones and proposed herbicide products be modified based on the model results to ensure that adequate safety zones for dilution are provided to avoid potential negative impacts on water supplies, sensitive species, fish spawning areas, emergent vegetation, macrophytes and shoreline vegetation.

5. The Draft SEIS does not consider impacts of the herbicide application to the submergent and emergent aquatic plants living in the lake and Chadakoin River (Lake Outlet) in proximity to the "terrestrial" wetlands and dismisses any impacts on the wetlands. The <u>2016 NYS Open Space Plan</u> calls this Chautauqua Lake Outlet area "<u>an ecological oasis…</u>" where CWC owns ¾ mile of this wetland shoreline. The waterside of these wetland boundaries would need to be field checked. While the proposed herbicide application avoids the "mapped" wetland 100-foot "check zones", these "check zones" were designed to limit impacts to <u>terrestrial</u> wetlands (from construction projects, for example). Highly ecologically-valuable submergent and emergent aquatic plant communities exist adjacent to the "mapped" wetlands in the "check zone" and would likely meet the definition as State-regulated wetlands. Greater setbacks should be required from wetland shorelines to avoid impacts to submerged and emergent aquatic plants associated with these wetlands. Again, current & dispersion modeling should be included in the SEIS to evaluate herbicide concentrations when treated water flows over the submerged and emergent vegetation associated with nearby and downstream shoreline wetlands. For example, in the Burtis Bay herbicide application area, which adjoins wetlands which are located just downstream on both sides of the Lake Outlet. The proposed plan calls for applying Aquathol K at a rate resulting in a 1.5 parts per million (ppm) concentration of dipotassium endothall (the active ingredient) in Burtis Bay water. What will the concentration be in the water a short distance downstream, affecting the submergent & emergent vegetation in the Outlet? The Aquathol K product label indicates that a concentration of 0.75 ppm of dipotassium endothall will kill some vegetation. Will the concentration of herbicide in water flowing downstream harm or kill the beneficial wetland vegetation (both submerged and emergent vegetation in the Outlet adjacent to the mapped LW-10 and LW-11 wetlands? If so, a substantial dilution zone will need to be established upstream this area to protect these habitats from negative impacts. Also, will shoreline trees with roots drawing water from the lake be affected? CWC is especially opposed to the use of Aquathol K in or near these Chautauqua Lake Outlet wetlands and any other location where beneficial or sensitive Potamogetons (pondweeds) exist or likely to be found, as this product will likely kill beneficial Potamogetons along with P. crispus (curly-leafed pondweed).

6. Section 3.8.2 of the DSEIS includes a discussion of the Chautauqua Lake Macrophyte Management Strategy (MMS), and acknowledges that the MMS "identifies the use of aquatic herbicides as an appropriate management technique within many of the Lake's management zones." However, the proposed herbicide treatment described in the DSEIS does not follow the MMS recommendations. We request that the herbicide treatment proposal be modified to fully comply with the zone recommendations of the MMS, which was prepared as mandated by the State of New York as a guide to future herbicide treatments. Preparation of the MMS was a significant expense to the taxpayers of Chautauqua County, State of New York and participating private and public organizations and individuals and it should not be ignored.

7. The rationale behind selection of herbicide type/concentrations/areas should be provided in the DSEIS text. Using a combination of products will affect both monocot & dicot species. For example, the following questions/issues should be addressed: Do each of these areas have greater than 50% invasive species? Could a lower concentration be effective? The applicant's (Solitude/CLP) own 2017 data for many of the proposed treatment areas indicate that Myriophyllum spicatum (Eurasian milfoil) and/or Potamogeton crispus are not dominant plants (>50% of plant community biomass). No herbicides should be used in areas where M. spicatum is not the dominant plant. Otherwise the chemicals are primarily targeting native plants.

8. We request that the DSEIS thoroughly consider the benefits of the "no action" treatment alternative and fully explain this option of allowing herbivorous insects, such as weevils, caddis flies and moths to build strong populations to have the opportunity to more effectively control milfoil and other invasive aquatic vegetation.

We request that the Town of Ellery as Lead Agency, and all municipalities as "permit applicants" take our comments and those of others into serious consideration when determining where, what and how herbicide treatments may be made. As Lead Agency, it is your responsibility to consider potential impacts and to change or refine the proposed action to avoid and minimize those impacts. We ask that you supplement the DSEIS to include the evaluations listed above and that you then incorporate appropriate protective mitigation measures to avoid or minimize any impacts identified.

We thank you for considering these concerns.

Sincerely,

John Jablonski III

John Jablonski
Executive Director

cc: Ms. Abby Snyder, NYSDEC Regional Director
Mr. David Denk, NYSDEC
Ms. Anne Rothrock, NYSDEC
Tom Cherry, Chautauqua Utility District
Doug Conroe, CLA
Ms. Maureen Brady, NYSDEC
Mr. Paul McKeown, NYSDEC
Ms. Connie Adams, NYSDEC
John Shedd, Chautauqua Institution

Ellery Town Clerk

From:	Nystrom, Becky <BeckyNystrom@mail.sunyjcc.edu>
Sent:	Friday, March 16, 2018 12:37 PM
To:	'Ellery Town Clerk'
Cc:	region9@dec.ny.gov; abby.snyder@dec.ny.gov; david.denk@dec.ny.gov; michael.clancy@dec.ny.gov; michael.nierenberg@dec.ny.gov; maureen.brady@dec.ny.gov; mark.passiute@dec.ny.gov; anne.rothrock@dec.ny.gov; connie.adams@dec.ny.gov; paul.mckeown@dec.ny.gov; Nystrom, Becky; Twan Leenders; Jonathan Townsend; Claire Quadri; Bowman, Jan; jpgalati@gmail.com; jpgmar@stny.rr.com; Robert L. Johnson; Robert L Johnson
Subject:	DSEIS Written Comments regarding the Scientific Review of SOLitude Chautauqua Lake Bemus Bay Data Collection Report in Appendix E
Attachments:	SOLitude Review Final2018March16Ellery.pdf

Dear Ms. Haines,

Please find attached the pdf of our Written Comments regarding Appendix E of the Draft EIS Chautauqua Lake Herbicide Treatment. Please confirm receipt, and thank you very much for your attention to this important matter.

Sincerely,
Rebecca L. Nystrom
Janis Bowman
Joe Galati
Dr. Twan Leenders
Jonathan Townsend
Claire Quadri

Becky

Rebecca L. Nystrom, *Professor of Biology*
Jamestown Community College
525 Falconer Street
Jamestown, New York 14701
716.338.1315
beckynystrom@mail.sunyjcc.edu

Town of Ellery Town Board, c/o Ms. Rebecca Haines
P.O. Box 429 Bemus Point, NY 14712
ellerytc@windstream.net

March 16, 2018

Ms. Abby Snyder, Esq., DEC Region 9 Director
Mr. David Denk, DEC Region 9 Permits Administrator
Mr. Paul McKeown, DEC Region 9 Natural Resources Supervisor
NYS Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

RE: Scientific Review of the Bemus Bay Data Collection Project Report by SOLitude Lake Management, *Aquatic Macrophyte Control at Bemus Bay, Chautauqua Lake, 2017 Data Collection Report* December 4, 2017, IN: Chautauqua Lake Herbicide Treatment DSEIS Appendix E

Dear Ms. Snyder, Mr. Denk, and Mr. McKeown, and the Town of Ellery Town Board,

As long-time members of the Chautauqua Lake scientific and conservation community, we are writing to advise you of serious concerns we have with a report which is being used as part of the environmental review and permitting process for the proposed Chautauqua Lake herbicide treatment.

The report, entitled *Aquatic Macrophyte Control at Bemus Bay, Chautauqua Lake – 2017 Data Collection Report* by SOLitude Lake Management (December 4, 2017) was prepared with a goal of including it "in future Environmental Impact Statements…on Chautauqua Lake…" Within only 8 weeks of its issuance, this report was included as part of the February 2018 Draft Supplemental (DSEIS) for Chautauqua Lake Herbicide Treatment and its findings are referenced throughout the DSEIS. Based on a detailed review of this report, it appears that it was not fully vetted prior to its inclusion in the Draft SEIS. We are concerned about the use of this report as a basis for decision-making for the currently-proposed herbicide treatment when there are significant questions about the validity of the macrophyte sampling methodologies, species identification, data analysis and interpretation, and resulting report conclusions. DSEIS recommendations based on Appendix E include the May application timing, the use of herbicide combinations, applications in fish spawning and rearing areas, and extending the application areas further into the lake. Examples of problematic sections include the DSEIS claims that:

- the Bemus Bay treatments of herbicides were effective, page 6 of the DSEIS
- areas of the lake treated with the combination of Aquathol K and Navigate had the greatest reduction in Eurasian watermilfoil densities, page 6
- targeting invasive plants early in the growing season may allow native species to recolonize treated areas during the same growing season, page 79
- the resurgence of natives will improve conditions for the native fish species, page 103
- native species "rebounded" in some of the 2017 treatment areas, page 106
- extending the treatment zone further into the lake (beyond 200 feet from shore) would be beneficial, page 117.

It is critical that the New York State Department of Environmental Conservation and the Town of Ellery, as lead agency in the State Environmental Quality Review process, be aware of these problems and take them into account in all decisions related to the current DSEIS or future SEIS findings and potential permit issuance. The information provided here summarizes the specific concerns. We request that DSEIS references to this report be updated and corrected to reflect the issues explained in this review or that reference to this report be removed from the DSEIS.

We thank you in advance for your careful consideration these issues.

Survey Methodology – Statistical Errors:
As a follow-up to the SOLitude 205-sample point May 24-25, 2017 pre-treatment macrophyte survey, and using the point-intercept methodology, which "can be replicated to track changes in the vegetation community and used to plan for future control methods in the Bay," this report states that SOLitude "randomly selected 100 of those pre-treatment sample points, and on July 20, 2017, resampled these points to evaluate the treatment goals. An additional 25 sites of the remaining 105 sites that were beyond the 200-foot treatment limit were sampled in order to understand the impacts outside the treatment area...."

- In reviewing the raw field data tables (pgs. 46-48 and 49-50 of 57) entitled Bemus Bay Chautauqua Lake Aquatic Vegetation Survey, May 24-25, 2017 and July 20, 2017, respectively, along with the various maps provided, it is clear that SOLitude actually sampled only 75, not 100, of the original 205 sites. Inexplicably and erroneously, the additional 25 sites, which were NOT in the original 205 sample points, were located beyond the 200-foot restriction area, and were not treated in the June 26 herbicide application, were included in their "100 Total Sites" for statistical analysis. Additionally, it appears that all sites lacking a particular species were disregarded in the calculations, and thus OVER-estimates of a particular species' presence is embedded throughout the study's conclusions. **All resulting statistics and subsequent conclusions in this report should therefore be rendered invalid.**
    - Percent Overall Plant Abundance percentages and various relative species abundance calculations in the report's July 20, 2017 Bemus Bay Aquatic Macrophyte Abundance Distribution table (pg. 12) are incorrect and cannot be used for comparative analysis with the May 24-25, 2017 data (pg. 11, table incorrectly labeled with a 2016 date). All SOLitude calculations of % abundance in July 2017 included the "extra" 25 sites that were NOT sampled in the original 205 in May 2017; only the true subset of those pre-treatment sites, here 75, not 100, should have been considered. For example, using SOLitude's raw field data:
        - For Eurasian milfoil, SOLitude's July 20, 2017 field data (pgs. 49-50), records this macrophyte as "Medium" in abundance in only 4, not 10, of the true subset of the original 205 sites. Specifically, only Sites # 83, 90, 154, 182 were included in the pre-treatment survey, while the inclusion of the "additional" outlier Sites #206, 207, 208, 210, 215, 216 skews the data and should NOT have been included.
        - Likewise, raw field data recorded for Common Waterweed (*Elodea*), indicates it is found at "Dense" abundance in 13 (Sites #3,13, 81, 87,

90, 113,115,129,149,155,165,168,170), not 15 sites, if only the true subset of sites is used.

- Calculations for relative species abundance percentages for both the May and July 2017 Macrophyte Abundance Distribution reporting should have been based upon the number of TOTAL sites sampled, not the number of sites in which a species was found. Lack of presence of a species for studies such as this is as important to document as is the presence of plants, yet all percentage calculations ignored sites with a finding of "no plants." For example, based on SOLitude's raw field data and Aquatic Macrophyte Abundance Distribution table, and ignoring their flaw of using 100 vs. 75 sites:
  - Eurasian milfoil's "Medium" abundance of 14% as calculated by SOLitude (10 sites in which milfoil was found in "medium" amounts divided by 74 sites containing milfoil) should have instead been 10% (10 sites divided by a total of 100 sites sampled).
  - Common Waterweed (*Elodea*)'s "Dense" abundance recorded as 20% by SOLitude (15 sites in which *Elodea* was found in "dense" amounts divided by 75 sites containing *Elodea*), should instead have been calculated as 15% (15 divided by a total of 100 sites sampled).
- When considering the two types of statistical errors described above, the errors become even more problematic:
  - Eurasian milfoil's "Medium" abundance should correctly be calculated as 4 sites in which milfoil was found in medium abundance divided by 75 total sites sampled within the true subset, or 5.3% (not 14%, as stated in the SOLitude table).
  - Common Waterweed's "Dense" abundance should correctly be calculated as 13 sites in which *Elodea* was found in dense amounts divided by 75 total sites sampled within the subset, or 17.3% (not 20%).
  - Considering that *Potamogeton* species (pondweeds) are especially valuable for spawning and rearing of young and as habitat to Chautauqua Lake's muskie and other fish populations, it must be noted that, using correct abundance calculations, 0% of Curly-leaf Pondweed (0/75), 0% of Sago Pondweed (0/75), and 0.01% of Leafy pondweeds (1/75) remained post-treatment. Numbers recorded in the SOLitude Abundance Distribution table are particularly misleading.
- No rationale is given for why the original 205 sites were not all resampled, nor why and how the 75 "randomly-selected" sites were chosen.
- SOLitude states on pg. 3 of 57: "A follow-up assessment of the control sites was conducted on October 18, 2017 in order to further evaluate the impact of drift. GPS was used to locate each data point in the field." No data is included in this report.

Survey Methodology – Errors in using the Cornell-modified U.S. Army Corps of Engineers survey methodology and estimate of overall plant abundance and individual species percentages of macrophytes associated with Rake-toss findings:

- The methodology's standard scale designations as cited on page 4 of the December 2017 SOLitude report (Z =Zero: no plants on rake, T = Trace: Finger-full on rake, S

= Sparse: Handful on rake, M = Medium: Rake-full of plants, and D = Dense: Difficult to bring into boat) are intended as an overall plant abundance evaluation for the entire mass of plants on the Rake, not for a measure of the abundance of individual macrophyte species found on the rake. Two rake-tosses per site should be used, but SOLitude used only one. Once brought on-board the boat, plants on the rake should be separated by species and the estimated percentage of the amount of each species on the rake recorded; that percentage is a more quantifiable abundance value for each species at each location. SOLitude did not determine specific amounts of each species found on the rake as percentages, but merely visually estimated their abundance. That makes comparison between rake tosses at any location from one time to another impossible. SOLitude's use of subjective estimates (Z, T, S, M, D) without actual percentage values for each of the plant species on the rake results in subjective qualitative, rather than quantitative findings. Please refer to Racine-Johnson Aquatic Ecologists report "Late Spring 2017 Presence and Abundance of Aquatic Plants in Chautauqua Lake," for correct methodology.

Results/Discussion – Vegetation Inventory Plant Identification Errors:

- Leafy pondweed (*Potamogeton foliosis*), Needle spikerush (*Eleocharis acicularis*), and Richardson's pondweed (*Potamogeton richardsonii*), cited in the SOLitude May 24-25, 2017 data, have not been documented by other researchers in Bemus Bay (or elsewhere) nor in the 2017 Chautauqua Lake studies by Robert L. Johnson of Racine-Johnson Aquatic Ecologists, ("Late Spring 2017 Presence and Abundance of Aquatic Plants in Chautauqua Lake"); in fact, Richardson's pondweed has not been seen in the lake since Johnson's 2003-2004 lake studies, and needle spikerush has never been documented per records 1937-2017 as recorded in Table 2 of the Racine-Johnson Late Spring 2017 report. On the other hand, a number of other species known to be present in Bemus Bay and identified by others are missing or have been misidentified as other species in the SOLitude reports. According to Robert L. Johnson of Racine-Johnson Aquatic Ecologists (personal communication, July 11, 2017 and January 4, 2018), and based upon his extensive familiarity and expertise with Chautauqua Lake, SOLitude's identification of *Potamogeton richardsonii* is more likely to be *Potamogeton praelongus* (white stem pondweed), *Najas flexilis* (slender naiad) is more likely to be *Najas guadalupensis* (southern naiad), and *Potamogeton foliosis* (leafy pondweed) is most likely *Potamogeton pusillus* (small pondweed). Other plants "missing" from the SOLitude May and July 2017 data reports but documented by varioius Racine-Johnson reports include *Nitella flexilis*, *Potamogeton zosteriformis* (flat-stemmed pondweed), *Potamogeton hillii* (Hill's pondweed, a species of special concern), and *Vallisneria americana* (wild celery or tape grass).
- SOLitude's May 24-25, 2017 and July 20, 2017 Data Tables for Aquatic Macrophyte Abundance Distribution fail to display consistency of ALL macrophyte species identified, again interfering with clear pre-treatment and post-treatment comparisons of macrophyte population abundance. The May 24-25 table lists Eurasian milfoil, benthic filamentous algae, common waterweed, curly-leaf pondweed, coontail, water stargrass, slender naiad, forked duckweed, white water lily, leafy pondweed, needle spikerush, and Richardson's pondweed. The July 20, 2017 data tables include common waterweed, Eurasian water milfoil, coontail, benthic filamentous algae,

water stargrass, forked duckweed, wild celery, leafy pondweed, curly-leaf pondweed, and sago pondweed. All plants should be listed on both tables, even if "no plants" are the case.

- SOLitude authors again falsely state on page 4 of 57 that the July data points were a "subset of the original 205 pretreatment survey points," when clearly their field data are evidence that only 75 of the July data points were truly a subset. They also falsely claim that the "additional 25 samples beyond that...were selected from the remaining 105 sites." All subsequent statistics are faulty as a result, as noted above. They also state here that "Eurasian Water Milfoil and Curly-Leaf Pondweed was documented at 74% and 1% respectively, of the surveyed data points..." while in reality 56/75, or 75% of sites, contained milfoil, while 0/75 sites, or 0%, contained curly-leaf pondweed.
- They reference Figures 4a & 4b, which cannot be found in their report.
- The statement on page 5 of 57, "The Bay continued to support significant native vegetation dominated by Common Waterweed and Coontail, with lesser densities of benthic filamentous algae, Water Stargrass, Wild Celery (*Vallisneria americana*), Forked duckweed, White Water Lily, Leafy Pondweed, and Needle Spikerush," is not supported by their July 20 tables, which entirely lack data pertaining to white water lily and needle spikerush, and include species (leafy pondweed) that were likely mis-identified. The stock photo in Figure 6L inaccurately portrays *Vallisneria americana* (tape grass, celery weed) with an image of water stargrass (*Zosterella dubia*)

Results/Discussion – Survey Documentation

Navigate Only Treatment Areas:

- No location map of treatment areas with labeled sample site numbers is provided, nor explanation of justification for which 12 treatment sites were used. All conclusions lack supporting data.
- The reduction of Curly-leaf pondweed to 0% cannot necessarily be linked to the Navigate treatment regimen. Pondweeds are known to naturally die down by late June or early July, so likely were "missing" in part or entirely due to the phenology of their life cycle.
- The statement that "Species richness remained the same pre- and post-treatment and densities and presences of beneficial natives such as Common Waterweed and Coontail increased post-treatment" is blatantly false. Based on the SOLitude data provided, eleven macrophyte species were documented in the May 24-25 pre-treatment survey (Eurasian Watermilfoil, Common Waterweed, Curly-leaf Pondweed, Coontail, Water Stargrass, Slender Naiad, Forked Duckweed, White Water Lily, Leafy Pondweed, Needle Spikerush, and Richardson's Pondweed) but only seven species were documented in the 75 subset sites in July 20 after herbicide treatment (Eurasian Watermilfoil, Common Waterweed, Coontail, Water Stargrass, Forked Duckweed, Wild Celery, and Leafy Pondweed (although this pondweed was found in only 1/75 sites, or 0.013%, so statistically 0). Thus white water lily, naiad, needle spikerush, Richardson's pondweed, all documented in May, were missing in this sample, and in addition, curly-leaf, sago, and leafy pondweeds were essentially at 0% abundance as well. Species richness AND species diversity clearly declined.

- Data are entirely lacking to support the claim that "A higher rate of Navigate also correlated with the highest beneficial densities post-treatment, indicating selectivity of the product and ability for native plants to flourish once invasive plants are reduced."

Aquathol K and Navigate Treatment Areas

- No location map of treatment areas with labeled sample site numbers is provided, nor explanation of justification for which 56 treatment sites were used. All conclusions lack supporting data.
- The claim that "Overall plant density was decreased, however species richness remained the same" is false – see above. There were 11 species in the pre-treatment report and only 7 in the post report. This statement is further weakened because the same species were not tracked in the pre- and post-survey data. Available SOLitude pre- and post-treatment data clearly show that both species richness and species diversity declined, although no further conclusions can be made without the specific data for the specific sites treated…which is missing.
- The claim that "using a combination treatment showed more suppression of Curly Leaf Pondweed...as the high rate of Navigate" is faulty, since both Navigate only and the combination treatment apparently brought Curly-leaf pondweed to 0% occurrence (or it just died down on its own).

Control Areas

- Control areas were not clearly defined, and the use of the "additional 25 sites," if also considered "control areas," is curious since they were added in addition to the original 205 survey points. The statement, "Results of pre- and post-treatment survey comparison showed minimal off-target impacts, which were dependent on the location of the control zones to open water and treatment areas" has no data from which to make these conclusions. Additionally, if these "control" sites were intended to assess drift into the control zones, no specific findings are apparent here, and data tables delineating control area macrophyte abundance are not provided. The critical question related to whether the treatment zones impacted macrophytes in the non-treatment (control) zones was unfortunately not sufficiently addressed, since only "visual observation" was made of the control zones, and the statement "Visual observation of the control zones showed denser populations of macrophytes than those visible in the treatment zones" is too vague to be valuable. To rely on visual observations to make conclusions about the control zones is wholly inadequate and not acceptable.

Data Collection Assessment

- SOLitude claims that "Navigate only and the Aquathol K and Navigate combination were effective at reducing the densities of Eurasian Watermilfoil and Curly-leaf Pondweed while preserving native vegetation. With Eurasian Watermilfoil densities reduced, native species, specifically elodea and Coontail, increased in densities." The loss of several species, including three species of native pondweeds, water lilies, needle spikerush, and slender naiads as documented in this study, does not support the claim that native vegetation is preserved.

- The claim that, "With Eurasian Water Milfoil densities reduced, native species, specifically elodea and Coontail, increased in densities" is unfounded and misleading, since cause-and-effect evidence is lacking, and coontail and elodea, like many other macrophytes, typically experience population growth as the summer season progresses. Additionally, it must be noted that other native macrophyte species declined in density or were not found at all after treatment, along with the reduction of milfoil.
  - This is a critical example of the problem with not reporting "zero plants" in the macrophyte abundance tables because it prevents valid comparisons and conclusions.
  - Impacts of herbivory on Eurasian Watermilfoil and the natural die-back of Curly-leaf pondweed were not considered here as well.
- Observable impacts made with a "handful of plants in and outside the treatment area" lacks validity since specific site locations are lacking. Additionally, documentation is lacking to support the speculations concerning "insufficient contact time due to dilution."

Conclusions – Primary: assess the efficacy of different combinations of Aquathol-K and Navigate on invasive species Eurasian Watermilfoil and Curly-leaf Pondweed

- The relative efficacy of each of the four chemical regimes (Navigate Only @ 4 ppm, Navigate Only at 3 ppm, Navigate @ 2ppm + Aquathol K @ 0.75 ppm, and Navigate at 2 ppm + Aquathol K @ 1.50 ppm) is not provided in this report, only general statements about relative abundance changes before and after treatment.
- Specific site numbers and locations used for each treatment regime within the general MMS zones are not clearly specified, although it can be deduced that 8 sites in MMS zone 152 were used for Navigate only @ 4 ppm, 4 sites for Navigate @ 3 ppm in MMS zone 155b, 15 sites for Navigate + Aquathol 0.75 ppm in MMS zone 154 (a fish spawning and rearing zone in which the MMS specified no herbicides until after the 1st of July, all of which was disregarded in this study), and 41 sites for Navigate + Aquathol 1.50 ppm in MMS 155a. A general sense of regime locations can be obtained from the original DEC Permit specifications for the various MMS zones, but more site location detail should be provided in this report. The variable number of sites used (sample size) for the various regimes is problematic and precludes accurate comparisons between treatments.
- The comparisons of pre- and post-treatment plant abundance for all regimes are invalid due to the inherent problems associated with the subjective rake-toss designations and density/abundance reporting for each species lacking specific % of biomass, discussed previously. The ability to meaningfully compare one site's treatment efficacy, pre- and post-treatment, is lost.
  - For example, Site #3 was documented as a "Medium" overall rake plant abundance with a "Trace" designation for milfoil in the May pre-treatment field data, while Site #3 post-treatment listed a "Dense" overall rake plant abundance with milfoil given a "Trace" designation. The actual amount of milfoil on either of these rakes is lost because the amount of each species on the rake was not reported as a percentage of the total. Instead, a second subjective evaluation of the abundance of milfoil was made by SOLitude

researchers. It might even be argued that this example for Site #3 represents an increase in milfoil biomass, since a "Trace" of "Dense" might be more than a "Trace" of "Medium." Critical data needed for these comparisons is therefore lacking in this document, and valid conclusions are impossible.

Conclusions – Secondary: assess the impact of different combinations of Aquathol-K and Navigate on desirable native species

- The same sites were used for comparison. Because different species of plants were monitored pre- and post-treatment, this comparison is flawed. Indicating the "presence" of a particular species says nothing about its abundance. Again, this density information is not available due to the error in the rake-toss methodology used. Additionally, some desirable native species were no longer present but there was no accounting in the document for "Zero" plants. Claims for increases in species richness remaining the same or increasing cannot be substantiated because specific data addressing specific macrophytes presence and abundance at specific sites receiving specific treatments are not provided.

Conclusions- Tertiary: assess drift into control zones and dilution potential resulting from smaller treatment areas within a larger lake

- These conclusions appear to all be based upon visual, subjective observations. For a data collection experiment, visual observation can be anecdotal but should not be the sole basis for a conclusion. "Limited data sets" referenced in this section are not provided in this report.
- Claims for "limited short-term impacts" and "minimal long-term impacts" of dilution potential and reduced efficacy of treatment, based on a "limited data set" in Control Site MMS Zone 153, are vague and not supported by specific longitudinal data.
- Claims for "no observable impacts to these sites" using the Control Site MMS Zones 156 and 157 "limited data set" are vague and lack comparative macrophyte density data in support. This is especially problematic because many concerns had been previously raised about potential ecological impacts of herbicide treatments upon non-target, native, desirable stands of macrophytes, and permitting of this data-gathering study was in part justified so that valuable data could be gained. These conclusions are not justified based on the "limited data set" and visual observations reported here.
- The statement, "Although some drift of herbicides may occur, the drift will likely be minimal, especially in areas exposed to open water," seems speculative and again, without objective data, fails to provide a key answer that was asked of this data collection experiment.

Recommendations

- Because the Conclusions of this study appear to be poorly supported and based on inadequate methods, poor quality control with the rake-toss methodology, errors in statistical analysis, and insufficient data-reporting, the validity of this Report's Recommendations is highly questionable. There are multiple inadequacies throughout the report, as extensively noted in this review, and verification of claims made is problematic.

- While the recommendations include making every effort to minimize dilution impacts, a recommendation to make every effort to minimize drift into non-target areas and minimizing impacts on non-target native plants is lacking.
- Recommendations for treatment between May 1st and May 15th (which disregard potentially negative impacts on fish spawning and rearing areas), extending further than the permitted 200 feet from shore, mitigating insufficient contact time, and application timing, all were included in this study's scope and are not substantiated with data.
- Since most of the recommendations proposed in this report are not supported by sufficient data, their validity is in question. Thus, for these documents to be used in Appendices E, F, and H for the Chautauqua Lake DSEIS and as the basis for recommendations in that document, the validity of that document must also be questioned.

Thank you for the opportunity to bring this analysis to your attention. The accuracy of the Chautauqua Lake SEIS is extremely important to all of us and to Chautauqua Lake. We look forward to your written response to this letter.

Sincerely,
Rebecca L. Nystrom, Professor of Biology
Janis Bowman, Professor of Biology
Jonathan Townsend, Biologist
Claire Quadri
Joe Galati, Fisheries Biologist
Dr. Anton (Twan) Leenders, President, Roger Tory Peterson Institute of Natural History

Cc: Connie Adams, DEC Region 9 Wildlife Biologist
Anne Rothrock, DEC Region 9 Wildlife Biologist
Mike Clancy, DEC Regional Fisheries Manager
Maureen Brady, DEC Region 9 Attorney
Mark Passiute, DEC Region 9 Regulatory Analyst, Environmental Permits
Michael Nierenberg, DEC Region 9 Pesticides

Rebecca Haines
Town Clerk
Town of Ellery
PO Box 429
Bemus Point, NY 14712

716-386-3465
ellerytc@windstream.net

Dear Ms. Haines,

Please find attached as a PDF my written comments in response to the DSEIS, titled "Chautauqua Lake Herbicide Treatment", due March 16, 2017 at 4pm. to the Ellery Town Board.

Thank You for considering my response.

Sincerely,

Robert L. Johnson

Aquatic Biologist, and A Chautauqua Lake Scientist

Racine Johnson Aquatic Ecologists
1185 Ellis Hollow Road
Ithaca, NY 14850

Following is a selection of claims in the Town of Ellery DSEIS which misrepresent my work. The claims are unsupported by data, and are simplistically addressed and misleading. I have attempted to restrict the scope of my remarks to a few statements and figures which will hopefully illustrate my counterarguments. Included are references some of which I have used to create my responses and many that generally refer to the scope of my work on Chautauqua Lake referred to in the DSEIS. Most of the sources are Annual Reports from research I had conducted on Chautauqua Lake from 2002 to 2017.

<u>Page 6 of DSEIS</u> "the NYDEC did not require the town of Ellery and the Village of Bemus Point to survey invertebrates following treatment because there was no natural ecological baseline in the Lake that would justify such a survey. (See SOLitude June 2017) (Appendix F)."

<u>Page 40 of DSEIS</u> "Few data exist on the macroinvertebrates (aquatic insects) of Chautauqua Lake"

<u>Page 40 of DSEIS</u> "Racine-Johnson Aquatic Ecologists (2008) identify a moth (Acentria ephemerella) a weevil (Euhrychiopsis lecontei), and a native caddis fly (Nectopsyche albida) as species found in Chautauqua Lake that feed on Eurasian watermilfoil."

This statement on page 6 references Appendix F, however, I find nothing referencing invertebrates within Appendix F. It is unclear to what the statement on page 6 is referring. If it suggests that a baseline for populations of invertebrates does not exist, then that is clearly incorrect. Further, the two statements on page 40 are also incorrect, the first statement that few data points exist and the second that 2008 was the first time we identified the herbivores in the lake. We began research on aquatic invertebrate herbivores that feed on Eurasian watermilfoil at Chautauqua Lake in 2002 with Ecology and Evolutionary Biology, Cornell University. I continue that effort currently as Racine-Johnson Aquatic Ecologists and utilize a courtesy staff appointment with Ecology and Evolutionary Biology at Cornell.

While beginning work at Chautauqua Lake in 2002 I had just finished publishing four peer-reviewed scientific articles on insect invertebrate herbivores establishing the former as biological control agents of Eurasian watermilfoil in New York State. (Johnson *et al*. 1998, Johnson *et al.* 2000, Gross *et al.* 2001 and Johnson and Blossey 2002). I began to record population densities of the aquatic weevil, *Euhrychiopsis lecontei* and the aquatic moth, *Acentria ephemerella* in 2002.

A primary control of growth (elongation) of Eurasian watermilfoil stems in Chautauqua Lake is the aquatic weevil (J. D. Johnson *et al.* 2012). This native invertebrate was likely present in Chautauqua Lake well before the introduction of Eurasian watermilfoil living on its host native watermilfoil, *Myriophyllum spicatum*. From 2002 through 2017, each year I recorded weevil and moth populations along with watermilfoil damage caused by these insects at 13 locations around Chautauqua Lake, which established a firm baseline for these populations over time.

We were first to present a summary containing graphs and numerical details of the aquatic weevil and the aquatic moth establishing population density baselines in the 2006-2007 project competition report to the Chautauqua Lake Association and Chautauqua County Government (Keith et al 2007). Since then, I have added ten additional years of lake-wide population data and summarized the data for the annual reports on Chautauqua Lake. Below, I include graphic depictions of weevil densities at locations around the lake, not unlike graphs reported in previous Chautauqua Lake reports. The proposed DSEIS, if applied, will most likely have a significant negative impact on these essential aquatic weevil populations, because they require water milfoil to survive.

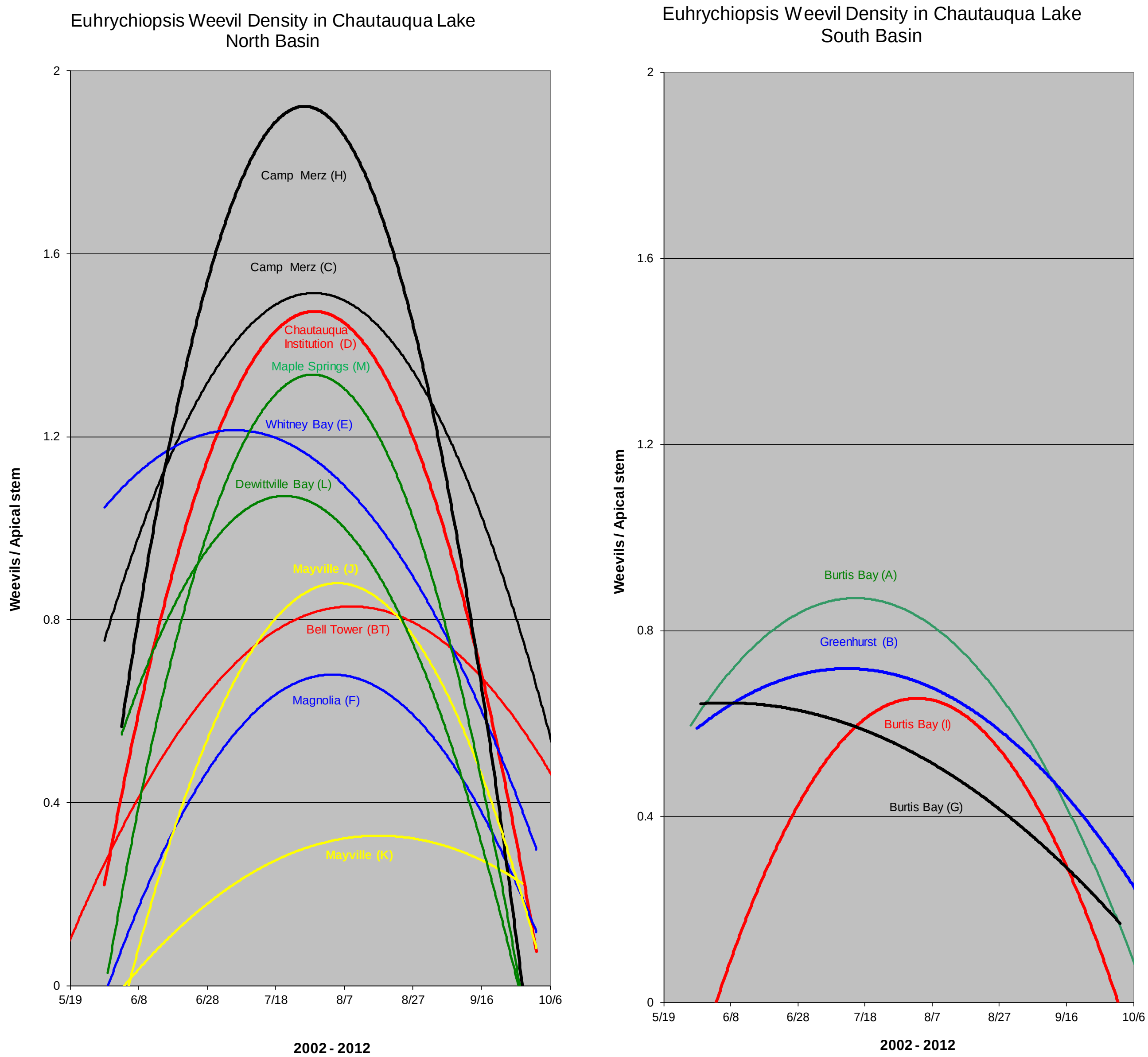


Figure 1. Population growth curves showing density of the aquatic weevil at various locations around Chautauqua Lake derived from several years of collected data.

<u>Page 8 of DSEIS</u> "Over the past twenty five years, since CLA's annual herbicide application program ended, the invasive weeds-primarily but not limited to Eurasian watermilfoil and curlyleaf pondweed-have increased in density and areal extent."

<u>Page 30 of DSEIS</u> "In 1989 "dense stands of Eurasian watermilfoil made the entire southern quarter of the southern basin impassable to boat traffic. (Id)."

The first statement suggests that in the last 25 years that invasive weeds have increased in density and areal extent since the annual herbicide application program had ended. The second statement, considering the first, implies that in 1989 (roughly 28 years ago) the southern quarter of the southern basin was not passable to boats. I suggest based on current data that follows, the first statement is incorrect.

__Page 114 of DSEIS__ **"Data collected between 2007 and 2017 reveals that the densities of invasive weeds in areas of Chautauqua Lake, such as Bemus Bay, have increased over the last ten years."**

Please cite the data that leads to this conclusion in the DSEIS.

__Page 114 of DSEIS__ **"The increase in densities of Eurasian watermilfoil was seen Lakewide. In the 2007 survey, Racine-Johnson found Eurasian watermilfoil present at 72% of the 716 sampled Lake locations. (Johnson, 2007). By 2016, Eurasian watermilfoil was found at 84% of the sample points. (Johnson, 2016). The following year, Eurasian watermilfoil was found at approximately 89% of the locations surveyed. (Johnson 2017). In 2017, the levels of Eurasian watermilfoil were medium to dense in 23% of the rake toss samples, a 3% increase from the previous year. (Johnson, 2016; Johnson 2017)."**

The previous statements (p. 114) include some correct points but several large errors that overshadowed the few facts. Given that the references cited in the DSEIS are generally incorrect, it makes it extremely impractical for the reader to determine on what the cited numbers are based. Referential errors are as follows: (Johnson 2007) should be (Johnson 2008), (Johnson 2016) should (Johnson 2017), (Johnson 2017) should be (Johnson 2017A, Johnson 2018). Three of the numbers attributed to my data in the above page 114 statement are in fact __not__ based on my data, nor are they even correct. The overall suggestion is that Eurasian watermilfoil has increased from 2007 to 2016/2017. The DSEIS accomplishes this by selectively choosing a low aquatic plant biomass year, 2007, and then comparing that year to a high biomass period 2016/2017. It conveniently omits three years of whole lake surveys in between the compared years. The DSEIS then chooses a line between two points (2007) and (2016/2017) while omitting the low-biomass years, 2010, 2013 and 2015. **Not having referenced all the available data that is credible, the DSEIS has drawn an incorrect conclusion from an egregious statistical misstep.**

The last sentence **"In 2017, the levels of Eurasian watermilfoil were medium to dense in 23% of the rake toss samples, a 3% increase from the previous year. (Johnson, 2016; Johnson 2017)"** is not supported by the data the DSEIS has cited. Incidentally the DSEIS appeared to consult the correct data source, since they reported a correct number (89%). However, when reporting the data, the DSEIS states *Medium* and *Dense* abundance ratings at 23% in 2017, which follows a 3% increase from the previous year 2016. The creditable data source however reports the opposite, not an increase from 2016 to 2017 of 3%, but a __marked decrease__ of 45% from 2016 to 2017 of M*edium* and *Dense* ratings. It is entirely unclear from where the 23% or the increase of 3% stated in the DSEIS has originated.

The above statements made in the DSEIS state that "Eurasian watermilfoil has increased in density and extent, had dense stands with increased densities." The DSEIS relies heavily on data collected by our rake-toss sampling method and then an assessment of density that we assign to the sampled plant masses. The case made by the DSEIS that Eurasian watermilfoil has increased is consequently unsound, and my data having been thus cited does not support that conclusion.

I conclude by presenting two graphs summarizing data that refute the baseless inference by the DSEIS on pages 8, 30 and 114 that Eurasian watermilfoil has increased in density over the last 10 years. Below figures show yearly averages of the number of M*edium* and D*ense* ratings of Eurasian watermilfoil abundance determined on the Lake, from all sampled locations in a given year (Figure 2). They also show the percentage of locations from our whole lake surveys where watermilfoil occurred (Figure 3). These figures show average levels from eight individual years of whole lake aquatic plant surveys of the littoral zone, spanning fifteen years (2003 through 2017).

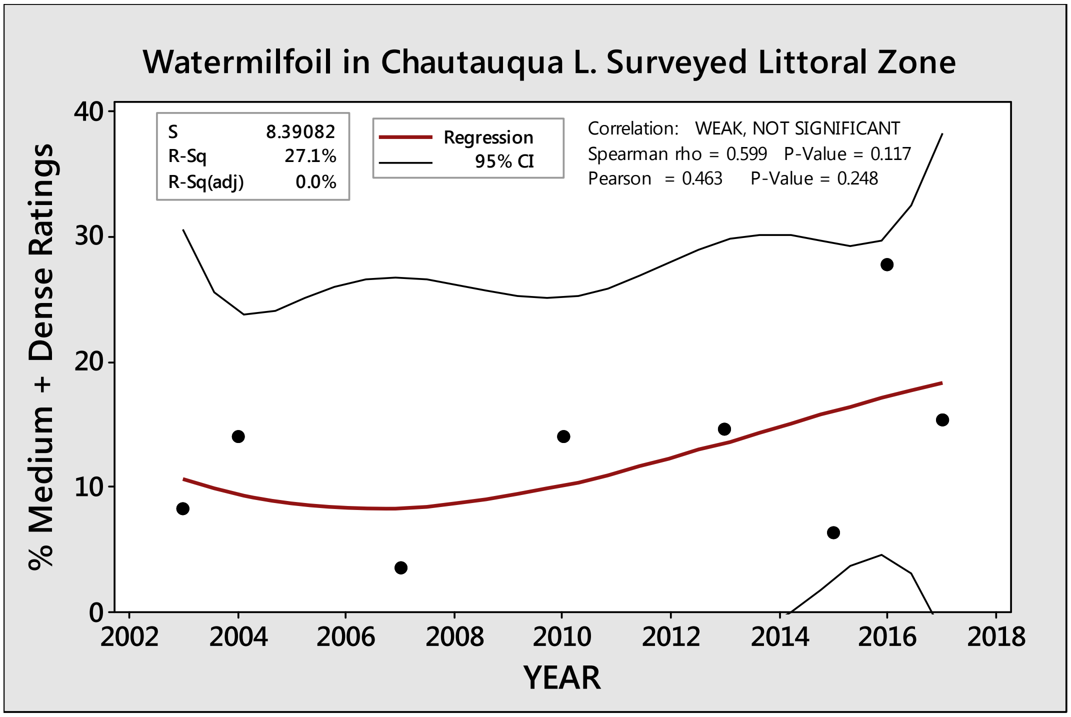


Figure 2. Change in the mean percentage of *Medium* and *Dense* Ratings described on Page 114 of the DSEIS. Above figure use eight years of data, rather than comparing the lowest year 2007 to the highest years 2016/2017. The graph spans a fifteen-year timeframe and includes the missing three years between the years that DSEIS selected to support a false conclusion.

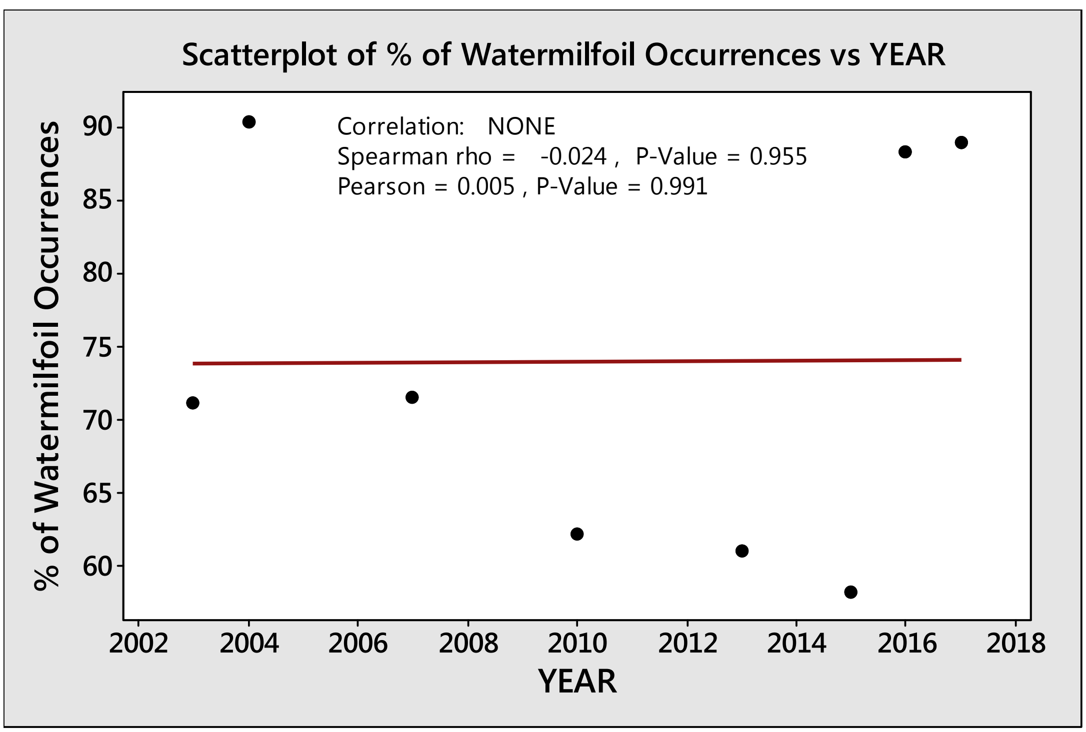


Figure 3. The mean percentage of watermilfoil occurrence does not increase over the last fifteen years using lake-wide rake-toss monitoring data, which directly contradicts several statements in the DSEIS presented as fact. The DSEIS presents no credible data supporting the conclusion that Eurasian watermilfoil increased over the same timeframe.

<u>Page 107 of DSEIS</u>. "the only known occurrence of the paper pondshell is at the north end of the north basin and well away from any treatment area (Racine-Johnson 2017). Therefore, no mitigations are being proposed."

I include here a figure (Table 1), the original which the DSEIS chose to modify as Table 3-5 on page 41. This table is a listing of non-Dreissenid mussels and the invasive Asian clam, for 2015. The DSEIS reproduces Table 1 from (Racine-Johnson 2016) and displays as an adapted Table 3-5 on page 41. Following on page 41 is Figure 3.5 with Figures 3.6-3.8 showing non-Dreissenid mussels on the following pages and attributed also to (Racine-Johnson 2016). However, the figures the DSEIS displays are not from my report (Racine-Johnson 2016) and do not relate to Table 3-5 on page 41. I provide the correct (Racine-Johnson 2016) figures (Figures 4, 5, 6, 7) following that logically relate to the DSEIS Table 3-5.

<u>Page 41 of DSEIS</u> "Table 3-5: Non Dresseneid (Zebra or Quagga) Mussels Collected in Chautauqua Lake in 2015 (adapted from Racine-Johnson 2016)"

Table 1. Non Dresseneid (zebra or quagga) mussels and Asian clam collected in Chautauqua Lake in 2015 (adapted from Racine-Johnson 2016**)**

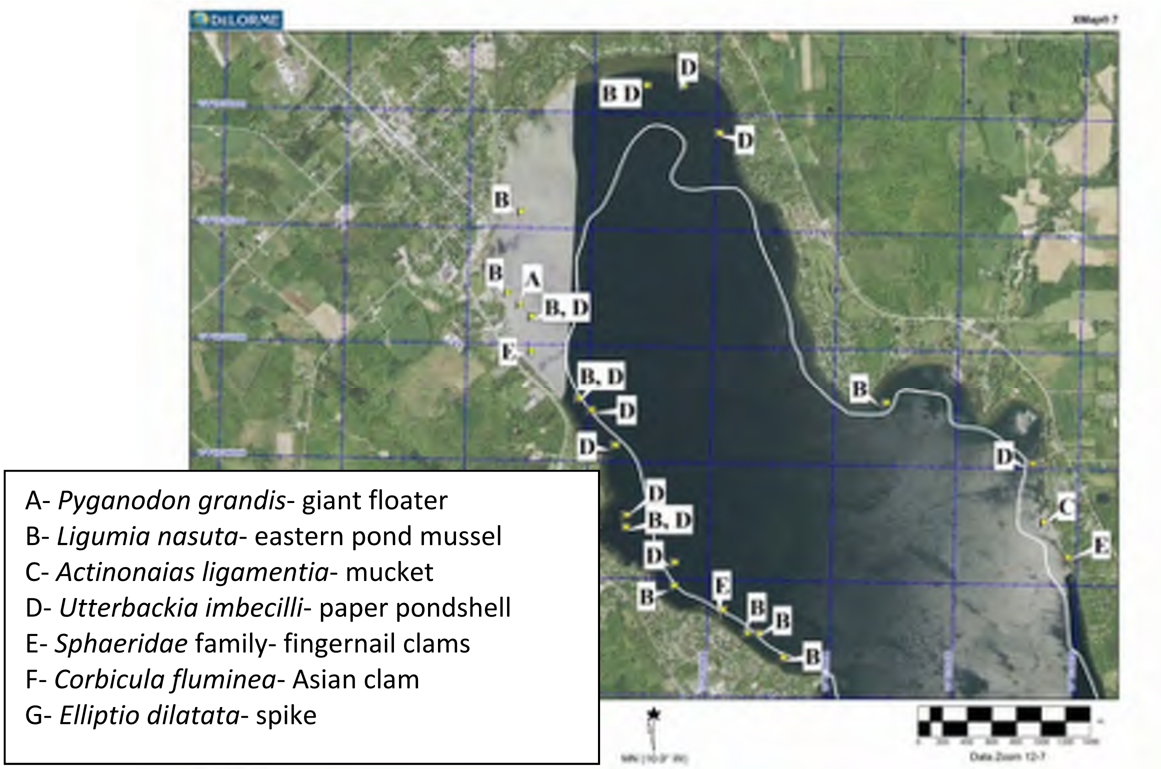
Species	**Common name**	**# Location**	**Map ID**	**Info**
Pyganodon grandis	giant floater	11	A	Native
Ligumia nasuta	Eastern pond mussel	35	B	Native
Actinonaias ligamentia	mucket	8	C	Native
Utterbackia imbecilli	paper pondshell	24	D	Native, last seen in 1895
Sphaeridae family	fingernail clams	11	E	Native
Corbicula fluminea	Asian clam	1	F	Introduced
Elliptio dilatata	spike	1	G	Native

<u>Page 103 of DSEIS</u> 4.8.4 IMPACTS TO INVERTEBRATES "There is a possibility that mussels may be adversely affected by some of the treatments. It should be noted that mussels are found in less than 20% of the proposed treatment areas."

I assume the mussels referred to here are native freshwater mussels; an important part of the biodiversity of Chautauqua Lake. The statement above "that mussels are found in less than 20% of the proposed treatment area" has little credibility. Refer to the following mussel location maps (Figures 4 – 7) which show native freshwater mussels covering the lake's entire littoral zone. It should be noted that the DSEIS does not provide a reason regarding which aspects of the treatments would adversely impact the mussels. A possible reason is that Endothall, the chemical in Aquathol K, is a recognized molluscicide (Sprecher and Getsinger 2002, Claudi *et al*. 2013).

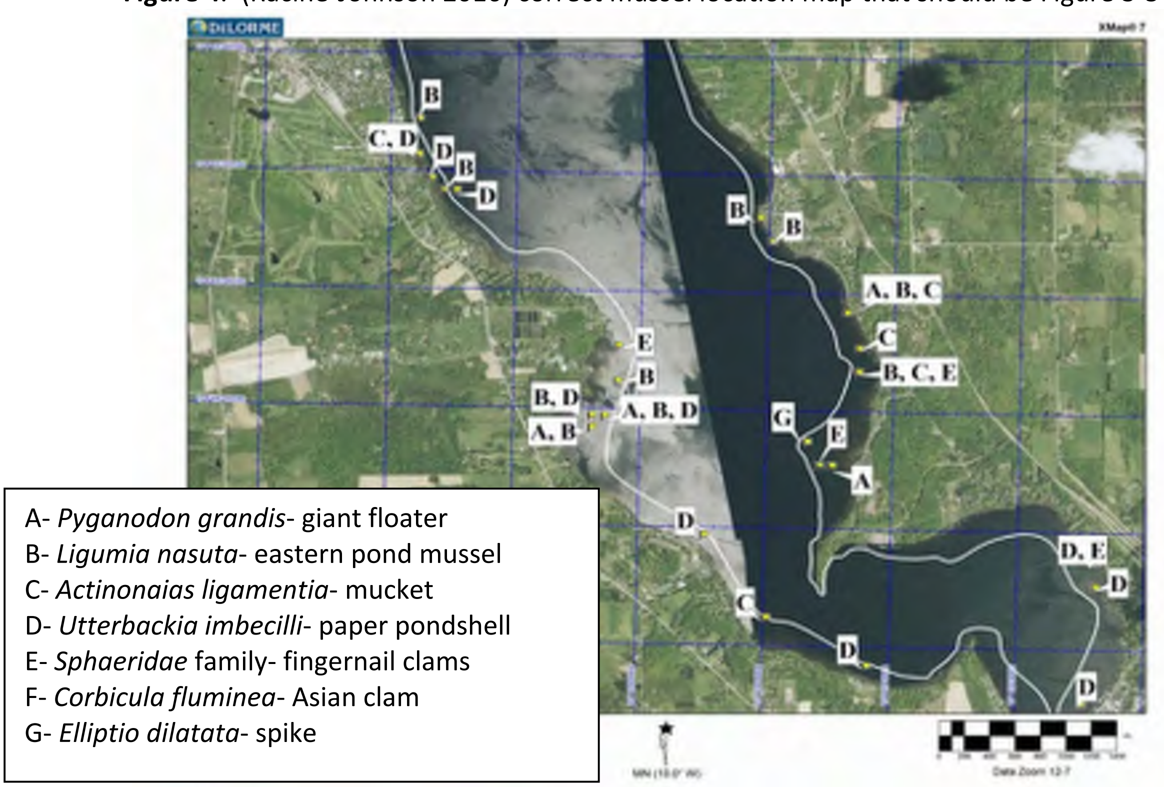
Under the "IMPACTS TO INVERTEBRATES" heading there is no mention or consideration of the most numerous invertebrates in Chautauqua Lake: the aquatic insects. The absence of discussion on invertebrates, an indispensable part of the Lake's food web, largely renders the document without merit.

<u>Page 41- 44 of DSEIS</u> "Figures 3-5 ,3-6; 3-7, 3-8 Non Dresseneid (zebra or quagga) mussels sampled and located in Chautauqua Lake in 2016 (adapted from Racine-Johnson 2016)"



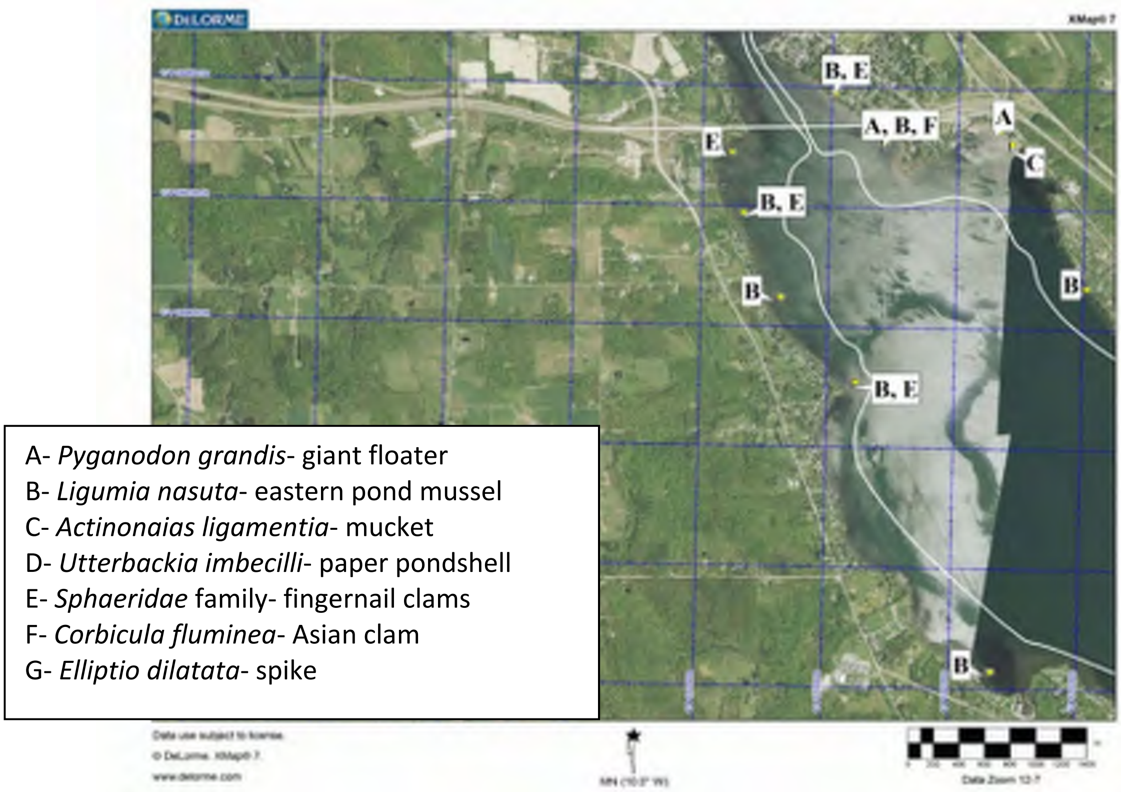
Map 23-A. All native mussel sample locations

Figure 4. (Racine-Johnson 2016) correct mussel location map that should be Figure 3-5 in the DSEIS.



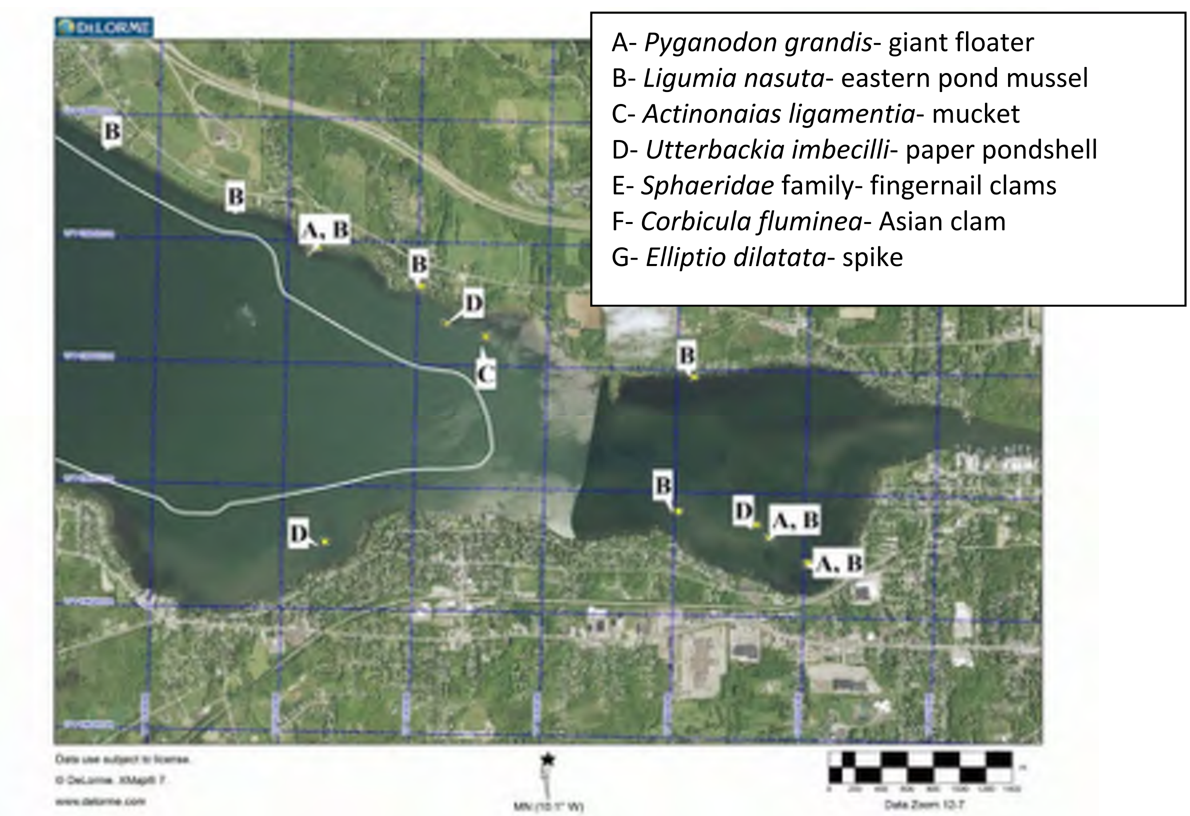
Map 23-B. All native mussel sample locations

Figure 5. (Racine-Johnson 2016) correct mussel location map that should be Figure 3-6 in the DSEIS.



Map 23-C. All native mussel sample locations

Figure 6. (Racine-Johnson 2016) correct mussel location map that should be Figure 3-7 in the DSEIS.



Map 23-C. All native mussel sample locations

Figure 7. (Racine-Johnson 2016) correct mussel location map that should be Figure 3-8 in the DSEIS.

At best, this is an oversight on the part of the DSEIS, albeit a very misleading one. It is true that in 2016, we report only one location at the north end where we find the paper pondshell mussel (Racine-Johnson 2017). However, the previous (Racine-Johnson 2016) report shows that the actual native mussel locations reported in Table 3-5, page 41 of the DSEIS, places the paper pondshell mussel at twenty-four locations and is thus wide-spread throughout the lake. The differences in mussel locations and species identified from 2015 to 2016 is likely due to variation in routine sampling collection. Note that we collect native mussels and zebra mussels only as a "by-catch" of our rake-toss aquatic plant surveys, and we only record mussel identification and GPS location when we inadvertently bring mussels to the boat with our rake-toss plant sampling activity. We do not sample for mussel density, or comprehensively identify all native mussels since such a task would require quadrat sampling by divers. We recorded many more mussels in 2015 than in 2016, likely since 2015 was an extremely low aquatic plant biomass "growth year". Less plant growth allows the plant sampling rake to hit the lake bottom and drag through the sediment, inadvertently picking up more mussels than would be in a higher plant biomass year. In 2016, more aquatic plant growth occurred in Chautauqua Lake which likely prevented the sampling rake from trolling through the sediment, thereby dislodging fewer mussels.

Page 107, 108 of the DSEIS. "5.2.2 Rare, Threatened, and Endangered Species Potamogeton hillii Treatment of the lake is planned for May, before the vegetative portions of the plant are present in the water column, so impact to Hill's Pondweed is not expected. No further mitigations are proposed."

On June 8, 2017 *Potamogeton hillii* was rapidly growing in several locations at Bemus Bay and north through Sunset Bay. In the 2017 spring plant survey around the lake we recorded *P. hillii* at several other locations in the South Basin. On June 8th the plant was generally about 6 to 8 inches tall suggesting it began growing several weeks earlier. An application of Aquathol K which targets *Potamogetons* would likely eliminate the plant upon exposure. Another early emerging native *Potamogeton*, *P.* pusillus is widespread in Chautauqua Lake and a species that Aquathol K would likely affect. Both species are plants that emerge in Chautauqua Lake very early in the growing season and finish their growing cycle in mid to late summer. Fall plant surveys on Chautauqua Lake would not normally record them (Racine-Johnson 2017A, Racine-Johnson 2018).

Page 35, of the DSEIS, "Solitude identified 13 aquatic macrophyte species in the survey zones. Racine-Johnson identified an additional 9 aquatic macrophyte species found in the Lake."

Racine-Johnson found 12 additional species, *Alisma gramineum, Nitella flexilis and Potamogeton zosteriformis* are missing from the list on page 35 (Racine-Johnson 2017A, Racine-Johnson 2018). A concern with the DSEIS and its appendices is the apparent under-reporting of native species in occurrence and mass (abundance rating) and the lack of reporting of any occurrence of a few abundant native species when compared to historical data. Any under-reporting of an abundant species limits an accurate measure of change in the Lake ecosystem, which could compromise the Lake's future.

<u>Page 6 of the DSEIS</u>. "In June 2017, the NYDEC granted permits to the Town of Ellery and the Village of Bemus Point to conduct a Data Collection Project pursuant to 6 NYCRR § 617.5 (c) (18) regarding the application of Aquathol® K and Navigate (2,4-D) to three areas of Bemus Bay (a total of approximately 30 acres). The performance of a data collection project is a Type ll action exempt from SEQR."

Lastly, I will finish my comments by returning to where I began: page 6, and by evaluating the foundation of this DSEIS **"<u>a Data Collection Project</u>"** described above. A paragraph which follows the above sentences in the DSEIS describes the Town, Village and CLP applying varying concentrations of the two herbicides to study the efficacy, effect and drift of the herbicides. The paragraph further continues describing actions of the applicator of the herbicides to Bemus Bay, "SOLitude Lake Management (SOLitude) assessed the results of the project and concluded that the herbicides were effective." "SOLitude further concluded that areas of the Lake in which a combination of the Aquathol ®K and Navigate (2,4-D) were applied saw the greatest reduction in Eurasian watermilfoil densities. (SOLitude Dec. 2017) (Appendix E)." "Following the herbicide application, both SOLitude (ld.) and the NYSDEC (personal and email communication with Michael Nierenberg) recorded a distinct difference in macrophyte density between the areas of Bemus Bay that had been treated with herbicides and those that had not been treated. SOLitude's December 2017 report is attached as Appendix E."

All the evaluations, numbers and statistics that underpin this DSEIS depend on having a **valid starting point** or more specifically, the **identification of plant species and how much plant mass (density ratings)** are present before applying the herbicide. SOLitude collected aquatic plant information in Bemus Bay on May 24 & 25, 2017. SOLitude then applies the herbicides in Bemus Bay on June 26, 2017. SOLitude on July 20, 2017 continues to collect aquatic plant information on Bemus Bay to be the after-treatment evaluation or ending point of the experiment. SOLitude then evaluates and publishes the efficacy of the **Data Collection Project** (experiment) in the appendices of the DSEIS.

Bearing in mind the date of their purported experiment in Bemus Bay, there were other management and monitoring activities taking place concurrently in Bemus Bay. Those activities and documentation of those events are missing in the DSEIS. Racine-Johnson Aquatic Ecologists undertook three separate plant surveys of Bemus Bay on May 5, May 30 and June 8, 2017 as part of a contract with the Chautauqua Lake Association to conduct a spring whole lake aquatic plant survey (Racine-Johnson 2017A, Racine-Johnson 2018). After the SOLitude application of herbicides Racine-Johnson Aquatic Ecologists conducted a fourth plant survey in Bemus Bay on July 12, 2017. We report our survey results and observations of plants in Bemus Bay (Racine-Johnson 2018). While the DSEIS does use some of our data from (Racine-Johnson 2018), the document does not include our observations from Bemus Bay.

Missing from the DSEIS and appendices is the acknowledgement of the massive destruction of the growing Eurasian watermilfoil tips (apical meristems) in Bemus Bay that we noted at our May 5, May 30 and June 8, 2017 monitoring efforts (Racine-Johnson 2018). The loss of the elongating growing tips limits the ability of watermilfoil to take up aquatic herbicides. Subsequent invertebrate herbivore sampling of Bemus Bay watermilfoil revealed that, out of 14 historical herbivore locations around the lake, Bemus Bay was second highest in herbivore densities only to Whitney Bay, the location that displays maximum watermilfoil destruction by invertebrate herbivores year after year.

If herbivory on watermilfoil was not enough to raise concerns about **Data Collection Project's** being bias-free, mechanical harvesting, a well-known plant control and having a long history of managing excessive plant growth in the Lake all but certainly invalidates the conclusions drawn by **Data Collection Project**. The DSEIS and appendices as far as I can ascertain, do not acknowledge the second (very effective) treatment administered to aquatic plants in the herbicide treatment area of Bemus Bay, that of cutting and removing the plants earlier evaluated as the **valid starting point** in the **Data Collection Project**. I consulted the Chautauqua Lake Association web site and noted the 2017 mechanical harvesting logs. Bemus Bay harvesting began on June 5 to June 9, 2017 and removed macrophytes and filled some percentage of 10 large trucks and 5 small trucks. The following week June 12 to June 16, 13 small truck and 20 large truck loads removed. On June 19, 2017, 4 small truck and 8 large truck loads removed from Bemus Bay.

Between May 24/25, 2017 and the June 26th application of herbicides, (the dates that SOLitude established as the before herbicide treatment values of plant species and species mass (abundance ratings) for statistical comparison), the overwhelming mass of aquatic plants required for the herbicide treatment evaluations, disappeared. Considering the observed insect herbivory together with removal of most of plants before the proposed herbicide treatment all data before and after the application of herbicides to Bemus Bay in 2017 are statistically invalid. Moreover, common sense might indicate there is little if any value gained from the Bemus Bay study as designed and executed.

Regarding DSEIS' main focal point study, **Data Collection Project**, major gaps are created by emphasizing opinion over facts, and then not adequately addressing Chautauqua Lake community concerns that were pointed out earlier but dismissed in the document. This study is without merit.

Therefore, I urge the Ellery Town Board to disregard this DSEIS as a document that might influence the future management of the aquatic plant community of Chautauqua Lake. The Lake as a living, valuable, economic and environmental resource does not deserve such a misguided future.

Sincerely,
Robert L. Johnson

Aquatic Biologist and A Chautauqua Lake Scientist
Racine-Johnson Aquatic Ecologists
Ithaca, NY 14850

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ROGER TORY PETERSON INSTITUTE
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Town of Ellery Town Board, c/o Ms. Rebecca Haines
P.O. Box 429 Bemus Point, NY 14712

Ms. Abby Snyder, Esq., DEC Region 9 Director
Mr. David Denk, DEC Region 9 Permits Administrator
Mr. Paul McKeown, DEC Region 9 Natural Resources Supervisor
NYS Department of Environmental Conservation
270 Michigan Avenue
Buffalo, New York 14203

RE: Written comments on the Draft SEIS for proposed Chautauqua Lake herbicide treatment

March 16, 2018

Dear Ms. Snyder, Mr. Denk, and Mr. McKeown, and the Town of Ellery Town Board,

Thank you for the opportunity to comment on the Chautauqua Lake DSEIS. In the limited time available, I will concentrate my remarks on the lack of mitigation for wildlife and rare, threatened and endangered species presented in this document. Due to the potential direct and indirect impacts that the proposed broad-scale herbicide applications may have on the wildlife of the lake, the DSEIS clearly provides too little information to adequately assess which species may be affected and to what extent.

The impressive recovery of wintering, migrating and even nesting Bald Eagle (NYS Threatened) and Osprey (NYS Special Concern) populations in recent years shows that aspects of Chautauqua Lake's biology are working quite well, and are in fact improving. The very exciting record of a Great Lakes-populations Piping Plover (Federally Endangered & NY State Endangered) using Chautauqua Lake as a migratory stopover site (a record I submitted recently to the NYS DEC) underscores the fact that the lake may be even more biologically sound than we anticipated. Reading the DSEIS submitted by the Town of Ellery leaves me with serious concerns about our lake's wildlife, as well as a sense of dread that drastic changes to Chautauqua Lake's biological functioning as a result of the proposed herbicide applications will result in unintended consequences for these conservation priority species, and other wildlife that is currently thriving in the lake.

I am not opposed to carefully controlled invasive or nuisance weed management experiments, as long as subsequent objective analysis of the results is used to guide the necessary adaptive management strategies. However, the speed and lack of defensible data that the current proposal hinges on is unacceptable.

The DSEIS currently is lacking in adequately addressing concerns related to NYS RTE birds and other wildlife. It affirms on P.40 the designation of Chautauqua Lake as an Important Bird Area (IBA) and the documentation of 270 different bird species on the lake. However, it fails to address all of the NYS RTE species known to occur on the lake, especially those that are known to be present during the potential application period. A quick subset of recent eBird (www.ebird.org) records for Chautauqua Lake hotspots can be easily acquired from the website. There are thousands of recorded sightings in the eBird data base that are not included in this review. The Christmas bird count data presented is just one of many record sets, and only provides data for the count week. I was one of the counters during the most recent Christmas Bird Count, and extensive ice cover on the lake caused many of the normally most prevalent species to be absent completely. Relying on a simplified species list based on one count during a limited time period can very easily skew or underrepresent the most critical species in the lake.

- **Rare, Threatened and Endangered Species (p. 45 & p. 107)**

The records available in the NYS Natural Heritage Program database are extremely limited and greatly under-represent the diversity and density of at-risk species, especially birds, on the Lake.

Pied Bill Grebe (NYS Threatened). the DSEIS states: "This protected bird has been reported to make Fall/Winter stops in Chautauqua Lake. No other mitigations are being proposed as treatment of the lake will occur in the spring season."

Pied-billed Grebes are present in significant numbers on Chautauqua Lake area every spring. eBird records verify that this species was observed within the last two years in three of the proposed treatment areas, one as recent as November, 2017. They breed in smaller wetlands, possibly the outlet forest, which may also be impacted by herbicide application. Food availability may be affected by removal of SAV as these birds prey in aquatic invertebrates and likely vegetation during their winter and spring stay in Chautauqua Lake.

Bald Eagle (NYS Threatened). The DSEIS states: "Bald Eagles are a threatened species. Two Bald Eagle nests have been documented within a ½ mile of Chautauqua Lake. Individual eagles may travel up to a mile from documented locations. The proposed herbicides have not been found to have negative effects on birds. Therefore, no mitigations are being proposed.

The identification of two nests comes from the Natural Heritage Program, whose database, as previously stated, is extremely limited. eBird verifies that eagles were located at seven of the proposed treatment sites within the last three years with a recent personal sighting in December, 2017. The proposed/desired application period coincides with Bald Eagle nesting season. Increased foraging for fish (dead or alive - but dead often preferred, as Bald Eagles are known scavengers) is required to feed their young. Due to feeding intensity late in the breeding season when chicks are large and growing fast, parents regularly forage at the same location, thus increasing potential for herbicide exposure to chicks. Scavenging dead fish is more energy efficient for adult bald eagles feeding young, than catching live ones. If fish are killed by any of the herbicides, there is an increased chance that these make it into the eagle's diet. The Lake is a critical foraging area for Bald Eagle during spring.

Common Loon (NYS Special Concern) is not included in the DSEIS RTE review but this species is present on the Lake every spring (eBird data, personal observation). Common Loon records exist in eBird for seven of the proposed treatment sites within the last three years, with two of those locations verified personally.

Common Tern (NYS Threatened) also not considered in the DSEIS but regularly recorded. eBird records indicate this species' presence in 2 treatment sites in the last 2 years

Osprey (NYS Special Concern) also not considered in the DSEIS. This species is now established and breeding after having been extirpated from the area - same concerns as Bald Eagle, but not addressed. Chautauqua Lake is a critical foraging area for Osprey during spring. eBird records document 8 occurrences in proposed treatment sites in the last 3 years.

Red-shouldered Hawk (NYS Special Concern) a strongly wetland associated raptor not included in the DSEIS review. Commonly seen in the Chautauqua Lake outlet area, and documented in 3 treatment sites in the last 2 years in eBird.

Common Nighthawk (NYS Special Concern) worldwide, one of the fastest declining bird species (>61% cumulative decline population-wide since 1966). Local populations are relatively healthy still but forage insects over Chautauqua Lake (personal observations) - not addressed in DSEIS.

Piping Plover (Great Lakes Population) – (Federally Endangered & NYS Endangered) - documented to occur on CHQ Lake during migration period, which coincides with potential herbicide application period. Forages on invertebrates in wrack line of dead vegetation. Not addressed in DSEIS.

In general, the DSEIS (Pg. 107 **Birds**) states:

"The proposed herbicides have do not have negative effects on birds. Therefore, no mitigations are being proposed."

Given that only a fraction of the area's known RTE species were inadequately addressed in the DSEIS, it seems very bold to state that there will not be any negative effects on the birds of Chautauqua Lake, an officially designated and internationally recognized important bird area (IBA). Applicant has not sufficiently establish the direct and indirect effects of herbicide application to Chautauqua Lake on resident, breeding, and migrating birds and waterfowl in light of the National Audubon's designation of the entirety of Chautauqua Lake as an Important Bird Area (IBA). Target species should include, but are not limited to, Common Tern (NYS Threatened) and Pied-billed Grebe (NYS Threatened), both critical to the IBA designation of Chautauqua Lake, as well as Bald Eagle (NYS Threatened), Common Loon (NYS Special Concern), Osprey (NYS Special Concern), Red-shouldered Hawk (NYS Special Concern), and Common Nighthawk (NYS Special Concern), which have all been documented to inhabit and utilize the lake. This analysis should also include impact on those migratory birds which are known to utilize Chautauqua Lake as stop-over habitat during the likely herbicide application period (such as the Federally and NYS Endangered Piping Plover). The DSEIS should also evaluate any impacts on breeding Bald Eagles and Osprey which nest in the vicinity of the lake and forage and feed their young fish captured in Chautauqua Lake during the potential herbicide application period.

Spiny Soft-Shell Turtle (NYS Special Concern). The DSEIS states: "The spiny soft-shell turtle was reportedly found in Sunset Bay within the treatment zone. However, it is not been reported in any of the treatment zones in recent years. Therefore, no mitigations are being proposed."

Spiny Softshell Turtles most definitely occur in the proposed Burtis Bay treatment area, per my own observations, and the wetland complex just downstream of the proposed treatment area. These areas represent a critical wintering, feeding and breeding habitat for this poorly known species. Based on my experience with these turtles, their occurrence and distribution in the area is greatly underreported and I have serious concerns about their likely presence in all other proposed treatment zones. Chautauqua Lake, the outlet and the Chadakoin River harbor a seemingly healthy population of Spiny Softshell Turtles - possibly the largest in New York State. Juvenile turtles forage and seek shelter in submersed aquatic vegetation beds and removal of their habitat will adversely affect their survivorship. In addition, Spiny Softshell Turtles rely to a significant extent on dissolved oxygen, absorbed through their skin and soft shell, for their respiratory needs. Hypoxic conditions as a result of large-scale vegetation die-offs after herbicide application can jeopardize survivorship of these turtles.

Additional impact studies are needed for at-risk species, such as Spiny Softshell Turtle all local bat species (which have declined dramatically in recent years, but have not received in-depth current population assessments), and other species identified in the NYS Endangered Species Act and NYS Comprehensive Wildlife Conservation Strategy that have been documented in the area. The occurrence of rare species is a sign of a healthy lake and should be celebrated. Simply because a certain species "only" ranks as "Special Concern" and lacks legally enforceable action, should not be considered a carte blanche to ignore these species and subsequently put them at risk of becoming "Threatened" or "Endangered" – it only shows that applicant does not have the overall health of Chautauqua Lake in mind.

I have been monitoring area bird populations, as well as local amphibians and reptiles in my capacity of Conservation Biologist, for the past 5 years. Special attention has been paid to area Common Nighthawk and Spiny Softshell Turtle Populations, which are surprisingly healthy in the Chautauqua Lake area when compared with other areas in New York State. The cursory attention paid to local at-risk wildlife, simply to quickly remove a large amount of vegetation from the lake is extremely worrisome. I'm not arguing that the target nuisance vegetation is not a challenge for certain lake uses, but I do have grave concerns over the fact that that several biological indicators which suggest that –biologically- things aren't all bad in Chautauqua Lake are being ignored. It behooves all of us to heed the signs that in the past decades/years sensitive species – including several formally designated RTE species - have recovered in the area and that we may undo all these gains if the proposed herbicide applications are not done carefully and after meticulous deliberation of the potential consequences for the health of Chautauqua Lake. Based on the inadequate way the DSEIS addresses these concerns for the few animal groups I am very familiar with, I worry about the quality of the remaining information in the document and urge great caution for any future steps.

Please do not hesitate to contact me with any questions you may have.

Respectfully,

Dr. Twan Leenders, President
Roger Tory Peterson Institute of Natural History

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Member Agencies:

ar Lake Association
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autauqua County Department of
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autauqua County Department of Public
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autauqua County Environmental
nagement Council
autauqua County Soil &
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autauqua County Town Hwy.
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autauqua County Watershed
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autauqua Lake Association
auta Region Professional
stewater Operators Association
utauqua Watershed Conservancy
utauqua Waterworks Association
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Nature Conservancy
A Natural Resources Conservation
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A Farm Service Agency
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CHAUTAUQUA county
WATER QUALITY TASK FORCE

RECEIVED
MAR 2 2018
NYS DEC
Region 9 - Buffalo

Rebecca Haines, Town of Ellery Clerk
P.O. Box 429
Bemus Point, New York 14712

February 27, 2018

Attn: DSEIS Comment Deadline March 12, 2018

Ms. Haines,

Our lake and waterway resources are a valuable natural and economic asset to the local communities. The County and other agencies have invested a significant amount in lake and watershed management aimed at reducing inputs of nutrients and sediment to the water bodies, especially over the last 10-15 years.

The purpose of Chautauqua County's Water Quality Task Force (WQTF) is to provide regular meetings where local agencies' representatives routinely share information about water quality in the region and offer each other technical support or direct such support to those in need. One of the typical actions taken by the WQTF is problem evaluation, such as sharing of knowledge and technical support, which can lead to more efficient and effective agency or organization response to the problem.

At the February meeting, members expressed concern over the short deadline to be able to thoroughly review the draft supplemental environmental impact statement for herbicide application to Chautauqua Lake. Due to the experience and local involvement of our member organizations, the Water Quality Task Force requests that the deadline be extended to a 90-day comment period to offer our members a chance to review the document and discuss concerns among the group to be able to supply the Town of Ellery with comprehensive and vetted comments on the document.

If you have any further questions or require any additional information, feel free to contact me at the Soil and Water Conservation District Office at 716-664-2351 ext.117 or by email at dspann@soilwater.org.

Sincerely,

David Spann, Chair
Chautauqua County Water Quality Task Force

CC: NYS DEC – Region 9, Town of Busti, Town of Ellery, Town of Ellicott, Town of North Harmony, Village of Bemus Point, Village of Celoron, Village of Lakewood

220 Fluvanna Ave,
Suite 600
Jamestown, New York
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716-664-2351

Member Agencies:

Bear Lake Association

Cassadaga Lakes Association

Chautauqua County Department of Health

Chautauqua County Department of Planning

Chautauqua County Department of Public Facilities

Chautauqua County Environmental Management Council

Chautauqua County Soil & Water Conservation District

Chautauqua County Town Hwy. Superintendents Association

Chautauqua County Watershed Coordinator

Chautauqua Lake Association

Chautauqua Region Professional Wastewater Operators Association

Chautauqua Watershed Conservancy

Chautauqua Waterworks Association

Conewango Creek Watershed Association

Cornell Cooperative Extension

Findley Lake Watershed Foundation

Jamestown Community College

NYS Department of Environmental Conservation

Ohio River Valley Water Sanitation Commission

Seneca Trail RC&D

Southern Tier West Regional Planning & Development Board

SUNY Fredonia

The Nature Conservancy

USDA Natural Resources Conservation Service

USDA Farm Service Agency

Western Southern Tier Building Officials' Association

CHAUTAUQUA *county*
WATER QUALITY TASK FORCE

Rebecca Haines, Town of Ellery Clerk
P.O. Box 429
Bemus Point, New York 14712

March 8, 2018

Attn: WQTF Comments on DSEIS

Ms. Haines,

Our lake and waterway resources are a valuable natural and economic asset to the local communities. The County and other agencies have invested a significant amount in lake and watershed management aimed at reducing inputs of nutrients and sediment to the water bodies, especially over the last 10-15 years.

The purpose of Chautauqua County's Water Quality Task Force (WQTF) is to provide regular meetings where local agencies' representatives routinely share information about water quality in the region and offer each other technical support or direct such support to those in need. One of the typical actions taken by the WQTF is problem evaluation, such as sharing of knowledge and technical support, which can lead to more efficient and effective agency or organization response to the problem.

At the March meeting, members expressed concern over the draft supplemental environmental impact statement for herbicide application to Chautauqua Lake. Due to the experience and local involvement of our member organizations, the Water Quality Task Force members reviewed the document and drafted comprehensive and vetted comments on the document for the Town of Ellery's review process.

If you have any further questions or require any additional information, feel free to contact me at the Soil and Water Conservation District Office at 716-664-2351 ext.117 or by email at dspann@soilwater.org.

Sincerely,

David Spann, Chair
Chautauqua County Water Quality Task Force

CC: NYS DEC – Region 9, Town of Busti, Town of Ellery, Town of Ellicott, Town of North Harmony, Village of Bemus Point, Village of Celoron, Village of Lakewood

WQTF Draft Comments
Chautauqua Lake Herbicide Treatment
Draft Supplemental Environmental Impact Statement

1) Several conclusions were made that requires validation by appropriate cited references. More references need to be cited for statements made.
2) Starting on page 69, the heading has in it "Draft, Attorney Work Product, Attorney Client Privileged, Not for Public Distribution." Is this the final draft of the document? Why is this still in the heading?
3) The document should be altered to consider the whole lake and impacts to the whole lake. The waters cannot be regulated as if they are not one continuous body. The people of New York State own the lake; therefore, the Town of Ellery does not have the authority to act as a lead agency.
4) The representatives on the Ellery Town Board who will be responsible for decisions on the DSEIS need to be identified, with their affiliations and qualifications, specifically for who will write the Lead Agency's rationale for its approval.
5) If the DSEIS has the support of four Towns and three Villages, what about the three municipalities (Chautauqua, Jamestown, Mayville) that have shoreline but have not supported the DSEIS. They still are adjacent to the body of the lake but are not an involved agency in the SEIS process.
6) Guidelines outlined in the 1990 SEIS for herbicide application on Chautauqua Lake should be paralleled in this document. The 1990 SEIS has a strict deadline of no application before July 1st. Also, the greatest extent on application area was 426 acres, the DSEIS is requesting to apply herbicides to 1,031 acres.
7) The DSEIS appears to refer only to a 2018 application, and thus is not usable beyond this timeline. Time windows and years of repeated treatments, if intended, must be included in the document. There are also concerns over the cumulative effects of a multi-year application were not stated, these potential impacts need to be addressed and mitigated in the DSEIS.
8) Chautauqua Lake's Macrophyte Management Strategy is a comprehensive document vetted by local and state professionals. The document considered a variety of ecological, social and economic factors. This proposed herbicide application in not in line with the suggestions of the MMS, including the importance of application during the spawning period, the restrictions of herbicide use in ecologically significant areas and potential alternative actions to the management of the two identified species.
9) Herbicides are already in the "toolbox" of the MMS, and their use has already been vetted by local professionals in drafting the document. In drafting the MMS, cost effectiveness was considered. What is the benefit of a short-term effective program at a high cost.
10) The DSEIS states that the herbicide application will result in beneficial impacts to the Lake ecology, but alleviating a nuisance is not ecologically beneficial. Show the study that indicates that herbicides are beneficial to the Lake ecology.
11) The TMDL is an estimate based on modeling, and not calculations, for reductions in phosphorus loading required for full implementation. Once this TMDL was completed, it was removed from the Clean Water Act Section 303(d) list.
12) After the 2017 herbicide application in Bemus Bay, it is critical that data be collected, at minimum, for the next growing season to determine the success of the application. Data collection on species and density in the Bay would determine the effects of the herbicide on the plant communities, beyond natural die off. This would also document the pioneer species for voids created from the herbicide application. Data collection should also extend to macroinvertebrates and fish (adult, young of year, fry) populations to assess residual impacts of an herbicide application on the ecosystem.

a) SOLitude work does not account for natural die off in drawing conclusions from past herbicide treatments. What is the exact proposed timing? If it's after natural die-off, as it was in Bemus Bay in 2017, then what is the justification for an herbicide application during the spawning period. Later, the DSEIS states that the timing is more focused around recreation and school vacation periods than ecological significance.

13) Due to the late timing of the additional Bay surveys, most plant density was characterized as trace to space, as plant growth had already begun to decline for the season. If the timing was late, why spend the effort collecting data. If this was a research collection project done by professionals, this should have been done with the proper timing to have data that can be useful.
   a) A sample size of one does not imply statistical significance and should not be used to make long-term decisions from in a complex environment.
   b) Need to identify what constitutes as trace or sparse. If sites only had this level of invasive plant community, does it still factor into the density percentages when looking at overall coverage? Only some of the Bay surveys include comparisons of native vegetation.

14) Document does not consider that milfoil is controlled by weevils, moths and caddisflies. Was this alternative considered to foster biological controls before the additional use of herbicides.
   a) Bear Lake, less than 10 miles away, has been successful for the past 8 years at managing milfoil populations through reliance on introduced weevils. While Bear Lake is a smaller system, biological controls are a relatively low-cost method that is still actively playing a role on controlling milfoil populations in Chautauqua Lake. Will an herbicide application impact these existing biological controls? Have there been any considerations to mitigate the impacts to these aquatic species?

15) The phenology of curlyleaf pondweed and Eurasian watermilfoil need to be included and how they correspond to the proposed treatment dates. They are an invasive species and will be the first to move into an area of native plants that are inadvertently killed by herbicides, making next year's stand larger. See New Hampshire's losing battle against milfoil using 2,4-D.

16) Major concerns are present over the impacts of a large-scale herbicide application on the algae communities, with the potential for more phosphorus to be readily available resulting in algal blooms and HABs.

17) A concern was expressed over a foul odor, yet this will not be improved by using herbicides.

18) The DSEIS states that the long-term accumulated mass of nutrients in the sediments may fuel macrophyte growth into the foreseeable future, even with substantial reductions in nutrient loading. This statement needs a citation. What is the time frame of "foreseeable"?

19) The City of Jamestown does not receive its drinking water from the south end of the Lake, but instead, from wells in the Cassadaga and Poland aquifers.

20) If the Lake is a Class A potable waterbody, why justify putting herbicides into it. Current treatment methods at the water intakes do not include removal of herbicides. 2,4-D is an endocrine disrupter and a benzene ring and can have human health impacts.
   a) The DSEIS states that there should be no impact to the aquifers or public/private wells. Will there be money in escrow to mitigate any potential impacts to public or private users, if there is an impact?

21) There is no quantification or mitigations to address the potential impact of herbicides to near shore wells. Quantify capture zones of wells near the lakeshore to ensure herbicides are not being drawn through.
22) The DSEIS states that concentrations of the herbicides to be applied and the dilution modeling show the concentrations at the major water intakes will be several orders of magnitude less than drinking water standards. Show the model for review. The only model indicated is a dilution model and not a transport of dispersion model to substantiate this statement. Does this also protect any non-regulated water intakes on the lake? Have any been identified in the proposed treatment areas?
    a) Discussion on dilution calculations and mitigation is focused on drinking water standards but should also include consideration for ecological standards for all life stages of fauna that depend on the lake (ie-protection of aquatic life from acute effects (A(A)), protection of aquatic life from chronic effects (A(A)), protection of wildlife (W)). The proposed herbicide applications may have sufficient dilution models for drinking water standards, as they are located away from the source water intakes. However, do the models meet ecological standards, A(A), A(C) and W, for the Lake?
23) The synergistic effects of Aquathol K and Navigate (2,4-D) are not known, and the long-term effects from their combined treatment in Bemus Bay are not known. They should not be recommended to be used together until the short and long-term effects are documented. Later, the DSEIS states that no negative effects from any synergistic interactions between herbicides are expected, provide scientific data that substantiates that statement.
24) For the Wildlife/Rare Threatened and Endangered Species chapter, it should include the NYS Species of Greatest Conservation Need (SGCN) that may use the Lake directly or indirectly. RTES exist in Bemus Bay, what was the impact on these species after the 2017 herbicide application?
25) The DSEIS does not account for any mitigation for the 270-bird species that have been documented. Are there concerns about the birds being in the treated water or feeding on the vegetation?
26) Wetland chapter does not list/show any federal/Army Corp of Engineers (ACOE) regulated wetlands. Were these considered or the proper permits for herbicide applications near these wetlands pursued? Need to identify and map these areas, as some ACOE designated wetlands may be isolated or extend beyond state regulated wetlands.
    a) This chapter also states that additional, non-mapped areas that meet the regulatory definition of wetlands are present near the lake. These areas need to be identified and mapped. Is there any mitigation for herbicide drift into these areas?
27) The document talks about the lack of implementation of reductions in commercial fertilizers from agriculture but does not address the lawn fertilizers. Why aren't there more efforts at mitigating the fertilizers that are applied adjacent to the Lake? The debate should be the private sector (lawn) benefit of fertilizers vs. the public resource (Lake) impacts of fertilizer use.
28) The DSEIS states that the active ingredients in the proposed herbicides are also common components of household herbicide products for land application and are likely used in the watershed. However, the behavior or 2,4-D in an aquatic environment is different that when it is in a terrestrial application.
29) Under the proposed herbicides chapter, it states that a pH of 8 or higher may reduce weed control. What is the pH of Chautauqua Lake, and will this reduce the effectiveness. Needs to be defined before a conclusion can be made on use.

30) In the Herbicide Dilution/Drift chapter, calculations need to be shown. Has the DEC model been used, and if so was it the correct application of the model? The model needs to be included in the draft, with inputs and assumptions included.
31) There has been no groundwater modeling to determine the impact of groundwater on the application of herbicides. Bottom springs need to be considered; if present, herbicide application may change. Clarification is needed on if/where bottom springs are identified in the Lake and any changes to the herbicide application rates (ie-more herbicide) for these areas.
32) The DSEIS states that nutrients released to the south basin in the fall when plants naturally die back would be more likely to be flushed out of the lake before the growing season the following year, yet earlier in the document, it states that internal loading is a problem for the "foreseeable future". Now, it states that it will be flushed out in less than a year?
33) In the Vegetation (Aquatic) chapter, there is no mention of potential impacts to native shoreline and riparian vegetation that could be affected by herbicides if a high-water event occurs. Some of these areas may be within the 100-foot buffer of state wetlands or federal wetlands. More literature is needed, as 2,4-D can kill shoreline trees whose roots access the treated water.
34) Was Table 4-3 supplied by the sales company of the chemicals or through scientific literature research?
35) For the Treatment Area Maps, the herbicide application was stated to be restricted to 200-feet off shore or 6-feet of water, whichever comes first. With the scale of the maps, the presented areas show zones many times that width. Proposed areas of herbicide application must be recalculated and mapped to maintain the stated restrictions.
36) In the Unavoidable Adverse Environmental Impacts chapter, it indicated that impacts associated with the application of herbicides for this project will be short term with no long term environmental impacts expected. Is there any background in science to support this conclusion? What about the impact removal of the macrophytes can have on HAB's?
37) Under the Impacts to Fish and Fish Spawning chapter, it states no data has been found that either substantiates or negates these potential impacts, yet herbicides will impact the survival of newly hatch fry of prey species that musky and walleye young of year depend on for food. Why proceed with herbicide application if it has the potential to impacts our revered fisheries in the Lake?
    a) Only addressed impacts to adult fish population, the documents need to address impacts to newly hatched fry and young of the year fish populations.
38) In the Impacts to Invertebrates chapter, it speaks to mussels, but is this the only invertebrate species that can be impacted by the herbicide application? What about the aquatic insect invertebrates?
39) There is no baseline for the invertebrate populations in Bemus Bay before the 2017 herbicide application, so the effects of the herbicide treatment on invertebrates is not known.
40) In the DSEIS it states that the NYS DEC Pesticide Program Policy requires written notice be sent to all riparian owners and users of the waterbody to be treated. Due to the Lake being on continuous waterbody, notice is required for all lake owners along the entire shoreline. Lake users from both private and public access points must also be notified.
41) Under the Alternatives Analysis chapter, it states that it is not likely that relying on current nutrient reductions and mechanical harvesting is an adequate alternative to address invasive macrophytes. However, is there any analysis done to be able to ensure that an herbicide application is an

adequate alternative. Herbicide treatments are not long term, and with the complete removal of the invasive species from the lake, will allow for reestablishment in the short term. Also, with mechanical harvesting, it cuts off the top of the macrophyte, but does not leave the bottom bare for colonization. Invasive species are considered "invasive" because of their ability to outcompete the native vegetation in these situations.

42) There needs to be a greater definition of what the proposed treatment is to weigh the environmental impacts. If the proposed application extent is a 1,031-acre application, that is the scale all the potential environmental impacts should be weighed on. Alternatives, such as a smaller surface area or a "split-treatment" can be appropriate, yet approval of this document should address all concerns that may arise from the proposed application and provide sufficient mitigation tactics. The proposed treatment and scale may have a greater ecological impact to the Lake then smaller, "split-treatments".

43) Due to the above concerns of items included in Section 4 and Section 5 of the document, without clarification, we cannot come to the same conclusion that the impacts will be effectively mitigated through the proposal included in this document. It is not clear that the proposal outlined in the SEIS will result in the improvement of the condition of Chautauqua Lake. An herbicide application will not treat the source of the impairments to the condition, yet just the symptoms of the condition.

B3. General Public (Letters and E-Mails)

To Ms. Rebecca Haines

I am 71 years old and when I was young I grow up in Celoron. Back then they would spray the lower end of the lake in the spring. We were not allowed to swim or fish for 6 or 7 days. After the period of time we went swimming and fishing. The Spraying Never Resulted in any health problems to me or my friends.

It's time to Stop all the testing and Studies. It's time to take action and save our lake, the tourist trade and lake income.

I have always had boats on this lake. Presently I keep my boat at Holiday Harbor. We have to back the boat off to clean the weeds atleast twice before we get to deep water.

Let's join the rest of the state lakes and spray. Let's not wait another Decade.

Thank You

Pat + Brad Zimmer

488 9396

Ellery Town Clerk

From: kclellandchq@aol.com
Sent: Wednesday, February 21, 2018 8:57 AM
To: ellerytc@windstream.net

Rebecca, my name is Keith Clelland. My wife and I live in dewittville. I'm 65 years old and have been on the lake since I was 8. I have never seen the weeds or the water so bad from the weeds as this past summer. Please give my input to restart the herbicides now! Thank you.
Keith Clelland

Sent from AOL Mobile Mail

Gifford and Jane Lawrence
29 Liberty St.
Bemus Point, New York 14712
Feb. 22, 2018

Dear Sirs:

We are permanent, year round residents of the Village of Bemus Point. We both grew up in this area, moved away for most of our adult lives and then moved back here in retirement 8 years ago.

A major consideration in our choosing the Chautauqua Lake region were the many recreational opportunities offered by Chautauqua Lake.

Since our return to Bemus we have seen the public beach in the village closed due to frequent mandated restrictions due to poor or dangerous water quality. We are reluctant to take our Grandchildren tubing or water skiing on the lake for the same reasons. When we do go boating we need to clear the prop of accumulated weeds and there is often a bad smell from decaying organic matter along the shoreline

We fully support the controlled use of herbicides as one of the tools that should be employed to control weed growth in the lake. We compliment the town of Ellery as being a lead entity in applying for the necessary permits that will allow the continued use of herbicides.

Sincerely,

Giff & Jane Lawrence

Giff and Jane Lawrence

Matthew T. Bowling

From: Ellery Town Clerk <Ellerytc@windstream.net>
Sent: Thursday, February 22, 2018 11:08 AM
To: Neil Robinson; Bowling, Anne K.; 'Jim Wehrfritz'; Craig Miller; Dave Wesp; John Cresanti; Mark Schlemmer
Subject: FW:

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning,

I am just back from NYC and catching up with my email. I will send any/all correspondence to you as I receive it going forward.

Thanks, Becca

From: kclellandchq@aol.com [mailto:kclellandchq@aol.com]
Sent: Wednesday, February 21, 2018 8:57 AM
To: ellerytc@windstream.net
Subject:

Rebecca, my name is Keith Clelland. My wife and I live in dewittville. I'm 65 years old and have been on the lake since I was 8. I have never seen the weeds or the water so bad from the weeds as this past summer. Please give my input to restart the herbicides now! Thank you.
Keith Clelland

Sent from AOL Mobile Mail

From: Ron Nelson <ranelson1968@gmail.com>
Sent: Friday, February 23, 2018 10:12 AM
To: ellerytc@windstream.net
Subject: DSEIS Document

To: Ms. Rebecca Haines
Hello, my name is Ron Nelson
I own a house o Lake Chautauqua at 3481 Old Fluvanna.
I am thrilled and amazed at the DSEIS document that has been created.
I want to be counted as fully endorsing the plan which includes spraying herbicides to control the weed growth.
I was involved with the CLP back in 2002 when we received approval to spray one time. Unfortunately I am in Florida until April and will not be available to attended the meeting on March 1st.
Hopefully I can be of some assistance in the future,
Thanks for all you have done,
Ron

Ellery Town Clerk

From: Ruth Wahl <rtw4748@gmail.com>
Sent: Friday, February 23, 2018 6:00 PM
To: ellerytc@windstream.net
Subject: Public Comment on DSEIS

Dear Ms. Haines:

As a scientist with a degree in geology, a science educator, and a Village of Lakewood resident with dock access; I am appalled at the proposal to use herbicides for mitigating the weed problem in the lake for the following reasons:

1. The water draining from Chautauqua Lake is used as a source of drinking water in tke long path of the water to the Gulf of Mexico. Surely, no one wants to drink herbicides

2. Poisoning the weeds is not a long term solution to the problem. The dead plant material will serve as a source of nutrients as it decays that will exacerbate the problem in the future.

3. We do not know the effect of the herbicides on the ecosytem of and near the lake. There may be unintended consequences on fish or insect life in the area. The unknowns are just too many.

4. Many of us try to eat organic food to reduce our exposure to pesticides and herbicides. To deliberately poison the lake waters is unconscionable.

May I suggest an alternative? The money spent on this proposal and the herbicides would be better spent on reducing the nutrients coming into the lake, thus solving the problem without the need for potential poisons. As I understand it, the Village of Lakewood is developing a comprehensive storm water management plant that will reduce nutrients coming into the lake. Perhaps the other communities that border the lake should should do this as well.

Sincerely,

Ruth Wahl
106 Winchester Road
Lakewood, NY 14750

Ellery Town Clerk

From: Wasik,David G <wasik@uakron.edu>
Sent: Friday, February 23, 2018 7:24 PM
To: ellerytc@windstream.net
Subject: Comment on the Use of Herbicides

Ms Rebecca Haines:

The following is my comment on the use of aquatic herbicides on Chautauqua Lake. Thank you for the opportunity to voice my opinion.

The overgrowth of invasive plants in Chautauqua Lake is largely a result of a chemical imbalance in nature. Farm fertilizers, lawn enhancement chemicals, improperly maintained septic/sewer systems, and more are the cause. Using more chemicals in the form of aquatic herbicides further pollutes the lake while only masking the problem. It does nothing to provide a permanent solution.

Think of the long term use of herbicides and the effect on the lake. It will be more difficult to control algae growth. Lakes that persistently use aquatic herbicides for a decade or more have ruined quality fisheries by destroying fish habitats. Fisherman I know will not fish in lakes knowing products like Aquathol K are being used. Chautauqua is recognized as one of the great fisheries in the northeast and it fuels much of the tourism.

Progress on the lake has been made without the herbicides. The problem has been caused over more than a century of misuse and yet we are unwilling to give sufficient time for programs carefully thought out and researched by marine biologists to work.

David G Wasik
2954 Chautauqua Avenue
Ashville, NY

Matthew T. Bowling

From: Ellery Town Clerk <Ellerytc@windstream.net>
Sent: Monday, February 26, 2018 9:08 AM
To: Neil Robinson; 'Jim Wehrfritz'; Bowling, Anne K.; Craig Miller; Dave Wesp; John Cresanti; Mark Schlemmer
Subject: FW: Comment on the Use of Herbicides

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning,

Here is a comment letter. Becca

From: Wasik,David G [mailto:wasik@uakron.edu]
Sent: Friday, February 23, 2018 7:24 PM
To: ellerytc@windstream.net
Subject: Comment on the Use of Herbicides

Ms Rebecca Haines:

The following is my comment on the use of aquatic herbicides on Chautauqua Lake. Thank you for the opportunity to voice my opinion.

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Think of the long term use of herbicides and the effect on the lake. It will be more difficult to control algae growth. Lakes that persistently use aquatic herbicides for a decade or more have ruined quality fisheries by destroying fish habitats. Fisherman I know will not fish in lakes knowing products like Aquathol K are being used. Chautauqua is recognized as one of the great fisheries in the northeast and it fuels much of the tourism.

Progress on the lake has been made without the herbicides. The problem has been caused over more than a century of misuse and yet we are unwilling to give sufficient time for programs carefully thought out and researched by marine biologists to work.

Matthew T. Bowling

From: Ellery Town Clerk <Ellerytc@windstream.net>
Sent: Monday, February 26, 2018 9:11 AM
To: 'Jim Wehrfritz'; Bowling, Anne K.
Subject: FW: DSEIS

Importance: High

Follow Up Flag: Follow up
Flag Status: Flagged

Good morning,

I wrote back to Shirley and let her know I would pass on this information to you. Becca

From: Shirley Sanfilippo [mailto:clerk@celoronny.org]
Sent: Friday, February 23, 2018 3:47 PM
To: 'T of Ellery' <ellerytc@windstream.net>
Subject: DSEIS
Importance: High

Hi Becca,

have been going over the notice and DSEIS. How critical is it that the info is correct? In several places it lists Jones and Gifford Ave. as being in Celoron. Jones & Gifford and the wetlands are located in the City of Jamestown. Also, on one of the maps it shows Lucille Ball Memorial Park in the middle of the City of Jamestown.

Shirley

Shirley A. Sanfilippo, MMC/CMFO
Clerk-Treasurer
Village of Celoron, New York
21 Boulevard Avenue
P.O. Box 577
Celoron, NY 14720-0577
Phone: 716-487-4175
Fax: 716-664-6693
E-mail: clerk@celoronny.org

Ellery Town Clerk

rom:	Rutkowski, Edward (DOT) <Edward.Rutkowski@dot.ny.gov>
Sent:	Tuesday, February 27, 2018 3:49 PM
To:	ellerytc@windstream.net
Subject:	Chautauqua Lake Herbicide Treatment

Rebecca,

New York State Department of Transportation (NYSDOT) reviewed the information submitted for the subject project and has the following comment:

- The proposed action will not have a significant impact on the State Highway System.

If you have any questions please contact me either by phone or email.

Sincerely,
Edward Rutkowski

Edward S. Rutkowski, P. E.
SEQR/Site Plan Review Coordinator
NYSDOT - Region 5
100 Seneca Street
3uffalo, New York 14203
716-847-3575

NEW YORK STATE OF OPPORTUNITY | Department of Transportation

February 28, 2018

Rebecca Haines
Town Clerk
Town of Ellery
PO Box 429
Bemus Point, NY 14712

RE: Draft Supplemental Environmental Impact Statement for Chautauqua Lake

Dear Ms. Haines,

I write as a citizen and homeowner to express my opposition to the Town of Ellery moving forward as the lead agency to determine the environmental impact of the application of herbicides to a significant swath of shoreline along Chautauqua Lake.

I don't want my grandchildren to swim in a lake that contains any amount of 2-4-D or other herbicides. I don't want the eagles, currently nesting, or other raptors that have rebounded after near extinction because of DDT (which included 2-4-D) to be affected. I don't want the swans, returning again on their migration to the Arctic, to be exposed to chemicals in our lake. I don't want my dog exposed to chemicals in our lake.

Please modify the SEIS so it covers the entire lake. There are no fences in the water, and the proposed application is substantial. In addition, please modify the document so ALL lake users, public and private, must be notified when herbicides are applied and when swimming or drinking is prohibited.

I believe we should rely on the expertise of existing and long-standing organizations like the Chautauqua Lake Watershed Conservancy and the Chautauqua Lake Association to study and control harmful algal blooms and invasive non-native weeds. I believe we should wait and listen to the findings of Governor Cuomo's Hudson Valley Summit and consider forthcoming recommended actions to reduce harmful algal blooms in New York's lakes and waterways. I think we should follow those forthcoming recommendations in a prudent and thoughtful manner, with qualified scientists determining a baseline and evaluating the impact of those recommendations. At that point, I could live with the limited application of chemicals, if that is what is recommended.

Please identify the persons, with their affiliation and qualifications, who will prepare the SEIS. In addition, the persons or organizations selected to prepare the SEIS should not benefit in any way from the application of herbicides to Chautauqua Lake.

There is more at stake with what is being proposed than being inconvenienced when the shoreline stinks. We need to make sure the long-term impacts of applying herbicides, killing native and non-native weeds, disturbing fish habitats, and the other environmental consequences are worth it.

I'm disturbed by the changes that are being made to reduce environmental safeguards on the national level right now and am sickened to see the threat of the same happening in my own back yard.

Sincerely,

Beth Peyton
Bemus Point

To Whom it May Concern,

I am writing regarding the use of herbicides in Chautauqua Lake. I am opposed to chemical controls because the risks outweigh the benefits.
These risks include:

1. Disruption of the delicate ecosystem of the lake. These herbicides will kill beneficial plants as well as invasive species. This will have a negative impact on fish, birds and other animals who depend on these plants for food and habitat. It is also possible that the die-off of these plants will contribute to excessive nutrients, exacerbating the very problem we are attempting to mitigate.
2. One of the herbicides intended for use poses an unacceptable danger to human and animal health; namely Navigate(2,4-D.) This chemical(one of the ingredients found in Agent Orange,) is a known endocrine disruptor. This means it may affect male reproductive development. It has been shown, in experiments at Stamford University, to change a male frog to a female frog. It is also associated with an increased risk for non-Hodgkins lymphoma and sarcoma. It as also been shown to negatively impact other hormones like estrogen, androgen and most significantly, thyroid hormones. The risk to those applying this herbicide are even greater.

A more sensible and healthful approach would be to concentrate on the nutrient density feeding the algae blooms from the use of fertilizers, human and animal waste, and "brown water," the runoff from sinks and washing machines, etc., running into the ground near the lake. As a resident of Greenhurst, when I'm walking my dog, I am often struck by the sudden rush of water into drainage ditches and lawns. Even though we have a public sewer here, it seems that this water is still being allowed to drain right into the lake.

I believe the use of fertilizers near lakes and streams should be outlawed in Chautauqua County. Also, chemicals in lawn herbicides, like the glyphosphate found in Round-Up should not be permitted. This widely-used herbicide poses grave risk to native plants, as well as humans and other animals.

I hope the Town of Ellery will think twice before implementing a plan that will ultimately not address the problem and will, in fact, cause others.

Rachel E Brown

Research was conducted by the Wisconsin Department of Natural Resources, in 2012, on the use of these herbicides. I also found other articles on Wikipedia and other sites online concerning the environmental impact.

Rachel Brown
PO Box 42 - 2867 Forest Ave
Greenhurst, NY 14742

Comments regarding Chautauqua Lake Herbicide Treatment Draft Supplemental Environmental Impact Statement 3/1/18

My wife and I have owned a small seasonal lakefront cottage at Cheney Point on the lower lake for 36 years.

I am a long time muskie fisherman. My main recreational use of the lake is muskie fishing from opening day in May to late October, although boating, kayaking, and taking my grandchildren tubing are all important.

I am a resident of Ohio, so do I not participate in electing local officials, but pay property and school taxes.

I do not obtain my drinking water from the lake.

I do not represent any group.

I wish to make the following comments:

A statement should be included indicating whether SOLitude Lake Management has had experience in applying herbicides to a lake approaching the size of Chautauqua Lake, that is greater than 10,000 acres, and experience in treating waters containing pure bred Esox maskinonge (not other species of Esox, ie northern pike, pickerel, or hybrid tiger muskies since each has its own unique sensitivities and habits).

This request was made in comments regarding the scoping document but it was chosen by the preparers of this draft, not to address this point.

This request is in no way meant to insult or demean SOLitude's 20+ year experience in applying herbicides to ponds and lakes. However, since the company appears to have been a major architect of the stated plan, it is relevant to establish their expertise beyond managing control of aquatic vegetation by applying herbicides, to be able to make accurate predictions with confidence that appear throughout this draft, regarding effects on the complex ecosystems and the unique muskie fishery that characterize Chautauqua Lake.

The fisheries should be respected and protected but are not by this proposal.

1) "Fish, Fish Spawning and Habitat", page 84, and 4.8.3, "Impacts to Fish and Fish Spawning, page 103:

The importance of the Chautauqua Lake fisheries in general and the muskie fishery specifically was recognized as one of its most important assets on page 35. However, if this asset was truly valued as stated, the proposed plan would not call for treating a quarter of the fish spawning/rearing areas in the Lake in the spring when large concentrations of fish of all species are present in these areas. Although the herbicides to be used are reportedly not directly toxic to fish, the treatment of these areas, will change/destroy habitat interrupting reproduction. Additionally, herbicide induced plant death results in locally decreasing dissolved oxygen levels, regardless of what the baseline pretreatment levels may be.

Although most of the muskie population in the lake is from the stocking program, with the claim there is minimal natural reproduction, adult muskies still congregate in the spawning areas and go through the spawning ritual, and would be at risk to the effects of the decrease in levels of dissolved oxygen.

2)"the NYDEC has regularly approved permits for herbicide application during typical spawning periods" (page 85):

Numbers and/or examples of such approvals and/or a statement whether such permits included waters inhabited by pure strain Esox maskinonge should be included.

3)"Mitigation" 5.2.3 Fish and Aquatic Animals, page 108:
"Impacts to the general adult fish population will be small" is not a statement that can be made with certainty with regard to muskies and should be altered to reflect known muskie behavior.

Muskies spawn in shallow weedy water primarily in April and May, sometimes extending into June dependent upon a number of variables. Telemetry studies have shown that individual fish frequently to return to the same area of a lake each year with fish congregating at these sites in the lake to go through the spawning ritual lasting 5 to 7 days, whether it results in reproduction or not. The location and timing are biologically programed in the fish. While on the spawning sites, the fish are usually oblivious to surrounding activity (a characteristic that makes them vulnerable to poaching by physical means). The stress of the spawning ritual leaves the fish more vulnerable to additional stresses such as decreases in dissolved oxygen.

The application of herbicides when the fish are in the spawning area, by the stated plan for mitigation of starting application at the shore and moving out toward deeper water is not likely to induce the large numbers of adult muskies concentrated in these areas to **"swim freely to deeper water and temporarily move to other parts of the lake".** This idea of mitigation is perhaps naive because these muskies are biologically programed to be where they are and likely will remain there despite the herbicides being applied on top of them. Even though as stated, the chemicals are not directly toxic to the fish, the decrease in dissolved oxygen known to occur with herbicide induced killing of plants, puts these adult muskies at risk of injury or suffocation and death if oxygen levels drop below critical levels, as was observed when a trophy sized 51 inch spawned-out female muskie floated dead to the surface at the site of the SOLitude herbicide application in the area of a known spawning site, the morning after the chemicals were applied in Bemus Bay last June.

Although it is uncertain, the proposed plan has the potential of damaging or killing a significant number of adult muskies or other fish in this fashion. It cannot be predicted or guaranteed by architects of this plan this will not happen.

4)It can be estimated, the cost of an adult muskie raised from the hatchery is in the range of $30 to $50 per adult fish depending upon the survival rate of stocked fingerlings reaching adulthood. The possibility of damaging or killing a significant numbers of adult muskies resident in the Lake runs counter to NYDEC Prendergast Hatchery attempting to provide desirable numbers of healthy fish in the Lake.

In summary, the stated mitigations regarding the potential impact on the fisheries, specifically the muskie fishery <u>are not sufficient</u> to protect them.

If the muskie and other fisheries are truly valued, the application of herbicides should be by the following guidelines and restrictions. (these are consistent with recommendations in Chautauqua Lake Macrophyte Management Strategy report and with comments regarding the scoping document submitted by others).

1)No herbicides should be applied to known or suspected spawning/rearing grounds or at sites of undeveloped shoreline.

2)Herbicide application should be delayed until after July 1, after spawning is completed and the large concentration of fish have left spawning/rearing areas.

3) Levels of dissolved oxygen should be monitored with suspension of herbicide application if there is a drop below the critical level of 6.0 ppm (Oram, PG, "Dissolved Oxygen in Water", Water Research Center, B.F. Environmental Consultants, Inc).

4)Herbicides should not be applied greater than 200 feet from shore or in water depth greater than 4 feet, whichever comes first.

Treatment of many contiguous acres of offshore weed beds in areas beyond 200 feet from shore has uncertain effects on the ecosystem and will negatively impact a large number of Lake users and should not be allowed except in area of high boat traffic such as the Stow narrows:

Figures 4-1 to 4-10 and 6.4.2 "Different application locations"

1) The meaning of "treatment area" as shown in Figures 4-1 to 4-10 should be defined. Do the shaded areas shown in the figures denote the location of deposition of herbicides or the expected area of killing? If the former, the killing effect will likely include a much larger surrounding area than shown due to dissipation and drift of the chemicals after they have been deposited. The expected area of killing should be shown in these figures.

2) Offshore weed beds are important habitat for fish and other living things that make up the ecosystem and are important in recreational activities for many users of the Lake. Indeed, curly leaf pondweed, one of the species of macrophytes targeted by the proposed plan provides a useful and healthy fish habitat in many areas of the Lake that are used in sportfishing. These plants regress and are gone by late June or early July in most of the offshore locations proposed for treatment (personal observation).

3) It is indicated that the **proposed plan may result in earlier growth of algae** due to the release of nutrients from dying plants (4.2.1 and 4.8.1) and decreased competition. The greater area treated, logically, the more such products would be released.

The first cyanobacteria advisory was issued for Chautauqua Lake on June 25 last year with advisories lasting 18 weeks (3.2.1, Aquatic Vegetation, Algae, page 28). The prospect of an **even earlier algae bloom is a huge negative for all users of the Lake.** While excessive weed growth is a problem, the algae bloom/levels are the greater impediments to aesthetics, swimming, and other recreation, as shown in figures 3-2 and 3-3, pages 25, 26. It is a health hazard and impairs recreational activities involving the most of the lake surface, not just the littoral zone where macrophyte growth is predominant. It continues to be present well after macrophytes have regressed and disappeared (Algae was still coating the lake at the time SOLitude was performing its survey October 17-19, 2017 in front of my property, and finding sparse or no growth of any macrophytes, including invasive species-Appendix H).

4) Many of the stated problems with excessive weed growth can be attributed to close to shore vegetation which could be addressed by spot herbicide application in these areas. While offshore vegetation may interfere with some recreational activity, it is not generally present in areas beyond the littoral zone; the open area beyond the littoral makes up the majority of the lake surface and is available for all recreational activities unimpaired.

Statements on page 99 claiming (milfoil) "it clogs boat propellers and causes the motors to overheat" or "forces individuals to tow their jet ski equipment to the middle of the Lake before it can be used" are generalizations that frequency or locations of such occurrences at Chautauqua Lake should be cited to document these are legitimate problems; otherwise these are embellishments and overstatements that should not be included.

5) "The treatment areas have been determined by the community and supported by their municipality representatives to address nuisance weed growth" (page 117).

The makeup of "the community" should be defined and estimates of numbers of Lake users making up said community should be indicated. The majority of Lake users are not represented by the cited local municipal officials.

"Eliminating locations would not achieve the goals of the project and the expectations of the residents the area" (page 117).

The "goals and expectations" are vague and should be defined or described.

While the "residents of the area" are an important group of Lake users, they do not own the Lake and quite possibly do not even make up the majority of total number users of the Lake. Chautauqua Lake is a multiuser lake and different groups of users may have different expectations that should not be allowed to be discounted as being less important.

The larger the areas of herbicide application, the greater the volume/amount of chemicals required. Since the herbicides are being placed into water, the treatment sites have no boundaries (Herbicide Dilution/ Drift 4.2.2) and result in distant undesirable effects including threatening drinking water supplies, real or perceived, of many residents of Chautauqua Lake, which is reinforced by the offers to supply potable or bottled water to those residents of areas where herbicide application is not wanted.

One group of Lake users should not have their rights supercede the rights of other Lake users and be allowed to dictate actions that will have negative impact on those other Lake users who disagree with that action.

6) "Open spaces and recreation facilities" (page 99, 4.5)

The second paragraph states that "In the 2017 MMS, the majority of residents (83%) listed the condition of the lake as declining, in large part due to the presence of the invasive macrophytes".

While that statement is not untrue, it is misleading in attempting to portray this as consensus; it appears the statement is based upon an opinion survey with 182 respondents, hardly representative of the thousands of people who use the Lake. If this information is to be included in this document, it should more honestly indicate that it was "151 out of the 182 or 83% of those responding". Likewise, "Many suggested that herbicides should be used to combat the invasive weed problem", is based upon 33 of the 182 respondents (18%) making that suggestion, hardly justification of calling this "many" (perhaps "some" would be more honest), if the statement is to remain.

7) The SOLitude surveys that form the cornerstone for identifying herbicide treatment sites in this proposal, focused on macrophyte populations, and minimally on the myriad of other forms of life, from amphibians to zooplankton that could be negatively affected by locally altering the ecosystem. Without a current baseline of assessment of non plant life prior to altering their environment, effects cannot be objectively judged and declarations like "there is not expected to be significant damage", "it is likely to be better", or "no long term environmental impacts are expected" (4.8 Unavoidable Adverse Environmental Impacts, page 102) are all speculations and there is no way to assess if there was actually damage or improvement after application of herbicides as planned.

These statements should be changed to reflect less certainty of outcome of the proposed treatments or assessments of non plant life should actually be made before herbicides are applied. This is relevant to the possible future requests for herbicide applications as indicated on page 117.

IN SUMMARY:

1. It is reasonable to use chemical herbicides in a limited "spot" fashion as a "tool" aimed at improving the water quality of Chautauqua Lake. These however, these should be allowable only with strict guidelines.

2.Those who use the Lake for sport fishing will have their recreational activity impaired in the short term by damage of existing fish habitat by this plan and possibly in the long term by damage to the fisheries (see "Decline in Lake Arthur muskellunge fishing has anglers, state trolling for answers", Pittsburgh Post Gazette, Oct 9, 2011; "A Lesson Learned at Webster Lake, michianaoutdoorsnews.com, 7/19/2012; DNR Stocks Larger Muskies in Lake Webster", IN.gov, 5/24/2016).

3.No evidence was presented in this draft to indicate that the extensive use of chemical herbicides would improve the algae bloom/levels in Chautauqua Lake and the algae bloom/levels may actually be worsen with an earlier onset. Objectively, as shown in this draft, the algae bloom/levels exceed the problem of increased growth of macrophytes in terms of odor, appearance, and impairment of recreational activities plus is a health hazard. Attempts to portray the plan making an overall improvement while increasing the severity of the worse problem is a bit disingenuous.

4.There are many users of the Lake that will be negatively impacted by extensive application of chemical herbicides as indicated in this plan without their approval; among others, those who draw their drinking water from the lake.

5. The plan does not include any form of evaluation of the effects of herbicide use on the ecosystems other than effects on vegetation and the assurances that "it likely will be better" or "no long term environmental impacts are expected".

6. The "expectations of (some of) the residents of the area" should not be a reason to allow their rights to unilaterally be prioritized ahead of the rights of other Lake users.

Edward D Crum, MD

11395 Woodlark Circle, Painesville, OH 44077

3076 Chautauqua Ave, Ashville, NY 14270

chautmuskie@sbcglobal.net

98 Elm Street
Mayville NY, 14757
716 753 3245
blnnn@roadrunner.com

March 3, 2018

Ellery Town Board
P.O. Box 429
Bemus Point, New York 14712

Attn: Rebecca Haines, Town Clerk

Subject - Comments on Draft Environmental Impact Statement, Herbicide Treatment Plan

Gentlemen,

I am very concerned about the plan for using chemical treatment for the control of weeds in Chautauqua Lake

The Impact statement does not include the negative impacts of herbicide use. After the weeds die and fish swim away we are left with a mess of dead weeds, bugs, crabs, snails etc. on the bottom and clear water rich in nutrients. What happens next is not addressed. Either we have muddy water from a bare lake bottom being stirred up by waves or an algae bloom fed on the now available nutrients. Last year we got an algae bloom. I observed this happening in Bemus Bay weeks before any algae appeared at the docks in Mayville. For a more scientific discussion of the after affects of herbicide treatment see the attached report by Michigan State University Extension, 'Be careful what you wish for when managing aquatic weeds' posted July 9, 2013 by Dan O'Keefe, www.msue.anr.msu.edu.

And what happens the following year? Not addressed in report. I suspect that the invasive weeds will have a field day on the barren lake bottom. More toxic chemicals will be needed for weed control, more income for the chemical companies.

In discussing the alternates not included is doing a more to reduce the nutrients entering Chautauqua Lake. Instead of spending on reaction why not go all in on the proactive plan in per the current Chautauqua Lake Management Plan. i.e. naturalize the lake shore, use best practice road ditch management, buffer zones along streams, rain gardens, aggressive collection of dead weeds in the fall, etc.

Sincerely yours,

Robert Lannon

4780 Whiteside Parkway
Maple Springs, NY 14756
March 6, 2018

Rebecca Haines, Town Clerk
Town of Ellery
Bemus Point, NY 14712

RE: Draft SEIS for Chautauqua Lake

I am pleased to have the opportunity to submit comments relative to the Draft Supplemental Environmental Impact Statement for the proposed Herbicide Application in Chautauqua Lake. As a town resident and taxpayer, I wanted to draw attention to the issue of the Town's liability relative to the proposed action.

In the first place, the application of herbicide in the lake will transcend the physical Town boundaries and will involve other towns as it relates to the quality of drinking water, the impact on the lake fishery, the duty to notify and police the lake during the quarantine period to protect against injury to the public, to provide for proper insurance, and to ensure that procurement in all jurisdictions is done by a qualified, licensed contractor. Effective implementation of this project will require unprecedented coordination among jurisdictions and the coordination of a lake-wide health and safety plan. Has anyone undertaken the planning and assumed responsibility for this coordination within the Town of Ellery?

Going forward, has the Town established policies and procedures relative to assuming responsibility for citizen-led and citizen-funded initiatives such as this proposed herbicide application? What are the implications for future grass roots initiatives that may seek town sponsorship? If the Town has not established policies and procedures, it opens itself up to discrimination liability regarding future potential initiatives and applicants.

Please consider these protections for the Town and its resident taxpayers as this issue moves forward.

Sincerely,

Robert Wooler

Ellery Town Clerk

From: Bob Wooler <director@graycliffestate.org>
Sent: Tuesday, March 06, 2018 4:09 PM
To: ellerytc@windstream.net
Subject: Draft SEIS Comment

4780 Whiteside Parkway
Maple Springs, NY 14756
March 6, 2018

Rebecca Haines, Town Clerk
Town of Ellery
Box 429
Bemus Point, NY 14712

RE: Draft SEIS for Chautauqua Lake

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Please consider these protections for the Town and its resident taxpayers as this issue moves forward.

Sincerely,

Robert Wooler

Kathleen McCarthy
4780 Whiteside Parkway
Maple Springs, NY 14756

Mailing Address:
PO BOX 66
Bemus Point, NY 14712
k.mcwooler@gmail.com

March 8, 2018

To: TOWN OF ELLERY
DEC, NYS, Region 9

The DSEIS indicates that herbicide application proposed to over 1000 feet off shore in Maple Springs. This area should be removed from the proposed treatment area due to extensive migratory bird population that comes to these bays. On page 45 the DSEIS indicates that the last year that a Common Loon was documented is 2005. By personal sightings, I know that the Common Loon has been in Maple Springs as recent as the Fall of 2007. The loon requires a lush plant populayion as habitat fir its mainly fish diet. Multiple waterfowl species use the Maple Springs bays and herbicides should not be used in these areas. Included in those species, is the migrating tundra swans. The Cornell Lab of Ornothology indicates, "Tundra Swans eat mainly plant matter, although they also like mollusks and arthropods. Plant foods include tubers, stems, and leaves of aquatic vegetation such as *Carex* sedges, saltmarsh starwort, alkali grass, pondweed, and *Nostoc* algae." Pondweed is one of the main native plants that is killed by herbicides.

The deadline needs to be extended by 30 days for all residents to properly view and understand the complex document.
Thank you for the opportunity for comments.

Sincerely, Kathleen McCarthy

March 8, 2018

Ellery Town Board
% Ms. Rebecca Haines
PO Box 429
Bemus Point, NY 14217

Dear Board Members:

I am writing in support of the Draft Supplemental Environmental Impact Statement (DSEIS) for the application of herbicides to certain targeted areas of Chautauqua Lake.

I am a year-round lake-front resident of Quigley Park in the Town of North Harmony. I have owned my propery for almost 49 years. Prior to my ownership this property had been owned by my grandparents since 1929. I have been around Chautauqua Lake for my entire 73 years of life. I love the area and the lake.

As a child, teenager, and even into my early twenties it was possible to waterski from the dock. In the 1990s when my children started to waterski the weeds were so bad we had to drive many hundreds of yards out into the lake where the weeds were far enough below the surface that they were able to get up on skis. Now my son is taking his children waterskiing and tubing in the lake and the weed conditions are even worse than what he experienced in the 1990s.

Off my dock, the lake becomes extremely bad by August or sooner each year. The weeds are abundant and smelly and blue-green algae is present. I have no desire to even walk out on my dock. Any idea of swimming in it is out of the question.

After 25 years of doing almost nothing to improve conditions on the lake, I feel it is time to try something different. The herbicides of today are much safer and targeted than the herbicides of 25 years ago. I support their use in the lake with the hope that instead of seeing the lake continue to deteriorate year after year, herbicide use can start to bring improvement.

Sincerely,

Mary A. Glatt

Mary A. Glatt
3238 Chautauqua Ave.
Ashville, NY 14710-9736

Ellery Town Clerk

From: Nystrom, Becky <BeckyNystrom@mail.sunyjcc.edu>
Sent: Thursday, March 08, 2018 6:33 PM
To: 'Ellery Town Clerk'
Subject: RE: your request for article

Hi Becca – Per your request, here's the link (below) to the article I referenced at the public hearing last week. There are additional links of interest embedded within the article, as well. I'm happy the Town may consider this of relevance to the DSEIS process – these alternative stable states are truly a concern . The last line of the article says, "If you are concerned about water clarity, be wary of large-scale vegetation control programs on shallow lake. In other words, be careful what you wish for." Take care!
http://msue.anr.msu.edu/news/be_careful_what_you_wish_for_when_managing_aquatic_weeds

Becky
Rebecca L. Nystrom, Professor of Biology
Jamestown Community College
525 Falconer Street
Jamestown, New York 14701
716.338.1315
beckynystrom@mail.sunyjcc.edu

From: Ellery Town Clerk [mailto:Ellerytc@windstream.net]
Sent: Thursday, March 08, 2018 3:49 PM
To: Nystrom, Becky <BeckyNystrom@mail.sunyjcc.edu>
Subject: 20180308155555702.pdf

Dear Becky,

Here is a letter of request from Town of Ellery Supervisor, Arden Johnson.

Thanks, Becca

(a hard copy is in the mail)

Ms. Haines
Statement concerning the Herbacide Treatment Proposal
March 9, 2018
From Jay Kuntz

As a non-resident property owner on the shores of Chautauqua Lake, I applaud all organizations and individuals who wish to find solutions to problems impacting the lake and the surrounding environment.

I am not totally opposed to the potential of using chemical treatment to the lake. However, this is not an action that should be done in haste or without broad input and consideration from citizens and respected scientists in and out of government.

I do not believe that the Environmental Impact Statement, of over 130 pages, should be rushed to a vote without all local towns having enough time for review, comments and providing answers to questions from property owners. This proposed action has serious implications on public health, the environment and use of taxpayer money. I also understand that the "due process" of NY Environmental Review may be bypassed by the lead of Ellery so that other communities can overlook this step. SLOW Down!

Some of the areas, which are part of the areas for treatment, have been identified as sensitive areas with important habitats. Can't better areas be found? Chautauqua Lake has many different layers and is not a place where 1 solution is the answer for everything.

In addition to the issue of better weed control, which I do support, the issue of HAB is a very serious public health concern. How will the use of herbicides impact the growth of HAB caused by algae? If the plan is successful in removing unwanted plant life in the lake will this create more probability for HAB? The ecosystem of the lake and wetlands is a complex environment. Consideration must be given to more than just getting rid of the weeds. Gov. Cuomo's panel to develop plans to protect lakes from HAB is having a summit in Rochester on 3/26. This is indeed an opportunity for further information about the interaction of chemicals with big picture of the lakes environment.

I can't claim cause and effect but last season, about a week after the herbicide treatment in Bemus Bay, I was doing the routine task of cleaning out the weeds along the shoreline. I found over 1 dozen dead carp. All were roughly 10-14 inches in length. It's not unusual to have a few dead fish in with the weeds. However, both the number and similar size of just 1 species got my attention. I looked across the lake at Bemus Bay and wondered...who would be the correct organization to report this to? Is anybody documenting more than just weed growth?

Is the township of Ellery going to be responsible for monitoring and reporting the secondary impacts of this treatment? Is their legal liability for communities, companies or organizations that are supporting the Chemical Herbicides?

I do believe that the best solutions can be found when input from different perspectives are merged. As an example, collaborative efforts are leading to significant reductions in the TDL of phosphorus in the lake, which is a major contributor to algae growth. This took time, money and partnership to get this far. It is also ongoing in North Harmony as proposals for sewer lines are on the horizon to eliminate septic systems close to the lake. The problem with the weeds did not happen overnight. The solutions being considered should not be limited to quick fixes.

Unfortunately, I believe that how the Herbicide proposal has been presented looks to minimize opportunity for serious input from "seasonal property owners". I also believe that all communities around the lake have a voice in any treatment. The region has many committed organizations and individuals who care for the lake. Their voices should also be recognized.

Not only is it necessary to look at many alternatives but it must be done with a very broad and open perspective. It should not be rushed to meet a manufactured deadline of the upcoming season. Create a timeline where analysis, input and questions can be answered. **I oppose Herbicide Treatment of Chautauqua Lake until those issues are addressed.**

Thank You,

Jay D. Kuntz
Property owner in North Harmony
446 Salem Dr
Pittsburgh, PA 15243
j.vid@verizon.net 412/915-6776

March 9, 2018

Ms. Rebecca Haines, Town Clerk
Town of Ellery
P.O. Box 429
Bemus Point, NY 14712
Email: ellerytc@windstream.net

NYSDEC Region 9 Office
270 Michigan Ave.
Buffalo, NY 14203
Email: region9@dec.ny.gov

RE: Draft Supplemental Environmental Impact Statement (DSEIS) for the Proposed Chautauqua Lake Herbicide Treatment

To Whom It May Concern:

The purpose of this letter is to provide comments on the document described above. I am a tax-paying, permanent resident of Chautauqua County and a lifetime lover of Chautauqua Lake. I am also on the Board of Directors of the Chautauqua Watershed Conservancy (CWC). CWC owns waterfront nature preserves at several locations on the Lake. These preserves encompass wetlands and near shore fish and wildlife habitats that will be negatively impacted by the proposed herbicide treatments.

The following are my specific comments regarding the Draft SEIS:

1. I continue to oppose the Town of Ellery designation to be the lead agency for the SEQR process and the SEIS. The SEIS is a lake-wide action and the Town of Ellery has no jurisdiction or regulatory authority over the Chautauqua Lake waters. In my opinion, Chautauqua County or the New York DEC should be the lead authority for this SEIS.
2. All actions and decisions regarding control of plants in the Lake must be consistent with the Chautauqua Lake Macrophyte Management Strategy (MMS) of 2017. The MMS restricts herbicide applications to June 20 or later to protect sensitive fish spawning areas. The proposed May application date in the DSEIS conflicts with the MMS directive and should be changed.
3. Similarly, to protect sensitive habitats, herbicide treatments in Chautauqua Lake are restricted to 200 feet offshore or 6 feet of water depth, whichever is encountered first. The DSEIS maps of proposed treatment zones delineate areas that do not follow this directive. The maps and treatment areas should be revised.
4. The SEIS should consider the "no action" treatment alternative. The benefits of the "no action" treatment include allowing herbivore species to grow and control milfoil. Furthermore, the significant cost savings that is inherent in a "no action" approach should be included in the SEIS analysis.

The multi-chemical approach currently described in the DSEIS will kill beneficial pondweeds as well as the invasive and exotic species. It will negatively impact sensitive fish habitat and spawning areas within

Fletcher E. Ward
3724 Crestview Drive
Bemus Point, New York 14712
(716) 386-7977
March 11, 2018

Rebecca Haines, Town Clerk
P.O. Box 429
Bemus Point, New York 14712
Re: Comments on the Draft Supplemental Environmental Impact Statement (DSEIS), Chautauqua Lake Herbicide Treatment.

I respectfully offer the following comments for consideration relative to the "Draft Supplemental Environmental Impact Statement (DSEIS), Chautauqua Lake Herbicide Treatment" to which the Town of Ellery is named as Lead Agency

ITEM #1: POTENTIAL AFFECT OF HERBICIDE APPLICATION ON CHAUTAUQUA LAKE'S MUSKELLUNGE POPULATION

As a fourth generation resident of Bemus Point on Chautauqua Lake, a fisherman, and an author of a reference on the history and life cycle of Chautauqua Lake's Muskellunge (Saving Chautauqua's Muskies, Ward, 2013) I would like to offer several comments relative to Draft Supplemental Environmental Impact Statement (DSEIS) for Application of Herbicides in Chautauqua Lake for which the Town of Ellery Board has been named as Lead Agency.

During the early history of the five muskellunge hatcheries on Chautauqua Lake workers stripped as many as 12,691,232 muskellunge eggs (1948)-a sufficient quantity to enable release 5,277,220 of that species back into the lake. Such a large number of fry was believed necessary because of the *extreme vulnerability of these* *fish to environmental factors-especially during the 8-21-day egg development stage and the 10 day to 2 week sac-fry stage. This period of extreme vulnerability coincides exactly with the application timeframe as presently proposed in the (DSEIS*

Over time, fish culturists improved the hatchery facility and the fish culture processes which enabled the facility to rear fewer muskellunge to a larger size. While some muskies are still released throughout the rearing process, today's primary goal is the release of approximately 13,000 fingerling muskellunge between 8.5 and 9". The larger size helping to reduce predation and ensure viable muskellunge populations. In more recent history, purity of water at the Bemus Point and Prendergast Chautauqua Lake's hatcheries was suspect as causative in several outbreaks of pathogens. High mortality rates due to waterborne diseases have been reduced by improving hatchery water purity through the use of ultra-violet lights and carefully controlled chemicals. In an environment where 88% of Chautauqua Lake's naturally-reared muskellunge die in the first year, it is extremely critical to insure the viability of each and every muskellunge fry.

Naturally-reared muskellunge stocks are vulnerable to a far wider range of environmental factors than their hatchery-cultured counterparts. At a minimum, the following consequences of herbicide application could be expected to diminish naturally-bread, young-of-the-year muskellunge stocks.

1. Reduced availability of muskellunge food stock zooplanktons, especially Daphnia, upon which the young fish feed almost exclusively for three days following the sac-fry stage and until approximately 1" in length. This could be anticipated as a direct result of mortality due to chemical uptake, as well as a consequence of increased feed stock predation due to kill-off of cover caused by chemical herbicide application.

2. Enhance predation of muskellunge fry by elimination of aquatic fauna killed by application of herbicides. Color pattern in young muskellunge varies from spots to blotches to stripes-all of which help camouflage the young fish as they swim in weed beds. Absent that weed cover-as would be the case following herbicide application-young muskellunge would be extremely vulnerable.

Wild Celery (Vallesneria americanus) and coontail (Ceratophyllum demersum) are both preferred spawning vegetation for muskellunge. (1994

"St. Lawrence River Muskellunge Nursery Habitat Inventory", Managing Muskies in the 90's). Coontail has been characterized as having a "high susceptibility to Aquatholl K, indicating that much of Chautauqua Lake's primary vegetative cover could be compromised by the planned spraying.

3. Artificially introduced chemical stressors such as oxygen depletion resulting from macrophyte die-off following herbicide application.

While it is accurate to say that as much as 78% of the lake's muskellunge population may be the result of hatchery-rearing, it would equally accurate to say that in historic instances where hatchery-reared muskellunge have been impacted by environmental factors, the resulting loss of eggs and/or fry has been catastrophic. Should such a loss take place in the hatchery concurrent with a natural die-off caused by chemical herbicide application, the results could be the loss of an entire year class of muskies.

Studies have been undertaken on walleyed pike, small mouth bass and largemouth bass relative to the effect of herbicide application, but to the knowledge of this writer, *no comprehensive, independent study of the effect of application of any of the three herbicides being considered for application has ever been conducted on Chautauqua Lake Muskellunge in the egg, sac-fry, fry or fingerling stages. There is also no study of the effect of any of the three herbicides under consideration in the DSEIS relative to Daphnia spp. which comprises 57% of the zooplankton in the north basin of Chautauqua Lake and 80% in the south basin. As previously stated, daphnia are the primary feedstock for young muskellunge for approximately three days following sac-fry stage, and a secondary feedstock thereafter (Chautauqua Lake Status of Fisheries 2014, Legard). Finally, this writer is not familiar with any study of the three herbicides being considered when those products are combined as would be in the proposed DSEIS.*

Studies included as Table 4-4: Summary of Selected Triclopyr Toxicity page 80, and Table 4-5: 96 Hour LC50 Aquatic Toxicity Test Using 2, 4-D page 83, are incorporated in the DSEIS. They reveal a very broad range of LC50, ranging from 891 mg/l in bluegill to 44 mg/l in fathead minnows in Triclopyr and 358 for rainbow trout to 2.5 in fathead minnows for 2,4 D. *The age or life-stage of the species used in these tests are not specified except in the case of "frog larvae" indicating that other tested subjects were adults of the species which would typically have a* *greater tolerance to these chemicals.* It is this writer's belief that the results obtained from studies of these three species cannot be "extrapolated" to estimate potential effect of herbicides on muskellunge because walleyed pike are stream spawners, and the two bass tested are nest spawners whereas muskellunge are indiscriminate spawners. As well, there are significant differences of temperature of the water at the time of spawning between these species and muskellunge.

Sanderson & Hammers "Status of the Muskellunge Population in Waneta Lake, 2005-2009") revealed that a lake-wide, April 2003 application of fluridone (Sonar) and subsequent 2008 localized treatment with triclopyr (Renovate) to Waneta Lake was said to have resulted in , "Low numbers of muskies that were age 3 and 4 in the 2005 nets and age 6,7,and 8 in the 2009 nets (which) indicated poor survival of muskies that were age 0 to age 2 in 2003, the year of the treatment."

Due to budget and manpower restrictions, trap net population data tend to be limited in scope and target only larger, older muskellunge from which "inferences" have to be made as to age group populations. Thus, these studies should not be considered an ideal tool to determine with complete accuracy the effect of herbicide application on muskellunge eggs, sperm, fry, or fingerlings. Other sampling methods more suited to collection and study of eggs and fry-of-the-year should be utilized to analyze for the presence of juvenile muskellunge and other species in the affected area.

Also, the effect of 2, 4-D is specifically indicated in the DSEIS as "not harmful to *beneficial* insects". Fish young-of-the-year are not selective as to whether an insect is "beneficial" or not, they are simply eaten. This begs the question of how much of the feed stock for fish species will be compromised by the application of this chemical.

Additional studies must be undertaken with the assistance of the DEC or Cornell University *at the egg and fry life-stages* prior to the approval of further application of the use of these chemicals in Chautauqua Lake. *Saunders and Hammers stressed in their recommendations that no large-scale application of the 813 acre Waneta Lake be undertaken, rather that only, "small, dispersed areas of aquatic vegetation" be permitted. At the very least, this recommendation should be considered were any application to be granted after suitable study.*

Mike Clancy of the DEC is quoted in the DSEIS as having said that, "The NYSDEC collects muskellunge eggs from the Lake the first week in May of each year..." Mr. Clancy's statement may have be here presented out of context. While muskellunge certainly spawn around that time, egg casting is certainly not that specific. Oneida trap nets are set at six locations around Chautauqua Lake for a longer period of time because spawning tends to be water temperature dependent, ranging from 50 to 60 degrees. Vagaries in ice cover thickness, cloud cover, rain quantity and temperature all factor into lake temperature, thus substantially altering muskellunge spawning dates.

I would ask that consideration of the above factors be made and a small, carefully controlled study be undertaken by NYS DEC Fisheries in spring of 2018 relative to the effects of application of these particular herbicides on Chautauqua Lake muskellunge and on zooplankton, in particular Daphnia, a primary muskellunge feed stock. Further, that the results of that study over the course of the first growing year be memorialized as part of the DSEIS prior to any permit being considered. I would further recommend that any future permit for application is tied to *lake temperature*.

In recent years, walleye pike and calico bass have probably been exploited as the most popular eating fish and small and largemouth bass as exceeding muskellunge for sport fishing popularity. Our lake's muskellunge take during spawning in 2014 indicated that the fishery enjoyed its highest catch since the 1970s (Legard). Because of the lakes ecology and the work of the NYS DEC Fisheries Division, Chautauqua Lake's Muskellunge remains a species which brings millions of dollars in sport fishing tourism into Chautauqua County's and New York State's economic base. At a time when local industry is diminishing, we can ill-afford the potential impact of the effect of herbicide application on the muskellunge population.

ITEM #2: APPLICATION OF HERBICIDE

According to the Wisconsin Department of Natural Resources, ("Endothall Chemical FAQ Sheet"), Aquathol K, an Endothall based herbicide is recommended not to be applied to more than, "...1/3 to ½ of the surface at one time because excessive decaying vegetation may deplete the oxygen content of the water and kill fish." Further, Cornell Cooperative Extension, Tompkins County ("Endothall FAQ") states that, (Endothall) ..."causes cellular breakdown of plants within 2-5 days. Symptoms of plant damage-including defoliation and brown, shriveled tissues-will become apparent within a week of herbicide application. Plants will fall out of the water column within 3-4 weeks of application." Given these two statements from renown and trusted institutions and the DSEIS requested application date of the first week in May, total suggested application timeframe could or should last as much as 12 weeks, thereby affecting the entire Chautauqua Lake muskellunge spawning season, Chautauqua Lake's tourist season, and peak use period of drinking water from Chautauqua Lake for Chautauqua Institution .

ITEM #3: RELATIONSHIP OF HERBICIDE USE TO ALGAL GROWTH

The third item I believe must be researched and made part of any potential application/approval for the use of these herbicides in Chautauqua Lake is the integral relationship between aquatic "weed" growth and algal blooms-especially those of blue-green algae. This relationship is little understood and has yet to be scientifically studied in Chautauqua Lake. The Final Scoping Document for the Draft Supplemental Environmental Impact Statement included (Section 6.0 "Prominent Issues Raised During Scoping *That Will Not be Addressed*") which stated that *"funding of algal bloom studies would not be included". Algal blooms were the primary reason that herbicide application was sought by a small group of residents of Bemus Bay and members of the CLP at their initial meetings with the Village of Bemus Point and Town of Ellery Board!* The potential exacerbation of conditions that promote algal blooms as a direct result of chemical herbicide application may well be one of the most important cause/effect relationships that could come out of this DSEIS because while excessive weed growth may be an annoyance, Cyanobacteria can be lethal! Avoiding this issue by simply indicating, "it will not be addressed" as part of the study may reduce cost and time, but the potential consequences may be grave!

Algal blooms are enhanced and supported by natural eutrophication in all water bodies. Phosphates attach to sediment particles and are subsequently released to the water column during periods of low dissolved oxygen, low turbidity, increased light, and warmer water temperatures (all of which would be typical *following the proposed herbicide application). It is during those conditions when they are made available to aquatic plants and algae-especially blue-green algae which tend to outcompete other algal forms.*

The same nutrients (phosphates and nitrogen) which exacerbate algae blooms are, in a measure, locked up in aquatic plant growth making them less available for algal growth. Simply put, when weed growth is removed from the lake by mechanical harvesting, a portion of the nutrient load is also removed. Absent appropriate scientific study, it is reasonable to believe that the application of herbicides to kill Eurasian water milfoil and curly leafed pondweed instead of mechanically harvesting those weeds, will in all probability, exacerbate the growth of algae in Chautauqua Lake. Currently, tons of weed growth harvested from the lake are composted for use as an agricultural supplement- some of it by organic farming interests. *Once any herbicides are applied, the use of any residual organic matter from that application as well as all mechanically harvested weeds would be prohibited for use by organic farms and all resulting organic matter would, in all likelihood, have to be landfilled at an exorbitant fee.*

Mechanical harvesting of submerged macrophytes has come under scrutiny because it reportedly leaves some (as yet scientifically undetermined percentage) residual weed cuttings. One only has to look at the enormous piles of tons of mechanically harvested weeds to appreciate the huge volume of organic matter the CLA removes from the lake. All of this matter contains phosphates and nitrogen which did not become part of the organic matter on the bottom of Chautauqua Lake. In contrast, 100% of submerged aquatics killed by herbicides fall to the bottom of the lake where they deplete oxygen and become an immediate source of nutrients for algal growth and regrowth of target macrophyte species. That is the reason the application has been proposed for May prior to significant growth of these plant species. Unfortunately this is also peak spawning time of several important Chautauqua Lake fish species.

A study of the relationship of weed and algal growth and the impact of mechanical harvesting vs. chemical herbicide treatment must be incorporated into this DSEIS.

ITEM #4: STUDY OF INVETEBRATES WILL NOT BE INCLUDED

The Final Scoping Document for the Draft Supplemental Environmental Impact Statement included a section (Section 6.0 "Prominent Issues Raised During Scoping *That Will Not be Addressed*") also indicates that invertebrate animals will not be included in the study "because there was no environmental baseline". Invertebrate species are essential food sources for several fish species as well as waterfowl in Chautauqua Lake. In short, all species which will be subject to the effect of herbicide application must be included as part of the necessary scientific data established prior to approval of the DSEIS. If no environmental baseline exists, one must be established prior to granting approval for herbicide application. Further, once established, that baseline must be compared to a secondary census following any potential application.

ITEM #5: POTENTIAL GROUNDWATER RECEPTORS

Section 3.3.3 "Groundwater" recites the number of wells within 2,000 feet of the shoreline of Chautauqua Lake on page 22.of the DSEIS "According to a NYS DEC Map of registered wells" there are approximately, "...nine wells in the Town of Ellicott, 72 wells in the Town of Ellery, 37 wells in the Town of Chautauqua, and 21 wells in the Town of North Harmony." While this figure is attributed to another source, it is grossly misleading and an inaccurate portrayal of the number of citizens for whom near-shoreline water wells are the only source of drinking water. To those unfamiliar with the area who will read and attempt to understand this data, it suggests a minimal number of potential receptors whereas overwhelmingly, the vast majority of homes surrounding Chautauqua Lake derive their drinking water from private wells and literally thousands of those wells are within 100 or 200 feet of Chautauqua's shoreline. The above referenced statement must be excluded.

Representative private water wells throughout, and nearest the shoreline area of treatment should be sampled and tested for all of the compounds contained in the three herbicides intended for use under the proposed DSEIS prior to any treatment, and periodically thereafter. While a generalized flow of groundwater is believed to be understood, there may be variations which could cause contamination-especially since previous history of the use and "success" of these chemicals indicates that they will need to be reapplied, potentially increasing contamination. (*Sanderson & Hammers "Status of the Muskellunge Population in*

Waneta Lake, 2005-2009") revealed that a lake-wide, April 2003 application of fluridone (Sonar) had to be repeated five years later in 2008 as a localized treatment with triclopyr (Renovate)). This history of required repeat applications makes appropriate testing of water wells in the affected area all the more critical.

Represented as a percentage of the entire proposed study and application cost of this project, precautionary testing is a miniscule cost to safeguard Chautauqua County's residents.

ITEM #6: CORRECTION

One minor correction to the DSEIS for Chautauqua Lake Herbicide Treatment, Section 3.2.2, Table 3-3 "Fish Species, Chautauqua Lake (Adapted from CCDPD 1990). Since original compilation of this table, Polyodon spathula "Paddlefish" have been successfully reintroduced into Chautauqua Lake by the efforts of the New York State Department of Environmental Conservation.

A great deal of time and effort has been expended in the preparation of this document-but it is far from complete. It would be the suggestion of this writer that consideration should be given the points enumerated above and that the authors of the work produce a scientifically complete study prior to submitting their application.

Thank you for your consideration,

Fletcher E. Ward

(1) Comments for
Chautauqua Lake -

2010 MARCH 12

Bemus Bay gets issues from up the Lake. It seldom works the other direction.
The upper basin area doesn't truly understand the algae/weed issues - even Maple Springs doesnt - the issues worsen as you travel southward toward the outlet

The scientists and biologist's have been studying the issues for many years from a "strickly natural" view. They seem to be no closer to answers than at the beginning. They do see many of the problems and that is a start

It seems there need to be a living solutions that can be based on seasonal, yearly, and or decade etc. cycles.

Schooled gardeners can tell you there are certain times of the year you can not cut tops off of plants. ~~if you don't~~ Wrong timing will cause them to expand expotentially. Try it with burdocks. top them wrongly and you will have a plant 4 feet by 4 feet and bigger with loads of burrs on every branch.

I can cut my hedge row at a certain time and I may need to cut one more time in the summer. the wrong time and I will need to cut it several times. This needs to be checked out with the ~~Lake~~ CLA people - not to be done just because they have workers available.

(2)

Is the weed/algae issue anymore balanced than when cutting was first started the many years ago?

How is the "experimental Bemus Bay area" doing ~~since~~ since the seeding was done last year? Is the weed/algae growth better?

Do any of the water filtration systems including Chautauqua institution remove ~~take~~ the algae toxins? I know many people who get health issues from the regular drinking water from around the lake. (The artesian wells systems seem to be okay).

Does the sewer + water plants to any checking for algae toxins? Maybe they could.

Do algae toxins get stuck in the weeds because of the consistency of algae/weeds + toxins? The seeds do their work - dissolve in water and flow away?

The seeds do their work and are gone?
The algae continues to produce toxins all their life cycle? - How many years do the algae live and reproduce?

There seems to be a communication problem whether it is the delivery or reception of the information -

3

I do not understand why the "raving lady" or the Lakewood swimming instructor did not understand about the seeking + timing - as in ~~that~~ is the timing it was done and/or the lake was swimable again in 24 hours.

Better communication of the above to particularily the "summer people" might help us to work better together.

Ellery Town Clerk

From: Brian & Cheryl Eckwahl <beckwahl1@stny.rr.com>
Sent: Monday, March 12, 2018 10:18 AM
To: ellerytc@windstream.net; region9@dec.ny.gov; abby.snyder@dec.ny.gov; david.denk@dec.ny.gov
Subject: Comments on draft SEIS for Chautauqua Lake

I previously wrote about concerns in regard to the use of herbicides on Chautauqua Lake and I am now expressing more concerns after reading the draft document. My family has lived on or near the lake for 3 generations. I have been on or in the lake on a regular basis since 1950 and continue to swim, fish and boat on the lake. Even during the period of herbicide use in the 1950s to 90s there were weeds and the lake always turned green in August. There was an odor, but we accepted that that was the way of the lake. Current publicity put out by the CLP would lead people to believe that the lake is unusable, but this is not true. The thing I find troubling is the toxic blue green algae which has increased in recent years. I believe this is largely due to climate change combined with nitrogen from lawn treatments and phosphorus from sewage and runoff. This will not be helped by herbicides and may even be worsened.

On page 6, there is a description of SOLitude's data collection project which concluded that there was a distinct difference in treated vs untreated areas in weed density. Of course there was. That is what herbicides do and it is what I would expect. I think a more valuable assessment would involve checking the weed density and nature of the weeds in May and June 2018 to see if there is any carryover and if native weeds replaced the milfoil. The CLP seems to be in such a hurry to use herbicides that they are unwilling to do valid review.

I had questioned the cumulative impacts of using several herbicides and what testing had been done. This was addressed on p.104 very briefly. There apparently has been no testing. The conclusion stated is that there will be no impact based on observation last year. This seems inadequate.

On p.103 it is stated that there may be some effect on fish spawning and rearing. Once the weeds are killed there will be no cover for fry to avoid predators. On p. 81 it is stated that 2,4-D has the potential to harm fish and that small fry may be more susceptible to the effects of herbicides.

On p. 84, the draft addresses spawning areas in weed beds, specifically for crappie, muskies, yellow perch and pumpkinseed which will be affected by herbicide use. The document repeatedly states that most muskies are hatchery raised so I guess we are not to care if spawning beds are destroyed. Muskies have been spawning in the lake for hundreds of years if not longer. I have read reports that 10% are naturally spawned. Should we jeopardize this natural reproduction, in addition to the loss of those other species?

Cheryl Eckwahl
2958 Townline Rd.
Jamestown, NY 14701

Sent from my

Ellery Town Clerk

rom:	John Dilley <johndilley@aol.com>
Sent:	Monday, March 12, 2018 11:50 AM
To:	ellerytc@windstream.net; region9@dec.ny.gov; borrellog@co.chautauqua.ny.us
Cc:	'Conroe Residence'; 'Peter Beeson'; 'John Shedd'; 'Tom Cherry'; 'Bill Neches'; 'Ted Arnn'; ebrickley@chautauquaalliance.org; 'Jen mcdowell'
Subject:	DSEIS Comments on transport and dispersion
Attachments:	Comments on DSEIS_DilleyFeb2018.docx

All concerned parties;
Please find attached my comments on section 4.2 Hydrology and Water Resources of the DSEIS. I am still amazed that users of the lake don't seem to care where these toxic herbicides go and how the concentrations decrease. With air pollution, smoke can be seen coming out of the stack. With toxic material in the water, it is a very similar process, except that it can't be seen. People have told me that there is a North to South current in Chautauqua Lake. This current is miniscule compared with wind driven currents. The dilution calculations use the full volume of the lake, which is off by a factor of 2 to 4 times.

The whole lake dilution calculation will work for ponds and shallow lakes, but not deeper lakes like Chautauqua. Because the North Basin is so deep, the stratification in the water column prevents mixing from top to bottom, except for twice a year; once in the Spring (Overturn) and again in the Fall (Overturn), when the water temperature is 40 degrees (max density of fresh water). The rest of the time, there is a vertical stratification due to warm water near the surface in summer, or cold water(near 32 deg, less dense than 40 deg) in the winter. In both cases, the lower density water on top will not mix with the higher/max density water at the ottom. Mechanical mixing due to wind/waves will form a mixed surface layer whose depth is a function of wind/waves.
Bottom line is that the current is driven by the wind, and the dispersion due to current/waves is much less than the whole lake dilution.

One final note – Toxic herbicide applications proposed for 2018 are much closer (2 -3 miles for Sunset Bay) to the Chautauqua Institution drinking water intake than the applications in Bemus Bay (5-6 miles) last year. So saying that there was not a problem last year isn't going to work for 2018.
Sincerely,

John F. Dilley, PhD
614-715-7857 cell
614-336-7888 home

March 15, 2018

Submitted via email
Ms. Rebecca Haines, Town Clerk
Town of Ellery
P.O. Box 429
Bemus Point, NY 14712
ellerytc@windstream.net

Dear Ms. Haines,

I write to object to the Town of Ellery's acceptance of the Draft Supplemental Environmental Impact Statement (DSEIS) in its current form.

As prelude, I will suggest that we have reached a point where there is a rush to action because of a failure over several decades of the County of Chautauqua to properly fund and investigate meaningful solutions. This long evolving negligence does not justify acting in a negligent manner once again by adopting a hastily conceived and poorly designed plan. Negligent action taken quickly does not make the action any less negligent. We are all better served in the long-run to do the right thing, rather than what is deemed the expedient thing.

The scoping document fails to address:

- Broader notification to all property owners within the watershed and outlet.
- It should be a lake-wide assessment and include downstream impact.
- More in depth study of water movement and potential for harming drinking water sources.
- Impact on algae blooms.
- Affects of herbicides on fish populations.

Specific sections should be corrected or language removed as it is based on supposition or conjecture and not science based examination:

Section 4.5

- "Densities of macrophytes on the lake are hindering..." My activities are only hindered by algae blooms.
- "Harvesting has not been sufficient..." harvesting limitations are purely expense based and there seems to be no comparative cost studies or examinations as to the benefits of additional harvesting in dense macrophyte areas.
- "Overall impact of the herbicide application on the socioeconomics... is projected to be positive". There is no foundation or research given that leads to this self-serving, conclusory allegation.

- "Forces individuals to tow their jet-ski equipment." I never had any significant issues when using a jet ski and any minor inconvenience to the operation of a jet ski pales in comparison to not knowing if I am ingesting harmful pesticides or other chemicals that could affect my health, or the health of my children, grandchildren or pets.

Section 4.9

- "Once applied, the products will dissipate" – there are no studies to confirm this and therefore no basis for the comment.
- "No negative effects from any synergistic interactions… are expected" - there are no studies to confirm this and therefore no basis for the comment.

Section 5.2.3. says only 25% of the fish spawning areas will be affected. No herbicide should be applied in any fish spawning areas. There is no science to confirm that drift of herbicides will not occur and impact other spawning areas. Much of the rhetoric in the DSEIS seems to suggest that containment of the herbicide application is a given. There is a reason we no longer have smoking sections in airplanes and you don't have peeing sections in a swimming pool.

Section 5.4 discusses notification and swimming restrictions. The proposed notification fails to notify the broad spectrum of lake users which includes non-resident visitors to the lake. There should be a written notification to all lake area property owners and notification sent to the home addresses of those who have second homes around the lake and within the watershed.

Take the time to do this study correctly and engage with all the stakeholders and appropriate agencies.

Sincerely,

Dustin Nelson

Dustin Nelson
14 Bemus St.
Bemus Point, NY 14712
dustindnelson@gmail.com

cc: nysdec region9@dec.ny.gov

Comments regarding Chautauqua Lake Herbicide Treatment Draft Supplemental Environmental Impact Statement 3/14/18

Below are comments regarding this draft that I wish to be added to those which were submitted on 3/2/18:

Page 103, 4.8.4 "Impacts to Invertebrates":

The effect of herbicides to be used, on herbivore insects including weevils, moths, and caddis documented to be present in the Lake and which preferentially eat Eurasian milfoil is not mentioned. A statement should be included if the proposed herbicides would adversely affect these insects.

It is curious that page 40 discussion of invertebrates indicates that herbivore insects are identified and feed on Eurasian milfoil, yet recent studies by credible scientists (Cornell University) that are consistent with these herbivores being effective in decreasing density invasive Eurasian milfoil growth are not mentioned on page 40 or in the discussion of history of weed control measures at Chautauqua Lake (section 1.2). This information is contained in references cited in the bibliography this Draft, which uses the contained information regarding mussels, so obviously was available to authors of this document.

Figure 4-4, page 90:
The proposed herbicide application to Burtis Bay should be modified.

The 41 acre 200 foot wide treatment area "navigation lane" extending from the main portion of the proposed treatment area to beyond the littoral zone is not necessary and would be harmful.

Burtis Bay is a popular fishing area which I visited more than 30 times from Memorial Day through October in 2017. At no time during the entire season was there not open water on the east side of The Crib and Grass Island in the area of the "navigation lane". Water craft of all kinds moved freely through this area (personal observation); it is the path taken by the Summer Wind from its dock in Celeron out into the lake and back.

Depositing herbicides in a 200 foot wide swath for 1.7 miles in this area will have an effect across a much wider area on both sides of the application due to drift of the chemicals and destroy the fish habitat consisting of deeper water weed beds and an area of fish spawning/rearing (Appendix I).

At this area of the lake, on many days, there are as many as 15 or more boats, containing 1 to 4 occupants, sport fishing for a variety of species including panfish, bass, walleye, and muskie. Over the course of the fishing season, this translates into hundreds of Lake users; destroying this fish habitat with herbicides will deprive these Lake users of their recreation at one of the most productive fishing areas in the entire lower basin.

Observations during many hours spent in the Burtis Bay area over the past 25 plus years fishing for muskies, are that the vegetation density varies considerably from year to year; however overall, it has definitely decreased over the past 3 years. There was no vegetation survey performed of this "navigation lane", and therefore no documentation of excessive growth of vegetation at this location (Appendix H).

Figure 4-6, page 92:
The reason that herbicide application to Warner Bay is extended far offshore for treatment of the Warner Bar should be stated.

The Warner Bar is an offshore area used heavily by fishermen because of its structure (Chautauqua MMS, map 6-2), and is a fish spawning/rearing area (Chautauqua MMS, map 7-1). It is a shallow weedy area with a solid bottom surrounded by deep water on 3 sides. Sediment depth measured by SOLitude with a few exceptions is 6 inches or less (Appendix H). It is far from any docks, and does not impair any watercraft from leaving the shore to reach open water. The only inconvenience is that watercraft need to swing out wider around the area when traveling up or down the Lake as much from the water depth as the presence of weed growth. **The necessity to treat this area should be stated.**

4.3.1, page 78, "Vegetation (Aquatic)

This section discusses the 3 proposed herbicides aimed at controlling selected aquatic plant species and the chart "reflects the documented plant community of the proposed Chautauqua Lake application sites", with susceptibilities.

Except the Bemus Bay site, the other proposed sites have not actually had the plant communities with relative densities documented since the SOLitude survey was performed in October 2017, after plant regression with minimal or sparse growth at most all of the survey sites. The proposed sites even include an area, Sunset Bay, where there was no survey, (with the apparent plan to carry out a survey in 2018). It thus appears it is just assumed that this area, as well as the other areas, will be dominated by the target plant species, and would likely receive herbicide application regardless of the findings, so results of the surveys are irrelevant and necessity of the surveys questionable, except to support preconceived conclusions.

Thank you for the opportunity to add these comments regarding this Document, to the comments submitted on 3/2/18.

Sincerely,

Edward D Crum, MD

11395 Woodlark Circle, Painesville, OH 44077

3076 Chautauqua Ave, Ashville, NY 14270

chautmuskie@sbcglobal.net

Ellery Town Clerk

'rom: James Reynolds <jimar7716@gmail.com>
Sent: Wednesday, March 14, 2018 11:59 PM
To: elleryTC@windstream.net; dave.denk@dec.ny.gov; abbey.snyder@dec.ny.gov

Subject: Regarding the Chautauqua Lake Herbicide Treatment

To Whom It May Concern:

My name is James Reynolds and I am the president of Muskies Inc. N.Y. Chapter 69. I would like to comment on the proposed herbicide treatment regarding Chautauqua Lake. As president it's my duty to point out that Chautauqua Lake is the most famous and renowned musky lake in the northeast. This is where the New York D.E.C. keeps its broodstock, and does its egg collection to support the oldest musky hatchery in the world located on that lake. As I understand it once again man wants to tamper with nature, by putting chemicals into a natural lake, in an effort to control weed growth.

This is a lake not a swimming pool. And these weeds were put here by mother nature for many reasons. This is where baby fish are born, where juvenile fish learn to hunt and feed themselves, while avoiding predators. For fish, amphibians and aquatic insects to lay their eggs. Weeds also help clarify the water and protect shorelines by buffeting wave action from the wind and more importantly boats.

I know there must be some strong reasons for contemplating the proposed weed control plan, but I implore you to consider this action very carefully. I have seen these weed control efforts on other lakes, and once started it's a never ending cycle. Once the weeds are removed it leaves open areas where the other weeds move in. In some cases worse weeds than what you started with. As an example Waneta Lake. Solitude Lake Management or some other company has been putting herbicides in that lake since 2005. Last summer while fishing on /aneta Lake, I personally found water chestnuts in the lake. These weeds were not in that lake before Solitude Lake Management started the weed control program there.

In addition to that fact, in 2016 they treated Waneta Lake with their weed control program and that year there was evidence of toxic blue green algae in the lake I witnessed myself. In 2017 they did not treat Waneta Lake and I saw no evidence of toxic blue green algae, but Waneta's sister lake Lamoka, an immediate connecting lake was treated downstream from Waneta Lake and that lake did experience a toxic blue green algae outbreak at the south end including Mill Creek. Oh and by the way Waneta Lake is the other lake that the D.E.C. has its musky broodstock and egg collection programs. These are the two premiere musky lakes in the state.

In addition these two lakes provide stocking for not only inland N.Y. waters but are also in other states in the northeast's musky stocking programs as well. And I don't care who says what, they don't know the long term extended effects of sustained usage of an herbicide or a cocktail of various herbicides in varied amounts. The fact that these two lakes together are the backbone of a musky stocking program started over a hundred years ago, and should not be jeopardized. Therefore very careful thought should be exercised regarding any herbicide programs on these two lakes together.

Most sincerely,

James Reynolds
President Muskies Inc. N.Y. Chapter #69
Veteran Member Niagara Musky Association
Charter Member of Chautauqua Lake
'usky Hunters Club
Former Member Muskies Canada
Honorary Member Carol's Fishing Club

Grand Island N.Y.
Proud Member of the Loyal Order of the
Moose #2290

P.S. Thanks for your time on this matter.

From: Ellery Town Clerk <Ellerytc@windstream.net>
Sent: Thursday, March 15, 2018 10:43:44 AM
To: Neil Robinson; 'Bowling, Anne K.'; 'Jim Wehrfritz'; Frank Nicotra; Tom Erlandson; JoDee Johnson; Craig Miller; Dave Wesp; John Cresanti; Mark Schlemmer
Subject: FW: Letter to Arden Johnson

Good morning,

Here is a little more information. Becca

From: Bowman, Jan [mailto:JanBowman@mail.sunyjcc.edu]
Sent: Thursday, March 15, 2018 10:39 AM
To: 'Ellery Town Clerk' <Ellerytc@windstream.net>
Subject: RE: Letter to Arden Johnson

Hello again!

I was able to find them faster than expected... here they are! Such studies have not been done on Chautauqua Lake, and we have so much more scientific information that we need (ACCURATE and SCIENTIFICALLY SOUND information) before applying chemicals that could have unexpected and disastrous effects. There are too many "unknowns" to safely do hat is being proposed.

Thank you for requesting additional information, Jan

From: Bowman, Jan
Sent: Thursday, March 15, 2018 10:15 AM
To: 'Ellery Town Clerk' <Ellerytc@windstream.net>
Subject: RE: Letter to Arden Johnson

Hello Becca,

I will do my best to get those to you by the deadline tomorrow, but I need to dig them out and have two very full days of teaching along with my comments that I'm working on for you as well. Though I greatly appreciate the extension, the deadline is still too short and does not allow for adequate time to pull together comments on a very large document with MANY issues. To then correspond and pull together your requested items is proving difficult. I will do my best... you will have it, but I can't promise by the deadline.

Respectfully,
Jan Bowman
Professor of Biology
Environmental Science Program Coordinator
Jamestown Community College

From: Ellery Town Clerk [mailto:Ellerytc@windstream.net]
Sent: Thursday, March 15, 2018 9:08 AM
To: Bowman, Jan <JanBowman@mail.sunyjcc.edu>
Subject: Letter to Arden Johnson

Good morning,

I have been asked to request "two more recent articles which confirm the findings" and the two published research papers referenced in your letter to Supervisor Johnson. Please send these articles/links at your earliest convenience so that we can consider all information.

Thank you in advance,

Becca Haines
Town Clerk

3.15.18

This is an additional comment on the proposed herbicide treatment. This concern was brought up at the meeting at the fire hall, but I believe this article really brings clarity to the problem. I hope it will be considered.

Thankyou,

Cheryl Eckwall

Rec'd - late afternoon
3/15/18, RHH

Ellery Town Clerk

From: B Blanchard <netkrap2@cs.com>
Sent: Thursday, March 15, 2018 2:47 PM
To: ellerytc@windstream.net
Cc: region9@dec.ny.gov; abby.snyder@dec.ny.gov; daviddenk@dec.ny.gov
Subject: Fwd: Comments of draft Supplemental Environmental Impact Statement

P. O. Box C

Maple Springs, NY 14756

March 15, 2018

Ms. Rebecca Haines, Town Clerk
Town of Ellery
Bemus Point, NY

Dear Ms. Haines,

I write in response to a request for comments regarding the draft Supplemental Environmental Impact Statement currently under consideration by the Ellery Town Board.

Let me begin by affirming my lifelong love for Chautauqua Lake and the pleasure which it has given me and my family. My great-grandfather was an original purchaser at Point Chautauqua in 1879, and lakefront property has been in my family continuously since then with the exception of the few years between 1982-1990. My husband and I have owned lakefront property in Maple Springs since 1990. I learned to swim in our lake in the 1940's when I spent several weeks every summer visiting my grandmother. I learned to fish from my father in a boat which now hangs from the ceiling of the museum in the old depot in Mayville. We even caught the largest smallmouth bass in NY State for the month of September 1954, and won a prize from the Louis Wehle fishing contest, a notable achievement in those days. I treasure our lake and hope that it will mean as much to future generations as it has to me.

I also understand that weeds are a thorny issue and more than a nuisance for some. I think we'd all like to see the invasive weeds eliminated, but the questions revolve around how best to do this and at what cost. The decisions we make in the next few months may well have repercussions well beyond the issues with weeds in Bemus Bay, so it is incumbent upon all of us who love the lake to work together to find the best and most wise solutions.

My bedrock starting point in this discussion is that if the application of herbicides is necessary, that this should be done to the smallest possible area and for the shortest possible period of time. Herbicides come with warning labels for a reason - they're hazardous to plants and animals - and although the hazards can be reduced or minimized in a number of ways, the inescapable conclusion is that these products are designed to kill. In reading the warning statements for the three specified herbicides, I find that one of them is a 'broad-spectrum weed killer' and that a second is 'toxic to fish'. I find that nursery and greenhouse crops should not be irrigated with treated water for as much as 120 days after application, yet this same water is supposedly safe for me to drink and swim in as soon as the next day. Is an African Violet or a Hosta deserving of greater protection than my grandchildren?

In looking at the maps of proposed application areas, it seems that most of the lakefront in the Town of Ellery has been targeted, and that the application areas run roughly from the shoreline out to perhaps

600-1000 feet. It seems that this area includes virtually everything from the shoreline to what fishermen call the 'weed line', the point at which weed growth falls off significantly. Using a 'broad-spectrum herbicide' suggests that this effort is designed to kill all weeds, native and invasive, although this program is routinely justified as simply being necessary to control the non-native invaders. Such a proposal is thus hardly limited to the smallest possible area, and the inescapable effect will be to compromise native vegetation which is part of the basic ecology of the lake.

As someone who has loved fishing in our lake for decades, I cannot support a proposal which seems likely to compromise the good fishing which I've always enjoyed. 'Navigate' is toxic to fish. Read the label ! The fish also need some native weeds as a source of food and as protection from predators. By using 'Aquathol K' to kill all weeds, the habitat which is essential for the fish will be damaged if not destroyed, even if the fish themselves are not damaged by Navigate. A more targeted attack on the fish and fishermen is difficult to imagine. By way of justification, the draft SEIS suggests that damage to the fish from applications of chemicals will be largely avoided because the fish can simply swim to other areas. Really? No research is cited to show that the fish can detect treated water before entering it, and if they can't identify it, how are they supposed to know to avoid it? Underwater signs? In what language? Or are they simply expendable? Who are we kidding here?

The fish are further threatened by plans to use herbicide during their spawning season. This relatively brief period largely coincides with early plant growth, the point at which the SEIS recommends herbicide application. Do a bit of reading on the spawning of bass and other fish and you'll find that in many instances their success requires not only some weeds, but also a relatively safe environment in which the males can fertilize the eggs deposited by the females. Saturating the area in which the fish spawn with toxic herbicides can't possibly be helpful, and reducing the success of reproduction is likely to have a ripple effect on the entire fishery. Larger fish eat smaller ones, and waterfowl and other birds eat larger fish. Disrupt this cycle by compromising spawning success and the impact on the lake habitat may go well beyond a few fewer fish. Is this what we really want?

Let us also be very sure that the course of action we choose will be truly responsive to the problem at hand. Two issues come immediately to mind:

The first is a large, totally obnoxious weed bed which appeared perhaps 200' off the end of my dock perhaps 10 years ago. It arrived in mid-June and was offensive by any standard, but it was essentially gone by August. I have no idea what it was, but it was wretched and I was hopeful to never have to deal with it again. Had someone offered to use an herbicide the following spring to kill it off, I might well have been thrilled. However, there was no serious talk of herbicides in those days and the following spring came, but the weed bed didn't - and it has never been back. Had herbicides been used that first spring and thereafter, I'm sure that someone would have claimed that the absence of the weed bed demonstrated the success of the herbicide, but history has demonstrated otherwise. There's a lesson here that has been instructive to me, and which I hope everyone else understands. Let us not use herbicides as a reflex action rather than being very very sure that we're taking action which is truly appropriate.

The second issue concerns blue-green algae. I think we all agree that blue-green algae is nasty offensive stuff that we'd be better off without. It is known for many things, none of them good, but one of which is a very unpleasant odor. The blue-green algae problem seems to peak in August. It's been widely reported that the weed problem faced by some residents is aggravated by highly malodorous aromas, particularly as the summer progresses. Let us please be very careful to separate the problems caused by native and invasive weeds from those caused by blue-green algae. The solutions for the two problems are not necessarily the same, and applying the wrong solution to the wrong problem is likely to make things worse, not better. It's too easy to suggest that using herbicides to kill weeds of every variety will magically erase the odors now being blamed on 'smelly weeds', and there's some evidence that the growth of blue-green algae is enhanced by warm water and decaying plant matter. We can't fix the water temperature, but if we kill weeds with herbicide, will this ultimately feed the algae problem and derivatively the odor problem? Please, let's make sure that we fully understand the problem before we make a poor choice in the interest of expediency.

As I read the draft SEIS, it becomes apparent that the use of herbicides in 2018 will not rid the lake of invasive weeds, but will only serve as a means of temporary control. If this is not a 'permanent solution', then the logical conclusion is that the herbicides will have to be reapplied periodically, and likely every year, to see the desired benefits. The SEIS thus appears to shift the focus of the weed control problem from harvesting to poisoning, a notable change of direction, at least for the Town of Ellery. Those who promulgate this approach seem to feel that this is a solution which can readily be applied around the lake to solve weed problems in other areas. The annual application of herbicides to significant amounts of shoreline around the lake comes with problems to which scant attention appears to have been directed.

Obviously the application of herbicides to a considerable expanse of shoreline comes at a cost, and there seems to have been little discussion of what this cost will be and who will bear it, particularly as it seems likely that this will be an annual undertaking. I understand that the SEIS is a separate matter from funding, but the two are inextricably connected because the SEIS is the enabling document for the project. Shouldn't we be entitled to have a full understanding of the financial aspects of herbicide application, including the liability issues in the event of some mishap. Is there some chance that the Town of Ellery will become responsible for the program and it will become another line item in the Town budget? Has any consideration been given to allowing lakefront property owners to opt in or out of the program and pay accordingly? Not all of us are experiencing the same problem, and we're not all equally offended by the weeds or equally supportive of the proposed solution. Without any estimates on the anticipated cost of the program envisioned by the SEIS, we may be being asked to write a large blank check to address the complaints of a relative minority of Town of Ellery citizens. Yes, there are times when size truly does matter.

Let me conclude with two points which give me great concern:

First, this draft SEIS is under consideration because some of us seek new and different solutions to a weed problem which has existed for many years. It substitutes one short-term remedy for another, but scant attention is given to making headway on the underlying causes. If what we really want is a healthy lake that we can all enjoy for swimming, boating, fishing and other activities, then it's imperative that a comprehensive effort is undertaken to achieve this. Anything else is simply a stopgap measure. People have talked about the need to resolve problems with septic systems and other nutrient contributors for decades, but little if any real progress is ever made. If half the time and resources that have been spent by those endorsing herbicides was applied to the causes of the problem, perhaps we wouldn't be commenting on this draft SEIS now. The larger solutions will be expensive, but they will likely never be cheaper than they are today. Kicking this can down the road once again is an abdication of our responsibilities as stewards of the lake we love, and this is true regardless of any decision on herbicides. If the Town of Ellery can put itself in charge of weed eradication, surely it can take a leadership position on the more basic issues.

Second, the draft SEIS is sponsored by the Chautauqua Lake Partnership and prepared by a Buffalo law firm which appears to represent CLP. The first listed 'consultant' on the draft is SOLitude Lake Management, which appears to be a subsidiary of Rentokil, a 'pest management company' which sells herbicides and may well be involved in herbicide application should this SEIS be approved. I look for the opinions of independent ecologists and environmentalists and find none. We are being asked to accept a document prepared by those who want to kill weeds based on information from a company selling weed-killers which stands to profit from acceptance of the document. A clearer conflict of interest is hard to imagine. If the only way to deal with weed issues is to apply massive amounts of toxic chemicals over huge expanses of our shoreline, then shouldn't there be documentation of this necessity from respected independent experts?

Approval of the draft SEIS will represent an early step down a slippery slope. Dealing with the weed problem is important, but not so crucial that choosing the wrong solution is preferable to continuing to harvest, particularly as there has been no suggestion that the recommended herbicides will either eradicate the invasive weeds or resolve the weed problem long-term. Let us not fall victim to the pleas of the desperate who would beg us to 'do something, even if it's wrong'. Selective localized application of herbicides in a manner which won't threaten native weeds or our fishery may be one prong in a comprehensive strategy for improving our lake, but that is not the proposal in front of you. Better we should await a more targeted plan which can be supported by independent experts as an intelligent pathway toward a long-term improvement.

In closing, let me reiterate my love for our lake and my concerns about the future. I want the swimming, boating and fishing experiences which I've treasured over a lifetime to be available to all of our grandchildren and their grandchildren as well. If we must use herbicides as part of a well-conceived program, let this use be as a last resort, not as a primary solution, and let this use be limited to the particular areas with the most egregious problems. Most importantly, please do not let the use of herbicides become an expensive annual exercise undertaken because we lack the will to fix the real problems. We can do so much better than what this draft SEIS envisions, and for that reason I must ask you to reject the draft and call instead for a plan which better serves the diverse interests of all of us who love our lake.

Thank you for your attention to these comments.

Very truly yours,

Barbara Blanchard

WRITTEN COMMENTS for Chautauqua Lake Herbicide Treatment Draft SEIS

Jonathan Townsend 3466 North Main St Ext Jamestown NY 14701

The Town of Ellery's Chautauqua Lake Herbicide Treatment Draft Supplemental Environmental Impact Statement (DSEIS) was released on Monday, February 12th 2018. During the scoping process for this document multiple sources of concern were identified from a number of local organizations and individuals. I specified concerns regarding the impacts to bats stemming from aquatic application of chemical herbicides.

The DSEIS identifies relevant areas of concern, however it fails to thoroughly analyze these issues. The document lumps non-targeted plants, birds, mammals, amphibians, and fish into one general group and states that there will be "minimal impacts" to these species. Given the vast differences in these organisms' specific natural history, habitat/diet requirements, and biochemistry; each group should be separately and thoroughly analyzed in this document, with supporting documents, literature and rationale that was made to make these determinations included. The exact language used in the DSEIS is "...expected to have a minimal impact...". Without a reasoned elaboration, this statement is pure speculation. While one may expect a minimal impact, that certainly doesn't mean that there will be a minimal impact and the flora and fauna of Chautauqua Lake is too unique to risk unintended consequences on a groundless expectation.

There is a notable lack of data on bat biology and conservation in general, and this is true when it comes to potential impacts to bats from herbicide applications. A lack of data does not constitute a lack of harm, and there are indications that herbicides can negatively impact bat populations. A United States Fish and Wildlife (USFWS) memorandum on proposed vegetation management in the Southern Appalachian National Forests discouraged use of 2,4-D and triclopyr specifically because of "their potential to adversely impact bats, even when applied at normal rates" (USFWS, 1989). The DSEIS cites a document from 1981 to support the claim that Project-related activities would have minimal impacts to bats. Given the tremendous advances in research and technology, as well as numerous changes in chemical compositions of herbicides, more current literature must be provided. This aforementioned memo from USFWS is admittedly outdated as well, yet it directly contradicts the statements in the DSEIS and this discrepancy warrants further investigation.

Because bats are long-lived and feed at higher trophic levels than other small mammals, they are prone to bioaccumulation and biomagnification. This phenomena may result in levels of contamination in bats that are higher than predicted for mammals of a similar size (such as the study organisms evaluating herbicide toxicity in many of the tests cited in the DSEIS). As many United States bats are insectivores, more focus has been paid to insecticide use, and the literature that exists on that type of pesticide shows a clear potential for negative impacts. While it is true that herbicides are engineered to impact plants, which have different biological functions than mammals, there remain numerous "proprietary" chemicals found in these substances that are largely untested. Given the increasingly large volume of chemical herbicides in use locally and nationwide, there is ample cause for concern.

A notable indirect impact to bats would be destruction of their food resources stemming from herbicide applications. Many of the invertebrates that bats prey on depend on aquatic macrophytes as larva for food resources which get them through metamorphosis to adulthood. Any large scale impact to the aquatic plants in Chautauqua Lake has potential to create a cascading impact on insect abundance and a subsequent reduction in prey availability for all insectivores using the Lake for foraging habitat. **This impact was not given any consideration in the DSEIS despite being brought up during scoping as a potential issue.**

As mentioned in my comments during the scoping process, bats worldwide are in trouble, and this is especially true in Chautauqua County. Our hibernating bats have been decimated by White Nose Syndrome, and our migratory bats are experiencing just as large of a decline from wind energy-related mortality. Based on these sources of mortality and other general issues that affect most wildlife in the area, 9 of the 8 species of bat in NYS are listed as "Species of Greatest Conservation Need" by New York State Department of Environmental Conservation (NYSDEC). For long-lived, slowly reproducing species, impacts can create a feedback cycle of population decline. The interjection of chemical herbicides may cause direct mortality (which could go unnoticed as bats are foraging over a water body and/or are away from their respective day roosts), and it is also possible that the impacts may relate to reproductive success and longevity. A little brown bat (*Myotis lucifugus*) that has already been made ill by White Nose Syndrome during hibernation may not be able to reproduce effectively, and may not reproduce at all if it is consuming chemical herbicides that further weaken or sicken it. As bat populations are driven by adult survival, it is crucial that bats be provided safe, healthy summer habitat in which to raise their young. Studies have shown transmission of toxins from female bats to their young via nursing, and young bats become volant (or flighted) around mid-July, at which point they will be directly ingesting any substance that is in Chautauqua Lake. Their survival is important in reestablishing collapsed populations, and great care should be taken with any plan for chemical use.

There are other issues to be found in the DSEIS, allow me to take a moment to comment on some statements made on invasive species. The DSEIS claims that a large scale aquatic herbicide treatment would have minimal impact on species that aren't being directly targeted. This is very unlikely, and if that is the case than appropriate data and supporting documents (i.e. peer-reviewed research articles) must be included to show support for this statement. Reports from the consulting firm contracted to conduct herbicide applications are not acceptable as sources to show impacts have been minimal. A third part must be used for any assessment of indications of negative or positive impact to avoid any semblance of conflict of interest. It is unlikely that removal of invasive macrophytes from herbicide applications will increase habitat availability for native species. While herbicide will remove living plants and open up habitat availability, the very nature of invasive species' ability to outcompete native species means that the more likely outcome will be a heavier prevalence of nonnative macrophytes over time. This competition is exacerbated in the absence of a robust invasive species management plan and subsequent reintroduction effort for native macrophytes. The DSEIS lacks any reference to or mention of a formal invasive species management plan. Prior to any herbicide application, terrestrial or aquatic, such a plan is critical in ensuring success and mitigating potential risks and adverse impacts.

Ultimately, the drafting of this SEIS must follow the established State Environmental Quality Review Act (SEQRA) processes. One facet of this process is the requirement for lead agencies to take a "hard look" at potential Project-related impacts. This "hard look" requires the lead agency to:

1) Identify relevant areas of environmental concern

2) Thoroughly analyze those areas to determine if the action may have a significant adverse impact

3) Support its determination with reasoned elaboration

As stated above, this document identifies some relevant areas of environmental concern. However, it fails to thoroughly analyze or to provide reasoned elaboration, and this has created a flawed DSEIS. These matters must be addressed in future drafts moving forward.

Aside from the SEQRA process, the NYSDEC has released a guidance document on aquatic herbicide entitled "Recommendations Regarding the Use of Aquatic Herbicides in Fish-Bearing Waters of the State". Three statements in this document relate to this project specifically.

See below:

Page 4: 6 NYCRR Part 327.3(3) states that: "*. . . permits [for aquatic vegetation control] shall be granted under such limitations as will protect to the greatest extent possible all terrestrial life, aquatic life other than aquatic vegetation intended to be controlled or eliminated, all public and domestic water supplies and irrigation, recreational, agricultural, and industrial water uses.*"

Page 5-6: C. "*Aquatic plants that are not interfering with human activities such as swimming and boating should not be treated. In waters open to the public, the Bureau of Habitat (BoH) recommends that herbicide treatments should be limited to areas where swimming, boating, and other human activities are adversely impacted because of excessive growth of aquatic* *vegetation. Herbicide treatments should* **not occur when** *the targeted aquatic vegetation is in water so deep that it does not interfere with human activities, no matter how close to the shoreline the vegetation is located."*

Page 6: *D. "Herbicides should not routinely be permitted in rivers or streams. A site specific environmental impact statement should be required before introducing aquatic herbicides into flowing waters".*

In order for this DSEIS to be deemed complete, the document needs to be reconciled with the above guidance. The DSEIS has not demonstrated sufficiently that all terrestrial and aquatic life not targeted with chemical application has been protected to the greatest extent possible. The proposed applications are sited in areas that conflict with Page 5-6: C in that applications are proposed outside of areas where aquatic plants are interfering with human activities. Finally, while chemical applications are not proposed for the Chadakoin River, the area of potential application directly abuts the Chautauqua Lake Outlet which flows into the River, and there will be associated issues with chemical drift. A formal downstream dilution modeling assessment that **follows established NYSDEC criteria** should be conducted to assess potential for environmental impacts outside of the proposed application area. The DSEIS included such a formal model, however the dilution factors were not calculated correctly. Given the proximity to the Outlet, the modelling should be conducted following the guidance in the NYSDEC model, i.e. "*If a significant portion of the partial lake application occurs in the lower half of the lake near the outlet, or if the sum of the application areas exceeds ½ of the entire lake area, then the modeling will start with the dosage rate concentration of the active ingredient*". As such, this dilution model must be run using the dosage rate concentrations, not a diluted concentration as was done in the DSEIS.

In conclusion, this document is incomplete and the issues outlined above must be addressed in full. The DSEIS failed to address any of the issues brought up during the scoping process regarding Project-related impacts to bats, providing very little to no attention to the issues originally outlined in my January, 2018 letter. These issues are listed again below for reference, and should be thoroughly analyzed with supporting documents and reasoned elaboration in the next draft. Due to a paucity of time, there are additional issues that I was unable to comment on, hopefully others found time to comment in the unusually short period of time granted for comments on a project of this scope. It is imperative that all issues brought to the fore by myself and other parties in this process be given equal and substantial consideration before moving forward. Thank you for your time and attention to this matter, I appreciate your consideration.

Sincerely,

Jonathan Townsend

Chemical applications in Chautauqua Lake may impact bat species in the following ways and must be addressed during the scoping process of the Chautauqua Lake Draft SEIS:

- Directly cause mortality or illness

- Weaken the immune system of impacted individuals and open them up to secondary infections or increased susceptibility to WNS when they may otherwise have been surviving the disease.

- Reduce reproductive success. Bat populations are driven by adult survival, and weakened or ill adults do not reproduce as effectively as healthy ones. This can create a feedback loop in conjunction with WNS that enhances the rate of decline of WNS-impacted species and prevents future reestablishment.

- Destruction of food web through removal of nutrient source (vegetative matter) for aquatically emerging insects. As little brown bats are known to forage preferentially over waterbodies, they are uniquely susceptible to impacts to aquatic vegetation.

- Pollution of food and water resources through contamination of waterbody with environmental toxins from chemical herbicide applications. All bat species would be directly ingesting water contaminated from Project-related activities, and those consuming insects contaminated from these activities may also be impacted.

To: Town of Ellery
Regarding: Comments for the 2018 Draft SEIS for Chautauqua Lake
From: Daniel J. Bowman,
P.O. Box #3, 2017 Hoag Rd. Ashville NY 14710
Date: March 16, 2018

I appreciate the opportunity to provide comments on the 2018 Draft SEIS for Chautauqua Lake. I've been an active fisherman on the lake since the early 1970's, and further, I've been a successful NYSDEC licensed fishing guide on the lake since 1997. My chief concerns center on maintaining and protecting our world-class fishery, and further, ensuring that our actions relative to the lake and its management do not endanger the health of lakefront property owners and recreational lake users. Some of my specific interests are listed below.

⇒Aquatic herbicides should not be applied prior to July 1. Spawning and nursery areas and their inhabitants are at a critical period of development.

⇒The synergistic effects of applying a combination of different herbicides to a treatment area, such as was permitted in Bemus Bay in 2017 with herbicides 2,4-D and endothall, is not documented as a safe practice and may have severely negative ecosystem effects. Coupling the herbicide Renovate with Navigate and Aquathol K seems ecologically unsound, and such toxicity data is absent in the Draft SEIS.

⇒Method of Application of aquatic herbicides witnessed (personally) in Bemus Bay on June 26th of 2017 was alarming. I observed the manual dispersal (i.e. dumping) of feedbag-sized packaging containing herbicide 2,4-D pellets into the near-shore treatment area from the applicator's airboat. Actual concentrations of the herbicide in the water, while being dispersed using this method, would be difficult to monitor. The Draft SEIS has little detail regarding application method.

⇒The effect of aquatic herbicide use on pre-existing biological control species (such as weevils, moths, and caddisflies) should be monitored. Herbivore effects on Eurasian Watermilfoil show promise as an effective management component and should not be disturbed. The Draft SEIS has no detail regarding application biological control.

In closing, again I'd like to express appreciation for the opportunity to provide comments on the 2018 Draft SEIS for Chautauqua Lake. It is my hope that future management of Chautauqua Lake will maintain and protect our world-class fishery, and further, ensure that our future actions relative to the lake and its management do not endanger the health of lakefront property owners and recreational lake users.

Sincerely yours,

Daniel J. Bowman
NYSDEC Licensed Guide
Fish Chautauqua Guide Service

To: Rebecca Haines, Ellery Town Clerk
Subject: Written Comments for the Draft SEIS for herbicide Application to Chautauqua Lake
Submitted by: Jane E. Conroe
4741 Whiteside Parkway
Bemus Point, New York 14712
conroe@windstream.net
Date: March 16, 2018

Thank you for this opportunity to comment of the Draft SEIS. It is clear that even in the limited amount of time allotted for comments, that multiple deficiencies exist in this DSEIS as currently written. The Town of Ellery, as lead agency, must not accept this document as written. The extensive comments generated by this document should not only be incorporated into the Final SEIS, but that they must also be addressed. If this draft is not significantly corrected and modified, the Town of Ellery must not determine in the positive in its Findings Statement.

Pg1 Sec1.1 Para2 The DSEIS in stating, "...in target locations of Chautauqua Lake." keeps this document from being useful in all areas of the lake. Recommendations in this document are to be for all possible areas of the lake that may need an application.

Pg2 Sec1.2 Para3 "Many plants at high densities in both ...basins are non-native...and are considered invasive." is an inaccurate statement and must be removed. The density reference is not substantiated by the data and the use of "many" and "are considered" is subjective by the authors.

Pg6 Para1 This paragraph is not substantiated by data, reflects personal opinions and must be removed.

Pg6 Para3 "...increasing levels of Eurasian water milfoil and curlyleaf pondweed..." is not documented by data, reflects personal opinion and must be removed.

Pg6 Para4 "...SOLitude assessed the results...and concluded that the herbicides were effective."
The conclusion in the Dec. 2017 report is significantly flawed. Due to the incorrect plant sampling techniques, the incorrect percentage calculations and incorrect interpretation of the data done by SOLitude this statement cannot be used in this document.

Pg6 Para4 The indication that DEC had not required a post-application invertebrate survey does not absolve this document from its requirement to state the effect of herbicides on invertebrates and to provide mitigation for them. The statement that since there was no pre-application baseline, does not absolve this document from its requirement to state the effect of herbicides on invertebrates and to provide mitigation for them.

Pg8 First line Please use the most recent CSLAP data which is for the year 2016 which is at the website.

Pg8 Para3 This paragraph argues incorrectly via incorrect grammar that the MMS does not allow for the use of herbicides. If the intent of this paragraph is to declare the MMS "invalid" as part of the DSEIS recommendations, then do so. But by commenting on its validity, this paragraph has no place in this document and must be removed.

Pg8 Para4 "...have increased in density..." can be disproven by data. "...recreation use ... is difficult or impossible." is false. These sections of these statements must be removed.

Pg9 Para1 To use the local newspaper and the notations of one journalist in a document of this import, has no place. Remove this paragraph.

Pg9 Sec1.3 Para1 To refer to "proposed target areas" or "target areas for herbicide application that roughly include" completely undermines the overall purpose of the SEIS. Its purpose is to recommend conditions or standards that will be followed no matter where the herbicide is applied. That is, once an area has been deemed acceptable for herbicide application, then the conditions set by the SEIS are reasonable for every one of those areas.

Pg10 Para1 "...demonstrated that herbicides could effectively reduce the density of EWM..." is a conclusion reached in the SOLitude Dec. 2017 report that is significantly flawed. Due to the incorrect plant sampling techniques, the incorrect percentage calculations and incorrect interpretation of the data done by SOLitude this statement cannot be used in this document.

Pg10 Para2 "As a result of the positive results of the Data Collection Project..." is a conclusion reached in the SOLitude Dec. 2017 report that is significantly flawed. The community outreach program was then also based on inaccurate, scientific conclusions. Thus, the support and input that these communities have given to the production of this SEIS must be revisited and investigated further.

Pg10 Para3 The indication that the 2018 herbicide application program will occur is presumptuous. That it included further survey work is admirable but conducting plant surveys the previous Fall, does not provide the information for an informed permit application. This process, survey in Fall, then treat in Spring, should not be a recommendation in this SEIS. Wording that "Further surveys will be conducted in spring..." is also presumptuous. The document should state what the long-term protocols for plant surveys will be. It also should state that all plant surveys follow the Cornell-modified Army Corps methodology.

Further, the stated reasons for selecting these treatment areas needs major revision. The reasons for choosing treatment areas MUST consider more than the presence of invasives and community input for recreational pursuits. This document should set the criteria for a treatment including over 50% dense coverage with invasives and depth and distance from shore restrictions and the criteria MUST include considerations for all lake users. To state that, "...noxious weed interference with aesthetics, swimming, boating, fishing and other recreational pursuits...." assumes that all of these lake users find the weeds to be "noxious." That is not accurate and must be removed.

Pg10 Sec1.4 "The goal of the project (herbicide treatment) is to enhance the use of the Lake for recreational purposes and to improve the ecological health of the Lake." The emphasis on recreation, to the exclusion of other lake users, continues on to page 11. Provide the scientific research that proves that herbicides "...improve the ecological health of the Lake." Until that research is provided, that phrase must be removed.

Pg11 Para2 "In addition to the harmful impacts ...the weeds create negative impacts on the Lake's ecosystem." cannot be substantiated by science definitions, is biased and must be removed. The positive impacts to the Lake's ecosystem provided by growing macrophytes are numerous.

Pg11 Para3 "This SEIS seeks to address the negative impacts of excessive invasive macrophyte growth..." is incorrect and should be removed. The SEIS is to address **the impacts of herbicides on the lake ecology, recommend mitigations for such and state the regulations that will need to be followed so that herbicides can be applied in the lake.** See page 12 Sec 2.1 for the three correct goals of a SEIS.

Pg17 Step 7 Significant changes in language occur here which lowers the requirements of the SEIS as compared to Page 12 Sec 2.1. The DSEIS should identify **and evaluate** the relative impacts. Remove "discusses measures" and return to "...explores ways to minimize impacts..."

Pg17 Step10 Identify the persons who will evaluate the SEIS "...to the satisfaction of the Ellery Town Board..." and include their professional qualifications.

Pg18 Para2 Identify the persons who will write the rationale for the Lead Agency's Findings Statement along with their professional qualifications.

Pg21 Para2 "The aquifer at the southern end of the Lake services the City of Jamestown." is not true.

Pg22 This page must be removed and rewritten due to multiple inaccuracies. A discussion of how near-shore water wells are affected by lake level must be included.

Pg23 It is incorrectly portrayed that the two monitoring wells in Panama and Falconer assess the groundwater in Chautauqua County. Correct and clarify this information.

Pg24 Para2 "...well water (groundwater from aquifers)..." is an incorrect definition for all of the wells around the lake. A discussion of near-shore water wells being affected by lake level must be included. It is critical that this document accurately map the residences that acquire drinking water directly from the lake.

Pg24 Para4 The 2016 CSLAP report covers both the North and South Basins.

Pg27 Para1 "...might explain a partial disconnect..." is speculative, unsubstantiated and must be removed.

Pg27 Sec3.2.1 Algae "Algal blooms ....(Appendix F)." indicates observations that are substantiated by Appendix F. This document has not been peer-reviewed and contains conclusions based on incorrect data. The algae information here should be corrected or removed.

Pg28 Para1 "The CLWMP was developed...because in-lake management measures to control ...growth were not by themselves improving the situation." is not an accurate statement explaining the development of the CLWMP and must be removed. Bias and inaccurate assumptions continue in this paragraph and must be removed.

Pg29 General Aquatic Ecology of Macrophytes This section is completely devoid of any discussion of the native macrophytes either in the water column or as emergents or in the nearby wetlands. This must be added.

Pg29 Para3 Add: "Depending in growing conditions, curlyleaf pondweed naturally dies off usually by early July."

Pg30 The discussion of milfoil must include recent data, with references cited, that explains the control of milfoil by specific, naturally-present insects in CL and milfoil's allelopathic effects on blue green algae.

Pg 31 Full Para1 " Short term reductions...may also result in less algal growth..." This statement is speculative, must be substantiated or it must be removed. Indicating that herbicide treatment will cause short-term reductions in nutrient loading and lessen algal growth implies that dying plants will remove nutrients from the water column, which is false.

Pg31 Last line "Significantly greater density is anticipated in the late spring..." is presumptive and should be removed. "Variations in year-to-year and even season-to-season biological measurements are common in living ecosystems." is an accurate statement of lake growing conditions stated by Racine-Johnson.

Pg31-35 The sections of the DSEIS based on SOLitude's research associated with the Bemus Bay 2017 herbicide application and plant surveys done in the Fall of 2017, must be removed. The statement that "This survey methodology can be replicated to track changes..." goes to the main reason these sections must be removed. SOLItude does not use the Cornell-modified US Army Corps abundance scale correctly which causes all of its individual plant species data to be subjective. That is, specific amounts of each species found on the rake are not recorded as percentages. That makes comparison between rake tosses at any location from one time to another impossible. Additionally, the percentages that appear on pages 33-35 are incorrect due to SOLitude's method or calculating percentages. Their calculations do not include finding "No Plants" of a particular species at sampling sites, which causes the denominator of the percentage to be in error. "The following data was collected at each point: water depth, aquatic plant species, relative density of each species, and overall aquatic species density." is incorrect concerning any plant density analysis due to the above explanation. The SOLitude reports frequently misrepresent plant presence with abundance or density.

Pg36 Fish Para3 Acquire more research on the status of naturally spawned and reared muskellunge in the lake. Several sources refute the statement that "...few to no muskellunge are naturally reared in the lake."

Pg38 The1990 SEIS fish list needs to be updated. For one, *Polyodon spathula,* IS present in the lake because it has been stocked by the NYSDEC and has been verified by several sources.

Pg 40 Birds The discussion in the DSEIS of birds, including both migrating and wintering waterfowl is insufficient. The scoping document comment "Chautauqua Lake was designated as an IBA because it is an important migrating stopover point for over 250 species of waterfowl and other species, including Pied-billed Grebes, a state-listed threatened species; the site regularly supports over 1% of the estimated state wintering population of Pied-billed Grebes." is not addressed in the DSEIS. This and the mating bird species, the common loon, osprey and bald eagle, must be addressed as significant species present on and near CL and are likely in any application area.

Pg40 Invertebrates "...data are insufficient to make conclusions about the role of zooplankton in the food web of CL." is unacceptable for this document. If a case cannot be made for this specific lake, then discuss the generic role of zooplankton in aquatic food webs so that their presence is recognized and considered for mitigating actions.

Pg40 Invertebrates "Few data exist on the macroinvertebrates of CL." appears to ignore the multiple reports done by Racine-Johnson. Only the 2008 report is referred to, however multiple reports are available and must be included here.

Pg45 RTE This document has failed in its responsibility to follow the instructions given to the authors by the NYS Natural Heritage Program:

> For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our database. We cannot provide a definitive statement as to the presence or absence of all rare or state-listed species or significant natural communities. Depending on the nature of the project and the conditions at the project site, further information from on-site surveys or other sources may be required to fully assess impacts on biological resources.

This directive means that the list provided by NHP is admittedly incomplete. Their instructions state "...further information from on-site surveys or other sources may be required to fully assess impacts on biological resources." which means that the DSEIS does not have a complete list of RTE species. It further puts the burden of responsibility on the document authors to do the research to determine ALL RTE species. The "may be required" is telling the authors, that for a project of this type, they need to provide that missing information. Documentation of follow-up communication with NHP needs to be provided along with the associated research for a complete list of RTE.

Pg45 Para1 under Table3-6 The common loon may have been last documented to NHP in 2005 but this document must say, "This species is has been reported on the lake as recent as 2017 via multiple sources and is definitely present on CL".

Pg45 Para4 Please verify by identifying the context and the source of the specific reference of the NY Natural Heritage Program's statement that Hill's pondweed "...has been known to disappear entirely." It is misleading to indicate that reference just before the statement, "It was not found in the Fall 2017 Racine-Johnson survey." ***P. hillii*** **definitely is still in CL** because it was found as recently as the spring of 2017. Potamogetons die off by fall (verified by Racine-Johnson) but Fall non-detects do not mean they have disappeared entirely.

Pg46 Para2 Since NYSDEC's Heritage Program was contacted as required by the SEQR process, provide the complete written report submitted by them. That is, the follow-up communication with NHP that provides their "sign-off" for the treatments because the biological impacts have been fully assessed. The updated number of bald eagle nests in the area is not provided.

Pg46 Figure 3-9 This wetland map must be enhanced and is insufficient for the import of this document.

Pg47 Table 3-8 Clarify the location of State Route 395. Explain the justification of identifying wetlands within 500 feet from the lake. It is well known that species such as osprey and bald eagles have ranges far beyond 500 feet. Additionally, prove that no herbicide drift will occur beyond 500 feet.

Pg51 Sec3.4 "The municipalities that surround the Lake have no zoning authority over the...waterbody itself." Since this is true, explain clearly here how the lead agency can declare a Finding Statement on the Final SEIS if it has no authority to do so. It continues to state "...municipalities...have land use control and zoning authority over...the Lake's shoreline." Since this is true, explain clearly here the exact location of the edge of the land and the edge of the lake's water. The locations of jurisdiction should be completely clear.

Pg55 Para3 "The proliferation...communities." is opinion, biased, unsubstantiated and should be removed. It is verified that the "rotting/stinking" is based on the decay of algae, including cyanobacteria decay, which is not weed fragments.

Pg56 This map is incomplete and inaccurate. It should be removed and replaced. If the many other parks are mentioned, they should be located and located correctly on a map.

Pg67 Sec 4.0 Include the use and impacts of Clearcast as originally proposed in the Final Scoping document. An SEIS should cover all currently available herbicides.

Pg68 Fate of Product in the Aquatic Environment State the half-life of endothall, it is not included here.

Pg71 Last sentence "...two treatments may be necessary." is vague, unsubstantiated, and inappropriate for this document and must be removed. An overall statement for multiple yearly treatments must be researched and clearly stated, with exact time frames and dosages indicated.

Pg72 Para1 "If treatments (plural emphasized) must be applied later in the season...spread granules in lanes..." is a speculative suggestion, unsubstantiated for efficacy and must be removed from this document.

Pg72 Para2 Referencing the CSLAP reports, the long-term average pH of the North Basin is 8.0 and for the South Basin is 8.2.

Pg72 Para3 Anthony Manno's declaration in January 2017 has no bearing on this SEIS and should be removed. This document is intended for future applications and NYCRR 6 Part 327.6 indicating that 2,4-D is "Authorized only for the control of emergent plants..." remains in effect.

Pg73 Sec4.2.1 Para2 This paragraph is speculative, unsubstantiated by any reference or data and must be removed from the document. This important paragraph is given as the justification for a treatment time revealed later in the document to be in May. Further research providing justification for applying herbicides during fish spawning MUST be provided in order for this time period to be acceptable.

Pg73 LastPara to Pg 74 Provide the research that indicates "The nutrients incorporated in treated macrophytes will not all be released at once." The concern here for nutrients incorporated in treated macrophytes and their transport through both basins is not clearly explained. The time frame for release of nutrients is contradicted by "Nutrient release to the water column...would be available immediately..." on Pg 74 Para2. Further it says that nutrients "...from natural dieback would be available for algal growth..." This implies that nutrients from dying herbicide-treated plants and nutrients from non-treated dying plants behave differently and that only natural die back will fuel algal blooms. Overall, Section 4.2.1 lacks clarity and documentation thus should be rewritten or removed.

Pg75 Sec4.2.2 No drift research for Chautauqua Lake accompanies the DSEIS. Without it, the document is insufficient and should not be accepted by the Town of Ellery. To state "Drift is expected to primarily move in the direction of the Lake outlet:..." is speculative for areas of the North Basin. Water movement is also temperature and wind driven. Drift must be determined for ALL areas of the lake due to the wide-spread treatment possibilities. Liability for harm from this one item, and there are more, should prevent the Town from accepting this document.

Pg75 Para1 Appendix K is lacking in providing the documentation that the water tests referred to were completed by a state certified lab. Further, no QAQC is included in this Appendix.

Pg76 Para3 "Laboratory analysis is offered by most manufacturers..." needs to be amended to require that all water sampling be done by state certified labs. Additionally, that the QAQC plus all chain of custody paperwork be available for review.

Pg77 Sec 4.2.3 Stating that, " The proposed herbicide treatment is not expected to impact water drawn from private wells surrounding the lake." does not remove the liability of harm. No research accompanies this document to prove this statement. No research accompanies this statement to explain varying directions of groundwater migration. My water well is shallow and is close to the lakeshore. When the lake level is higher, the groundwater level in our area is higher. Prove that lake water does not migrate to the well's groundwater.

Pg79 Para1 "The goal of the (herbicide) program is to encourage a native plant assemblage..." must be removed because the purpose of herbicides is to kill plants, including natives that are susceptible to the chemicals. "...the nearly monotypic stands of invasives..." is not true, as proven such by multiple lake macrophyte surveys, and must be removed. "Targeting control of the invasive plants early..." was not verified in the 2017 Bemus Bay test because the application was done on June 26. Additionally, the conclusion "...may allow native species to recolonize..." is based on an inaccurate statement on Page 4 of Appendix E. Incorrect plant abundance methodology, plant species misidentification, incorrect percentage calculations and thus invalid conclusions must not be used to justify this quotation. It must be removed.

Pg79 Para2 "The proposed treatment plan will...allow native macrophytes to return and establish..." is another inaccurate extension of the incorrect work of Appendix E. This statement that plants **will** (emphasis added) return is misleading and this type of supposition is not acceptable in this document.

Pg79 Sec4.3.2 This document must contain an explanation of the steps required for various permit applications. Since this section refers to wildlife, it is imperative that the requirements of an Article 24 permit be included. Multiple wetland species and areas are affected by proposed herbicide application in several areas of the lake. The special permit requirements should be explained and required in the DSEIS.

Pg81 Para1 Provide the documentation for "...NYSDEC allows use of granular formulations (of 2,4-D) for Eurasian watermilfoil..." Also in this paragraph, "...NYSDEC (1981) states that certain esters of 2,4-D are toxic to certain fish species..." thus mitigation expected later in this document does not exist.

Pg84-86 Fish Flawed conclusions from Appendix E produced these pages that recommend that, "The proposed treatment time frame coincides with the spawning season for a number of fish species." Instead of offering mitigation for the known impacts on fish, the document declares the gizzard chad and black crappie to be of "lesser importance." The document fails to recognize any natural reproduction of muskellunge. Thus, it recommends overlapping treatment zones with fish spawning, fish rearing and endangered species zones. The further justification that overlapping 6 out of 10 zones because it is "...25% of the identified fish spawning and/or rearing areas." somehow absolves the harmful impact is unacceptable. This entire proposal of overlapping these zones MUST BE REMOVED from this document. Liability for harm due to this overlapping is another reason the Town of Ellery must find this document unacceptable.

Pg84 Fish Para4 The four reasons given for May treatment are not substantiated. Provide the peer-vetted data and research that supports these reasons. Without that documentation in this document, these reasons are invalid and must not be used. Use of SOLitude's conclusions and then recommendations from its various research projects cannot be verified and cannot fulfill this purpose.

Pg85 Para1 "Potential treatment areas...have been chosen to target areas of dense growth of invasive species." These choices appear to be based on Appendix H. That document was prepared by SOLitude whose methodology of determining plant abundance is flawed. Further investigation of the data points they did record, finds multiple areas that DO NOT HAVE DENSE GROWTH yet are still recommended for treatment. This entire process of researching plant growth months (even weeks) before treatment is a waste of resources. The permit takes care of this. This document fails in its obligation to set the parameters for general conditions that MAY allow for treatment. This is another main reason the Town of Ellery should find this document unacceptable.

Pg 85-86 Table 4-6 This table completely disregards the recommendations of the MMS for fish spawning, fish rearing and endangered species zones and should be removed.

Pg87-96 The distances off shore for treatment in these maps reaches from hundreds to over 1000 feet. This is in violation of the General Conditions written by NYSDEC Fisheries in the NYS 1981 EIS for which this proposed document is a supplement. The fact that this draft is recommending significant extensions of the accepted state distance makes it unacceptable. There is significant liability is extending these distances and thus, this is another significant reason the Town of Ellery should find this document to be unacceptable.

Pg97 Sec4.3.3 Wetlands An Article 24 permit should be required for these applications. The recommendation of a 100' protection zone must be supported by drift research and data. Mitigation for nesting eagles due to noise has not been addressed and is significant.

Pg98 Sec4.4 Mitigation for herbicide-treated weeds taken to local farms must be included in this document. The removal of plants form the lake is a critical piece of lake management, this significant impact must be addressed.

Pg99 Para1 "Harvesting, however, has not been sufficient to address the increasing problems of invasive weeds." is incorrect, cannot be substantiated by data (in fact, the data indicate that the invasive population has decreased) and must be removed from this document.

Pg99 Para3 "The overall impact...for recreational pursuits." is speculative, unsubstantiated by research, and must be removed.

Pg100 Para4 "Concerns have been raised...performed according to the label." states that the available literature minimizes the toxic effect on the fish. The comments that have been raised involve the reduction in plants that are the habitats for the fish. This paragraph fails to mitigate the impacts on the fishing industry that could be caused by these treatments. Again, this document fails in its responsibility to consider the impacts and suggest possible mitigations.

Pg100 Sec4.6 To state that "...there will be no significant impacts to historic or cultural resources." completely ignores this document's responsibility to consider the visitors that come to the area for Chautauqua Institution, Midway State Park and others. The impact of the publicity of treating multiple, significantly-sized areas of the lake close to the two named locations should not be ignored. The liability that the Town of Ellery takes on in the even possibly perceived reduction in influx of visitors to Chautauqua Institution should be considered. Mitigation of this impact must be included.

Pg 101 Last Para "...every shoreline resident within the notification zone..." is not sufficient mitigation. EVERY AND ALL shoreline residents MUST receive the notification that treatments are occurring. Far too many residents are from out-of-town and have no access to public notification. Far too many residents have private lake access that may not be in the treatment zone but allows them to navigate to the treatment zone. Without complete lake-wide notification of ALL lake area residents, the notification system is inherently flawed.

Pg102 Para1 This paragraph indicates that "...notice will be sent to shoreline residents..." but it fails to state to "ALL" residents. Without complete lake-wide notification of ALL lake area residents, the notification system is inherently flawed.

Pg102 Sec4.8 Unavoidable Adverse Environmental Impacts Having this section in the document with this biased, unresearched declaration, "No long term environmental impacts are expected." does not remove the author's or the town's responsibility to mitigate as many of the adverse impacts as possible. Since, impacts to the water column, plant biomass, fish and fish spawning invertebrates and human use are all included here, you are clearly stating that there are adverse impacts to all of these which you then indicate "will be short term" and no mitigating actions can occur because the impacts are "unavoidable." This entire section of the document must be removed.

Pg102 Sec4.8.1 "The early treatment..." during fish spawning and rearing is given as the mitigation for low DO levels caused by macrophyte decay from treatment. No substantiation or research is given for this recommendation and it must be removed. Mitigation of impacts to the water column must be included.

Pg 102 Sec4.8.1 A significant impact to the water column that is not addressed is the known increase in cyanobacteria blooms that will occur when the growing macrophyte population is decreased. This is another significant impact that must be addressed with mitigation.

Pg 102-103 Sec4.8.2 Potamogeton sp. must be added to the list of affected native macrophytes. No mitigation is suggested and that is not acceptable for this document. Mitigation, especially for RTE, must be included for native plants. This is another significant weakness for which the Town of Ellery should find this document to be unacceptable.

Pg103 Sec4.8.3 This section on impacts to fish is inadequate and must be completely rewritten. To indicate that native plant reemergence should improve the conditions for native fish species is speculative and is supported only by invalid conclusions found in Appendix E. Mitigation for fish must be included. This is another significant weakness for which the Town of Ellery should find this document to be unacceptable.

Pg103 Sec4.8.4 This section on impacts to mussels is inadequate and must be completely rewritten. To indicate that native plant reemergence should improve the conditions for native mussel species is speculative and is supported only by invalid conclusions found in Appendix E. Mitigation for mussels, especially for RTE, must be included. Included here must be all invertebrates, with special attention to the herbivore moth and weevil, that are effectively controlling milfoil. This is another significant weakness for which the Town of Ellery should find this document to be unacceptable.

Pg104 Sec4.9 "No negative effects...are expected." is speculative, unsubstantiated by research and must be removed. "No negative effects were observed as a result of the use of both Aquathol and Navigate in Bemus bay in 2017." is an invalid conclusion based on Appendix E. Cumulative impacts were not researched in 2017, no long-term testing was done, thus there would be no observed negative effects. Necropsies of multiple dead fish after the application were not done nor were even counts of dead fish recorded. "Dissipation" given as the mitigation is unacceptable. This section must be significantly redone.

Pg105 Para3 To offer as mitigation "treatment early in the year" is unacceptable and actually causes more harm to fish spawning and rearing. Effective mitigation for fish must be included.

Pg106 Sec5.1.1 To offer as mitigation "herbicides that are selective" is unacceptable because herbicides are NOT selective for only invasive species. The mitigation for native species MUST be included in this document. To offer as mitigation "treatment areas are balanced with non-treatment areas (spread out)" is unacceptable because by reviewing the mapping presented, the proposed treatment areas show no breaks. There are hundreds of consecutive feet of shoreline marked for treatment. Effective mitigation for lowered DO levels and increased algal blooms must be included.

Pg106 Sec5.1.2 Most of the near-shore water wells do not get their water from aquifers but rather the near-lake water table. Effective mitigation for these private water wells MUST be included. This is another significant weakness for which the Town of Ellery should find this document to be unacceptable.

Pg106 Sec5.2.1 "The 2017 post treatment survey showed a native species 'rebound'..." is an invalid conclusion of that document. The inaccurate data collection methodology combined with inaccurate percentage calculations produced this invalid conclusion. It must be removed from this document. To state that "The (vegetation) impacts are small..." is simply false due to the fact that the intent of herbicides is to impact vegetation. Logic here would indicate that if the impacts to herbicides on vegetation are small, then another method for their removal should be investigated. Native macrophyte mitigation MUST be included in this document.

Pg107 Birds Per Jillian Liner, Director of Bird Conservation, Ithaca Office of the Cornell Lab of Ornithology and New York State Audubon:

- Chautauqua Lake was designated an Important Bird Area (IBA) by Audubon because it provides critical habitat to breeding and migrating birds. Chautauqua Lake is an important migrating stopover site for over 250 species of waterfowl and other species, including Pied-billed Grebes, a state-listed threatened species. The site has supported over 1% of the estimated state wintering population of Pied-billed Grebes.

- The IBA status of Chautauqua Lake, and its importance to Pied-billed Grebes and other waterfowl, want to ensure herbicide application will not directly impact birds and that the herbicide application doesn't impact habitat condition or cause a complete devastation of Submerged Aquatic Vegetation (SAV).

- Treatment sites must be monitored pre and post treatment in order to document the level of control and confirm that only the targeted, invasive species are being controlled.

- Monitoring should be done by, and reported to the regulating agency, by a third party to avoid a conflict of interest with the paid applicator.

- The data should be integrated into a lake-wide assessment/Integrated Pest Management plan that outlines the target invasive presence and persistence as the data become available.

- In addition, if the aquatic treatment damages desirable native vegetation in the littoral zone, resulting in complete or functional loss of SAV in the littoral zone, re-establishing native SAV should be part of the management process to protect the food chain.

There will be impacts to birds' habitat in the proposed treatment sites. Mitigations for birds, including significant numbers of migrating waterfowl, must be included in this document.

Pg107 Paper Pondshell Mussel Mitigation for this species MUST be included in this document.

Pg107 Sec 5.2.2 Mitigation for RTE MUST be included in this document. This section is unacceptable as written. One eagle nest is directly across the lake from Maple Springs and eagle sightings in Maple Springs are fairly common. State the known locations of eagle nests. The lack of RTE mitigation is another significant weakness for which the Town of Ellery should find this document to be unacceptable.

Pg108 Para3 Indicating that Hill's pondweed "may have a small impact" is unacceptable and that it was not found in the fall, when it naturally dies off, does not remove this document's obligation to mitigate for its presence. Treatment in May "...before the vegetative portions of the plant are present...." is unacceptable as a mitigation for this rare plant.

Pg108 Sec5.2.3 Indicates that adult fish will be protected by staged treatment and staggered locations of treatment. There are no staggered areas shown on the proposed treatment maps. Staged treatment implies that multiple treatments will be done and there are current EIS restrictions to such that this document cannot remove. Significant research to prove that either of these suggestions are viable mitigations is not provided.

Further in this section, to use "...fish are free to move into other areas of the Lake temporarily while the application occurs." as a mitigation for fish is nonsensical. Please make some realistic suggestions for how the impacts of herbicides will be mitigated for the fish.

Pg109 Mitigation for fish spawning and rearing areas must be included in this document. Page 85 and 86 states the areas where treatment and fish spawning and rearing overlap. Stating here that they do not overlap with the three muskie areas is contradictory and confusing. Mitigation for all fish propagation MUST be included in this document.

Page109 Sec 5.2.4 Proximity to wetlands must be considered and mitigations must be suggested. Eagle nests are known in the wetlands at the Outlet.

Pg110 Sec5.4 Item #2 Due to the extent of the proposed applications, ALL areas of the lake MUST be posted due to the previous explanation that private homes and boats owners have access to the lake and could unknowingly enter the treatment zones during the restricted times. Unless this mitigation includes posting at ALL areas of the lake, significant liability is imposed on the Town of Ellery. Further, posting must include specific information about treatment areas and restrictions. In 2017 signage posted in non-treated areas caused great confusion as to what should be proper remote site precautions.

Pg 111 Lake Recreation Para4 "...all public access points..." MUST be changed to "...all public **and private** access points..."

Pg113 Sec 6.0 This document fails to include a section on the pros and cons of all the available plant management practices. Briefly, these need to be mentioned in order for the user to easily see all of the tools available in the tool box. On page 12, this document says that plants die off, accumulate in the bottom sediment, consume oxygen, release their nutrients and feed more macrophyte and algae growth. These are listed as the "negative impacts" of weeds in the Lake's ecosystem. However, the document fails to state that the exact same negative impacts occur when herbicide is applied to the plants.

Pg113 Sec6.1 This document severely fails in evaluating "other alternatives." A minimal literature review begs to be included here where at least a few more than the two presented are added.

Pg114 Sec6.2.1 Para1 The term "status quo" shows bias which has no place in this document. It should be removed.

Pg114 Para 3 "Data collected between 2007 and 2017 reveals that densities of invasive weeds...have increased over the last ten years." is not substantiated by facts. Provide the research to document this statement or it must be removed.

Since Appendix F incorrectly records plant abundance and misuses the term "density" the statement that "By May 2017....macrophytes were ...at dense or medium density for approximately half of the data points tested." is false and must be removed. This plant survey data is not substantiated by Racine-Johnson work.

Pg115 Top line "Studies on the effects of mechanical harvesting..." is unsubstantiated with no studies being referenced and must be removed. To use the passage that follows from *Diet for a Small Lake* to justify "studies" on "...25 years of unregulated mechanical harvesting..." is biased, incorrect and must be removed.

Pg117 Sec6.4.1 This section indicates that Renovate concentrations are expected to be 1.0-4.0 ppm. Page 79 of this document indicates "...application of triclopyr as proposed (2.5 mg/L)..." contradicts this page. Clarification of the recommended concentration for Renovate must occur.

Pg117 Sec 6.4.2 Stating that "Extending the treatment zone further into the Lake..." comes without research-based justification. Conclusions from Appendices E and H are invalid due to plant sampling errors, plant abundance calculations errors and misleading conclusions that are not documented by the data. This recommendation contradicts the current state EIS and adds another significant weakness for which the Town of Ellery should find this document to be unacceptable.

Pg118 Sec6.4.3 This section incorrectly states there will be "...no significant impact to native plants..." states that there will be a single application but then discusses a "split-treatment" scenario along with a follow-up application. All of these statements should be corrected or removed. This document must clearly state the proper procedures for herbicide application. The document fails in its purpose as its statements are open to interpretation due to conflicting directives as found in this section.

Pg121 Sec9.0 This section states that impacts of the proposed application of the herbicides "... will be effectively mitigated (see Section 5.0)." This conclusion is not accurate based on the multiple areas of impact that were not addressed for mitigation. It is left to the last sentence of the conclusion to state an important goal that was apparently missed earlier in the document. Since it appears that this document has been written to address the removal of invasive species, significant consideration must be placed on all previous comments to insure that the intention of "removal" is taken into consideration. Since this statement is included, there is serious need for even more extensive modifications to this document. The conclusion must be corrected.

This DSEIS, as currently written, fails to meets it purpose as stated on page 12: to state and evaluate the environmental impacts of the proposed action, to explore ways to minimize adverse environmental effects and to identify potential alternatives to the proposed action. Significant rewriting and research is required to move this document to a level that could be accepted by the Town of Ellery with complete confidence for its content.

Ellery Town Clerk

From: Nystrom, Becky <BeckyNystrom@mail.sunyjcc.edu>
Sent: Friday, March 16, 2018 12:17 PM
To: 'Ellery Town Clerk'
Cc: 'abby.snyder@dec.ny.gov'; 'region9@dec.ny.gov'; 'david.denk@dec.ny.gov'; McKeown, Paul (DEC); Connie Adams; 'connie.adams@dec.ny.gov'; 'anne.rothrock@dec.ny.gov'; 'michael.clancy@dec.ny.gov'; 'maureen.brady@dec.ny.gov'; 'mark.passiute@dec.ny.gov'; 'michael.nierenberg@dec.ny.gov'
Subject: Written Comments on the Chautauqua Lake DSEIS and Appendices
Attachments: NystromCommentsDSEIS2018.pdf

Dear Ms. Haines,

Please find attached a pdf of my written comments in response to the Draft SEIS for Chautauqua Lake Herbicide Treatment. Please confirm receipt, and thank you!

Becky

Rebecca L. Nystrom, Professor of Biology
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TO: Town of Ellery Town Board
c/o Ms. Rebecca Haines, Town Clerk
PO Box 429 Bemus Point, NY 14712
ellerytc@windstream.net

WRITTEN COMMENTS for the Draft SEIS for Chautauqua Lake Herbicide Treatment

Rebecca L. Nystrom
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93 Beech Street, Jamestown, NY 14701
March 15, 2018

Thank you for this opportunity to comment on the Draft SEIS for Chautauqua Lake Herbicide Treatment. I am a long-time biologist, conservationist, and college educator whose parents resided for more than 30 years in Arnold's Bay on Chautauqua Lake, and who has enjoyed skiing, kayaking, boating, birding, botanizing, and exploring the natural history on the lake and its outlet over many decades. I have served or serve on several scientific technical review committees related to Chautauqua Lake macrophyte management, am a founding board member of the Chautauqua Watershed Conservancy, and co-wrote the Phytoplankton (Algae) chapter for the *2000 Chautauqua Lake State of the Lake* report. I have long been concerned about the complex ecosystems, water quality, and healthy functioning of this lake, and thank the Town of Ellery for the opportunity to participate in the review of the draft SEIS (DSEIS).

It is clear that the DSEIS is deficient in multiple areas and will require extensive revisions and corrections before incorporation into a Final SEIS document. Additionally, the accelerated SEQR timeline precludes sufficient public review and thorough scientific vetting needed to create a high-quality DSEIS and FSEIS document, the whole purpose of which is to provide critical management guidance for many years to come. Careful consideration of the lake's large size and complex natural ecosystems, in addition to the varied needs of its diverse lake users, is extremely important so that unintended consequences of poorly-informed decision-making do not occur in the long run.

- ❖ SOLitude's 2017 Bemus Bay macrophyte surveys and data collection reports (Appendix E), as well as the Fall 2017 plant surveys (Appendix H), are based on questionable macrophyte sampling methodologies, species identification, data analysis and interpretation, apparent under-reporting of native species in some cases, and misidentification of certain native macrophytes. The June and December 2017 documents as submitted appear to lack independent scientific vetting and peer-review, and unless corrected should not be considered objective scientific reports for the purpose of the DSEIS. Remove these reports as a reference justifying certain future actions, including DSEIS recommendations such as the May application timing, use of certain herbicide combinations, applications in fish spawning and rearing areas, and extending the application areas further into the lake.

- ❖ In Section 1.2 Project/EIS Background, page 6, with all due respect I find the following statement quite disingenuous: "In accordance with these permits, the Town and Village, with the assistance of CLP, applied varying concentrations of the two herbicides to study the efficacy, effect, and drift of the herbicides. Following the application of the herbicides, SOLitude Lake Management (SOLitude) assessed the results of the project..." Why not acknowledge that SOLitude applied the various concentrations of the two herbicides, NOT the Town and Village or CLP? And yes, SOLitude also "assessed the results of the project and concluded the herbicides were effective."
    - o From a scientific standpoint, it appears that this entire project and its conclusions represent a clear conflict of interest and lack independent evaluation of the "success"

of the treatment, since the company paid to apply the herbicides also evaluated its own work.

- o Additionally, from this same section, "SOLitude further concluded that the areas of the Lake in which a combination of Aquathol® K and Navigate (2,4-D) were applied saw the greatest reduction in Eurasian watermilfoil densities. (SOLitude Dec. 2017) (Appendix E). Following the herbicide application, both SOLitude (Id.) and the NYSDEC (personal and email communication with Michael Nierenberg) recorded a distinct difference in macrophyte density between the areas of Bemus Bay that had been treated with herbicides and those that had not been treated."
  - Apparently anecdotal subjective observations by SOLitude and the NYSDEC are not sufficient for conclusions such as this and diminish the legitimacy of these findings.
  - Visual assessment of macrophyte density does not distinguish between milfoil and non-milfoil, nor invasive non-native and native macrophyte density, occurrences, and percent abundance. If the NYSDEC and SOLitude "recorded a distinct difference" then that data should be included in the DSEIS, and specific species present (or not) should be indicated.

- o As noted earlier, SOLitude's December 2017 report (Appendix E) includes questionable macrophyte sampling methodologies, species identification, data analysis and interpretation, apparent under-reporting of native species in some cases, and misidentification of certain native macrophytes. The June and December 2017 documents as submitted appear to lack independent scientific vetting and peer-review, and unless corrected should not be considered objective scientific reports for the purpose of the DEIS.

- o Claims throughout this section (and others elsewhere), such as "the growth of these invasive and native macrophytes has become so problematic that the recreational use of and movement through the Lake in these area is difficult to impossible," (p.6) and "invasive weeds...have increased in density and area extent" (p.8) are anecdotal, and while they may apply to select areas such as Bemus Bay at certain times of the year under certain circumstances, they are generally untrue when applying to the entire lake, according to other lake observers and experts such as Robert Johnson of Racine-Johnson Aquatic Ecologists. Please review his many published reports (Johnson 2008, 2017, 2018) on Chautauqua Lake macrophytes, for more comprehensive, science-based conclusions about the Lake's general macrophyte condition and changing population densities and occurrences of the non-native Eurasian milfoil and *Potamogeton crispus*, as well as native macrophyte abundance.

- ❖ While the DSEIS includes maps showing general locations of proposed herbicide application, intended herbicide or combination of herbicides for each area, application concentrations, and physical proximity to wetlands, they should also indicate via map overlays natural shore and ecologically-important areas including Ecologically Important Habitats, Environmentally Sensitive Areas Home to Rare, Threatened, or Endangered (RTE) species, Unique Plant Communities such as water lily, and Fish Spawning and Rearing areas, as delineated by the 2017 MMS Final Report. <u>No herbicides of any kind</u> should be applied in these natural, conservation, and environmentally sensitive areas, and they must be protected from drift.
  - o Treatment zones and proposed herbicide products should be modified based on current/flow modeling and dispersion modeling to ensure that adequate safety zones

for dilution are provided to avoid potential negative impacts on shoreline woody and herbaceous vegetation and shallow near-shore emergent vegetation in all treatment areas, as well as in nearby and downstream wetlands, CWC preserves, NYS-owned lands, habitats of sensitive species, fish spawning and rearing areas, including the Chautauqua Lake Outlet.

- ❖ Remove Navigate (2,4-D) from the list of usable herbicides per NYSDEC's regulations from the Division of Fish, Wildlife, and Marine Resources (DFWMR). It is a systemic, synthetic herbicide intended only for emergent aquatic plants, not the diversity of submerged macrophytes known to grow in Chautauqua Lake. This herbicide has moderate acute toxicity, is a potential groundwater contaminant, possible carcinogen, and probable endocrine disruptor/estrogen mimic in certain amphibians and people (Wisconsin DNR 2,4-D Chemical Fact Sheet www.dnr.wi.gov and www.pesticideinfo.org). 2,4-D has been shown to reduce the rate of survival in ducks and waterfowl, is toxic to some fish, and causes mortality in crayfish, many mussel species, and certain insects and zooplankton. It can also kill shoreline trees whose roots access the treated water.

- ❖ Specify that no herbicide shall be applied before July 1st in order to protect fish spawning and rearing periods through June 30, as delineated in the 2017 MMS Final Report, and adhere to the "no herbicide use" in MMS-recognized fish spawning and rearing zones.
  - o Table 4-6 on page 85 of the DSEIS completely disregards the recommendations of the MMS for fish spawning, fish rearing, and endangered species zones and should be removed.

- ❖ Specify that herbicide application may occur only within 200 feet of shore or in up to six feet of water depth (per 1981 EIS), whichever comes first.
  - o Certain proposed treatment zones appear to extend vastly farther into deeper waters beyond 200 feet or six feet of water. Maps included in this DSEIS contain scaling which indicates treatment beyond these limits, notably Warner Bay, Burtis Bay, Bly Bay, Sunrise Cove, and others. Maps would be improved if water depth data is also included and scaling is consistent.
    - ▪ According to maps on pages 87-96, the distances off shore for treatment appears to reach from 100s to over 1000 feet off shore. This is in violation of the General Conditions written by NYSDEC Fisheries in the NYS 1981 EIS for which this proposed document is a supplement. The fact that this draft is recommending significant extensions of the accepted state distance makes it unacceptable. There is significant liability is extending these distances and thus, this is another significant reason the Town of Ellery should find this document to be unacceptable.

- ❖ Specify that herbicide application may be permitted only in areas documented by the NYSDEC to have 50% or more dense rooted invasive species coverage, as determined using the Cornell modified Army Corps technique for measuring density of invasive species plants during the week immediately preceding the application of herbicides.

- ❖ It is not appropriate to state that the purpose of the proposed action of using herbicides (Aquathol K (endothall), Navigate®, and Renovate 3®) includes facilitating the "re-establishment of native macrophytes." This language must be removed from the DSEIS. These herbicides are not selective to just targeting non-natives, nor are they designed to promote the re-establishment of native plants. In fact, they are all designed to kill, debilitate, or reduce the growth of macrophytes. Additionally, studies of the synergistic and bioaccumulative effects of these herbicides in combination, on both native and non-native species, must be explored and included in this DSEIS.

- While all three proposed herbicides are effective in killing non-native Eurasian milfoil, Aquathol K endothall is lethal not only to curlyleaf pondweed but to our many desirable native pondweed species, including *Potamogeton praelongus, P. hillii, P. pusillus, and P. zosteriformis*. How does this proposed treatment ensure that native pondweeds are NOT impacted by the herbicide treatment, and if they are, how will this be mitigated? How does this proposed treatment ensure that more aggressive, non-native invasive species won't more successfully "re-establish" than our native species? And if they don't, how will that be mitigated?

- Statements in the DSEIS (Section 1.4) claiming the "goal of the Project (herbicide treatment) is to enhance the use of the Lake for recreational purposes and to improve the ecological health of the Lake" must be justified with scientific research which provides evidence for such ecological improvement.

❖ The section 3.2.1 Aquatic Vegetation addresses general information about algae and general aquatic ecology of macrophytes (pgs. 27-35), but is deficient in numerous ways:
- The Algae section fails to:
  - describe or distinguish key native algal groups (filamentous greens, phytoplanktonic diatoms, dinoflagellates, and motile greens), "benthic" vs. "planktonic," nor provides native algal species names nor their significant role in maintaining a healthy, oxygenated, biodiverse and productive lake
  - distinguish between true algae and cyanobacteria, which are typically also abundant in Chautauqua Lake but may be associated with harmful algal blooms and potential toxin release
- address the complex ecological relationships between macrophytes, algae, and cyanobacteria, and important allelopathic and other inter-species interactions such as competition for nutrients which may impact algal and cyanobacterial population densities. This all relates to the "alternative stable states" of a lake and help determine whether it's a macrophyte-dominated lake or an algal (including cyanobacteria)-dominated lake. (http://msue.anr.msu.edu/news/be_careful_what_you_wish_for_when_managing_aquatic_weeds).
  -
- The General Aquatic Ecology of Macrophytes section:
  - focuses mainly on the two invasive species, Eurasian watermilfoil and curly-leaf pondweed, but lacks sufficient recognition of the many valuable native species of macrophytes in Chautauqua Lake and their critical ecological roles in stabilizing and supporting a healthy, biodiverse ecosystem, not only within the extensive littoral zones but also in the deeper waters.
  - should acknowledge that both non-native curly-leaf pondweed (*Potamogeton crispus)* and our many native pondweeds all tend to complete their life cycles by early July, and die down naturally.
  - clearly shows the biodiverse nature of Chautauqua Lake macrophytes, even in the late fall 2017 surveys, although SOLitude's sampling methodologies preclude confidence in conclusions regarding percentage of each species found at various sites and bays around the lake.
- The sections of the DSEIS on pgs. 31-35 based on SOLitude's research associated with the Bemus Bay 2017 herbicide application and plant surveys done in the Fall of 2017, must be removed. The statement that "This survey methodology can be

replicated to track changes…" goes to the main reason these sections must be removed. SOLItude does not use the Cornell-modified US Army Corps abundance scale correctly because all of its individual plant species data is subjective. That is, specific amounts of each species found on the rake are not recorded as percentages. That makes comparison between rake tosses at any location from one time to another impossible. Additionally, the percentages that appear on pages 33-35 are incorrect due to SOLitude's method or calculating percentages. Their calculations do not include finding "No Plants" of a particular species at sampling sites, which causes the denominator of the percentage to be in error, and in turn leading to erroneous over-estimates of species present.

- The document fails to recognize the ecological significance of aquatic herbivorous insects, nor does it address the potential harmful impacts of the proposed herbicides on aquatic weevils and other insect herbivores that have been shown to naturally reduce milfoil growth by feeding on the growing tips. These beneficial herbivores include the moth, *Acentria ephemerella*; the weevil *Euhrychiopsis lecontei*; and native caddisfly *Nectopsyche albida*, which help control Eurasian milfoil during their larval stages but need shoreland/littoral vegetation for certain other life stages.
  - Treatment zones and proposed herbicide products should be modified based on current/flow modeling and dispersion modeling to ensure that adequate safety zones for dilution are provided to avoid potential negative impacts on shoreline woody and herbaceous vegetation and shallow near-shore emergent vegetation in and near all treatment areas.

  - Potential impacts of shoreland/littoral zone habitat loss on other macroinvertebrates in these areas should also be considered, since they, too, are essential components of the lake's food webs which ultimately support our fisheries, waterfowl, and many other creatures.

- This document continues to lack studies regarding
  - synergistic effects of chemical cocktails, or combining one or more of the three herbicides planned for use;
  - research showing the greater risk of the establishment of the invasive macrophyte *Hydrilla verticillata* where Eurasian watermilfoil has been chemically removed without a management plan for reestablishing native vegetation (http://nyis.info/index.php?action=invasive_detail&id=16).
  - sufficient data on bioaccumulation, degradation times, potential for soil mobility, dispersion, and longer-term ecosystem impacts on native plants and wildlife;
  - scientific research/data regarding biological oxygen demand (BOD) and impacts of reduced dissolved oxygen levels in the water column and near the sediments, where massive die-back of herbicide-killed or debilitated plants may promote microbial decomposition, oxygen depletion, and potential biological stress and/or loss of invertebrates, fish embryos, young fish, amphibians, turtles, mussels, and other creatures that may not have the ability to move into more oxygenated waters. Research must be included documenting how depleted dissolved oxygen seriously stresses fish and their young, amphibia and their larvae, and spiny softshell turtles, which requires sufficient dissolved oxygen through their shells for critical oxygen supply.

- This document should include critical information addressing potential impacts on algal and cyanobacterial population growth, including filamentous green algae and harmful algal (cyanobacterial or "blue-green algae") blooms (HAB), which will likely be exacerbated by the release of nutrients from dying macrophytes into the water column, and additional light availability in the photic zone. The publicized goal of reducing weed and algal mats and cyanobacteria accumulations by applying herbicides which target macrophytes (not algae nor blue-green bacteria) is not based on sound ecosystem science. Dying and decaying macrophytes debilitated by herbicides will likely release additional nutrients into the water column, including phosphorus and nitrogen. Macrophyte loss will, in turn, reduce shading and competition for limiting nutrients, and will enhance, not control, algal and cyanobacteria population growth. Herbicide treatment will thus likely exacerbate the filamentous green algae and cyanobacteria problem and be counter-productive in addressing the challenges of harmful algal blooms (HAB).
    - The possibility of converting our lake from a stable, macrophyte-dominated lake to an algae-dominated lake as a result of large-scale "weed control" must be addressed in the DSEIS and potential mitigation plans for these unintended consequences must be included. See "Be Careful What You Wish For," from the Michigan State University Extension (http://msue.anr.msu.edu/news/be_careful_what_you_wish_for_when_managing_aquatic_weeds).
    - Include studies showing protective allelopathic impacts of milfoil against the growth of the potentially-toxic *Microcystis* HAB and the production of the toxin microcystin.

- While it's possible the project may positively impact the economic vitality of the area, it is also true that the opposite may occur and this should be recognized, along with mitigation plans. Real and perceived socioeconomic impacts must be assessed.
    - Herbicide use has the potential to negatively impact Chautauqua Lake's renowned big-game fisheries if sufficient fish habitat is impaired by herbicide use. Loss of shelter, spawning, and rearing areas, and stress and impairment resulting from reduced oxygen availability, all may lead to decline of key fish populations, including our world-class musky. Fishermen with concerns about the health, safety, and biological impacts of herbicide use may choose to fish elsewhere.

    - While herbicide use may result in positive impacts on the odor and appearance of the lake due to the removal of the invasive vegetation, it must be recognized in this document that negative impacts of foul odor, toxic algae, unsightly overgrowth of algae and cyanobacteria, and dead and dying plants are most definitely possible as well. As noted previously, increased algal and cyanobacterial blooms are likely as a result of decaying macrophytes' released nutrients into the water column, increased light, and reduced competition from killed or impaired plants debilitated by the herbicide treatments.

    - A transparent, lake-wide public information campaign, including social, print, and radio media, letters to individual property owners around the entire lake and downstream, and lake-wide, informative postings, is necessary to create full public awareness and to ensure health and safety before, during, and after application of herbicides for all who use the lake. The DSEIS suggests notifications only to those in the treatment area, which is not sufficient.

Unfortunately, the truncated time-frame allowing scientific research and review and public comment on this DSEIS precludes my ability to address a number of additional concerns and deficiencies throughout this document, including much of the very incomplete Section 5.0 entitled Mitigation Measures (pgs. 105-112). I encourage the Town of Ellery to please hear and appropriately respond to the many voices of science and other community members expressing deep concerns about this project and its process, and to substantially correct and improve this DSEIS and supporting documents. As written it currently fails to adequately accomplish its stated goals of identifying impacts and modifying the proposed action "to avoid or minimize potential, significant adverse impacts to the environment" (p.12), and without significant additional research and re-writing, this DSEIS should not be accepted as the basis for a critical guiding document affecting our lake for many years to come.

Thank you for this opportunity to submit my comments for the 2018 DEIS and proposed herbicide action on Chautauqua Lake.

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E. Thomas Arnn
70 North Lake Drive
Chautauqua, NY 14722

March 16, 2018

Dear Rebecca Haines, Town Clerk, Town of Ellery

Subject: The Draft SEIS (Supplemental Environmental Impact Statement)

I am a concerned user of Chautauqua Lake. I drink the water and enjoy water sports in and on it.

I am familiar with what Suffolk County did to stem rampant Development on Long Island and suggest that Chautauqua County take simpler action but in this case, to improve the quality of the water in Chautauqua lake. Suffolk County bought up the development rights of farmland to stop housing developments in the Hampton's. Here is a link explaining what it is.

http://www.suffolkcountyny.gov/departments/planning/divisions/openspaceandfarmland/farmlandpreservation.aspx

That is, by spending what would be spent on herbicides (a temporary fix) to give incentives to municipalities and or home owners to fix the source of nutrients going in the lake (a permanent solution). Money spent on eliminating nutrients going in the lake is a far better strategy. The Chautauqua Utility District is a good example of what needs to be done. As many know the District installed a tertiary sewer treatment plant which should be operational this year. I am suggesting monies are far better spent on projects like this even thought it might require floating a bond to achieve the clean water goal.

I note on page 9 Paragraph 2 of the DSEIS "...more efficiently and effectively control..." with herbicides, where controlling the source of nutrients that grows the weeds and algae is the real enemy and that in fact is more "efficient and effective" to control weeds and algae! Using weed killer is not a prominent solution and it poisons our drinking water source.

Best Regards,

E. Thomas Arnn

Ellery Town Clerk

From: Deborah Moore <dem511@hotmail.com>
Sent: Friday, March 16, 2018 11:23 AM
To: ellerytc@windstream.net; region9@dec.ny.gov
Subject: Comments on DSEIS

March 16, 2018

Rebecca Haines, Town Clerk
Town of Ellery
P.O. Box 429
Bemus Point, NY 14712
ellerytc@windstream.net

Ms. Haines:

We are writing to request that the Town of Ellery not accept the Draft Supplemental Environmental Impact Statement (DSEIS) without considerable change to the document. The document is full of rhetoric, does not demonstrate scientific research of impact and alternatives, and needs to reflect all changes requested by the many experts who have prepared comments.

We continue to be disappointed by the lack of public involvement in the process. The Town of Ellery accepted the final scoping document a mere 4 working days after the deadline to submit written comments and the document reflected very few of the requested changes. The Town of Ellery then accepted the DSEIS exactly 4 weeks later. It is clear that the scoping document was merely a formality and not used to guide procedures for the preparation of the DSEIS. Several organizations requested at least 30 days extension to review the DSEIS and the 4 day extension again demonstrates the lack of desire to address public comments.

Our specific comments on the scoping document that have not been addressed are:

- The SEIS should require notification by mail to all properties between the lake and Routes 430 and 394, as well as properties along the outlet.
- The SEIS should be a lake-wide assessment and include the impact downstream as well.
- Any potential for water movement north toward the intake for Chautauqua Institution's drinking water needs to be analyzed.
- Impact on harmful algae blooms needs to be considered.
- The document lacks adequate consideration of the affects the specified herbicides will have on fish, crustaceans, benthic macroinvertebrates, and other animals that reside in Chautauqua Lake.

A few of our specific comments on the DSEIS given the time available for review are:

- Section 1.2 CSLAP corrections needed
    - "Chautauqua Lake also participates in the NYSDEC overseen CSLAP" – It is the "Chautauqua Lake Association" that participates in CSLAP

- "2016 CLSAP report only covers north basin" – Jeffery has performed the CSLAP sampling in the South Basin for many years, including 2016. The report for the South Basin for 2016 is on-line.

- Section 4.5 is full of rhetoric that must be removed:
  - "Densities of macrophytes on the Lake are hindering….." – Our family performs all of those activities in various locations on the lake and have not been hindered by density. Only the harmful algae blooms have hindered our activity.
  - "Harvesting has not been sufficient…." – We don't see where any attention was given to the impact additional harvesting could have to address certain dense areas of macrophytes.
  - "Overall impact of the herbicide application on the socioeconomics …..is projected to be positive" – Provide the research that substantiates this statement.
  - "Forces individuals to tow their jet ski equipment to the middle of the Lake" – Our family rides jetskis the entire length of the lake including to shore at Chautauqua Institution, Dewittville, Maple Springs, Bemus Bay, Greenhurst, and Lakewood without ever needing to tow our jetski and rarely removing weeds from the intake.
  - "Herbicides will assist the socio-economics" – Knowing that two of the references in this section were used out of context and one does not exist (Mefford, 2017), there is no basis for this statement. Information exists on open space and recreation facilities where harmful algal blooms occur, that is not mentioned, and should be. Herbicides can enhance algal blooms which are clearly worse for the socio-economic climate.

- Section 4.9 Cumulative Impacts
  - "Once applied, the products will dissipate" – Research for drift must be included.
  - "No negative effects from any synergistic interactions….are expected" – Provide the research data that verifies this statement.
  - "No negative effects were observed" – Though not documented, this statement appears to be based on the SOLitude research done in Bemus Bay. Appendix E is known to be significantly flawed due to its improper methodologies. This statement must be removed since it is without basis.

- Section 5.2.3 To suggest the following "fish are free to move into other areas of the Lake temporarily while the application occurs" as a mitigation is simply absurd. How exactly are the fish going to know that the application is occurring? This statement alone should make the Town of Ellery realize the inadequacy of this document. It must be removed.

- Section 5.2.3 says "the proposed treatment areas cover about 25% or less of fish spawning and/or rearing areas" – Absolutely no herbicide should be applied in any fish spawning areas.

- Section 5.4 discusses public notice of herbicide application, which has been our biggest concern with what occurred in Bemus Bay. This is now the third time we have publicly requested that all residents surrounding the lake are notified. To only notify "specified areas" and only post restrictions on websites of municipalities "within the treatment zones" is not adequate and improperly makes assumptions about "affected parties."

- Section 5.4 also discusses swimming restrictions for "3-24 hours". This is relevant to our comments about notification of all residents for any herbicide application in Chautauqua Lake. The labels say swimming restrictions are lifted after 24 hours, however human intake is restricted until certain dissolution levels are met. In 2017, the restrictions on human intake were restricted from June 26 until July 7. We strongly believe every lake user should have the right to judge the distinction between swimming and human intake on their own and need to be notified in order to do so.

- Even if you assume there is no drift beyond the identified affected area, the lake is used by a variety of users through a variety of access points, most of which are private. Many of the lake users do not follow local media, making direct mail to all residents the only way to make a good faith effort to notify all users.

We believe the Town of Ellery has been misled by the Chautauqua Lake Partnership. Please consider the vast wealth of knowledge the long list of reputable organizations, science professionals, and concerned community members are providing with their comments. The DSEIS should not be a pro versus anti herbicide document, but rather a document that accurately considers all potential impacts on the health of the lake.

Sincerely,

Jeffrey and Deborah Moore
3266 Cheney Drive
Bemus Point, NY 14712
dem511@hotmail.com

Cc: NYSDEC region9@dec.ny.gov

Submitted via email prior to the due date of March 16, 2018 at 4pm

Sent from Outlook

Additional Comments on Draft Supplemental Environmental Impact Statement for Chautauqua Lake Herbicide Treatment by the Town of Ellery, January 11, 2018

By John F. Dilley, PhD

General Comments: Throughout the document there is a lack of technical understanding of limnology, i.e. the physical processes of lake characteristics, like currents, waves, temperature profiles, and resulting vertical stability. These characteristics determine what happens to chemicals that are added to a lake. This document concentrates on the "permitting process", which is necessary, but not sufficient. The sufficient part is what effect do these chemicals have on living organisms? What is covered is how well these chemicals kill certain weeds at certain levels due to their toxicity. What is NOT covered is: "what is the impact of these chemicals during the time period, where the chemicals are dispersed to lower concentrations, on others living organisms, like fish, dogs, children, and adults, who are exposed in the water or drink the water?" I am afraid that this "process focus" is a result of this document being written by lawyers and for lawyers.

The Town of Ellery's jurisdiction does not include the whole lake and therefore should not be allowed to be the Lead Agency for this herbicide application, which will affect areas of the lake outside of its jurisdiction.

Many of my comments are focused on drinking water impact, because I am a summer resident of Chautauqua Institution (CI), which draws its drinking water from the lake. No one to date has studied where the herbicides are transported to and what the dispersion is. The Bemus Bay episode last summer promised to do this in their plan, and said they did it in their post test summary, but presented very little herbicide concentration data. None of this data has been used for transport and dispersion analysis/predictions. This data, with analysis, is critical for maintaining safe drinking water from the lake. Data collected is most important. Next is dispersion analysis which needs to be done for various wind/current combinations, to be able to estimate the dispersion of the herbicide with distance from the application site, to the CI water intake. Transport and dispersion modeling will give much more accurate results.

<u>There needs to be a requirement that the transport and dispersion characteristics of the lake as a function of release location and meteorological conditions be known through data collected and analysis performed.</u>

Future herbicide applications should be delayed until transport and dispersion data are analyzed and presented. To maintain safe drinking water, it is critical that this information be available. The position of this document appears to be it was safe (except for the dead fish in Bemus Bay) last summer, so it will be in the future. This couldn't be further from the truth. The areas proposed for treatment in 2018 is very much larger in area and thus in total herbicide to be applied. For Chautauqua's water intake, the proposed Sunset Bay application is very much larger than Bemus Bay and much closer. This combination is doubly bad, and there is little consideration of potential harm to other living organisms.

If some of my comments are the same as previous ones, it is because they were not addressed.

Specific Comments (by section #):

1.2 Project/EIS Background – Document states, "This SEIS is intended to specifically identify potential impacts and explore ways to minimize identified significant adverse environmental effects of herbicide application." Actually this document identifies adverse impacts, but does little to minimize or treat them seriously.

1.3 Project Description and Mapping – The number of sites and their area is a large increase compared with Bemus Bay last summer. At a specified point, the toxic concentrations from multiple sources all add together. Of particular concern for CI is the area of Sunset Bay and Warner Bay, which are much closer to CI, and north of Long Point. A South wind will generate a Northerly current, which will transport herbicide directly toward CI's water intake, which is north of the Bell Tower. In the Southern Basin, the diluted Renovate concentrations are at the safe limit (Table 4-1).

3.1.1 Ground water - I would be worried if I had a private well near the lake where herbicides were applied. The water source for these wells is the lake. Granted that flowing through the ground can have a filtering effect, but underground channels would eliminate it. Water from wells near the lake needs to be tested.

3.1.2 Surface Water - Document states, "water generally flows from north to south and empties into the Lake's outlet in its southeastern corner where it drains into the Chadakoin River", with no mention of wind driven currents which dominate when the wind is over 5 mph.

3.1.3 Water Quality – This section is really surprising. It reports on how the lake is "impaired" for potable water, swimming and recreation. Instead of addressing the real topic of why adding toxic chemicals to our drinking water supply is safe.

3.7.1 Public Water Supply – Document states, "The number of private residences using surface water as a drinking water supply is unknown and likely dwindling." Implying that this not important. Map shows public water intakes sites, and then moves on, instead of discussing how wind driven surface currents can transport toxic chemicals in a surface layer to public drinking water intakes.

4.2 Hydrology and Water Resources – covered in earlier submission. The document does allude to wind driven currents in Section 4.2.2, "however, in larger Lakes, wind fetch can play a significant role in movement of herbicide." They never take this into account in other parts of the document.

4.7.1 Public Water Supply – Document states, "The labels for the proposed herbicides state that they should not be placed within 600 feet to 1300 feet (depending on type and concentration) from a water supply intake. Don't know how this was derived, but it depends on many factors, and it's not "one size fits all". Without a dispersion study, you have no idea whether this is safe or not. It could be many times that distance. It depends on the amount deposited, the current direction and speed, and the turbulence in the water that causes the spreading/dilution of the deposited concentration.

Document also states "The Chautauqua Utility District intake is located over 2 miles from the nearest treatment area and is north and uplake of the treatment area. Concentrations of the herbicides to be applied and the dilution modelling show that the concentrations at this intake we be several orders of magnitude less than the drinking water standards. The Plan also includes not using Renovate in the areas closest to this water intake." My earlier comments about full lake dilution and North-South current apply. These crude estimates are way off – need dispersion modeling in the surface layer. It is possible that with a South wind that concentrations could exceed safe values.

4.8.3 Impacts to Fish... - Navigate label states that it is toxic to fish. Last year, I submitted pictures of dead fish floating in Bemus Bay, 2 weeks after application.

5.5.1 Public Water Supply – Document states, "The other two systems take water from the lake and the treatment plan is designed to minimize or eliminate any potential impacts." This statement is based on false premises; north south current and full lake dilution. False premises equal false result.

John F. Dilley, PhD

March 16, 2018

Additional Comments on Draft Supplemental Environmental Impact Statement for Chautauqua Lake Herbicide Treatment by the Town of Ellery, January 11, 2018

By John F. Dilley, PhD

General Comments: Throughout the document there is a lack of technical understanding of limnology, i.e. the physical processes of lake characteristics, like currents, waves, temperature profiles, and resulting vertical stability. These characteristics determine what happens to chemicals that are added to a lake. This document concentrates on the "permitting process", which is necessary, but not sufficient. The sufficient part is what effect do these chemicals have on living organisms? What is covered is how well these chemicals kill certain weeds at certain levels due to their toxicity. What is NOT covered is: "what is the impact of these chemicals during the time period, where the chemicals are dispersed to lower concentrations, on others living organisms, like fish, dogs, children, and adults, who are exposed in the water or drink the water?" I am afraid that this "process focus" is a result of this document being written by lawyers and for lawyers.

The Town of Ellery's jurisdiction does not include the whole lake and therefore should not be allowed to be the Lead Agency for this herbicide application, which will affect areas of the lake outside of its jurisdiction.

Many of my comments are focused on drinking water impact, because I am a summer resident of Chautauqua Institution (CI), which draws its drinking water from the lake. No one to date has studied where the herbicides are transported to and what the dispersion is. The Bemus Bay episode last summer promised to do this in their plan, and said they did it in their post test summary, but presented very little herbicide concentration data. None of this data has been used for transport and dispersion analysis/predictions. This data, with analysis, is critical for maintaining safe drinking water from the lake. Data collected is most important. Next is dispersion analysis which needs to be done for various wind/current combinations, to be able to estimate the dispersion of the herbicide with distance from the application site, to the CI water intake. Transport and dispersion modeling will give much more accurate results.

<u>There needs to be a requirement that the transport and dispersion characteristics of the lake as a function of release location and meteorological conditions be known through data collected and analysis performed.</u>

Future herbicide applications should be delayed until transport and dispersion data are analyzed and presented. To maintain safe drinking water, it is critical that this information be available. The position of this document appears to be it was safe (except for the dead fish in Bemus Bay) last summer, so it will be in the future. This couldn't be further from the truth. The areas proposed for treatment in 2018 is very much larger in area and thus in total herbicide to be applied. For Chautauqua's water intake, the proposed Sunset Bay application is very much larger than Bemus Bay and much closer. This combination is doubly bad, and there is little consideration of potential harm to other living organisms.

If some of my comments are the same as previous ones, it is because they were not addressed.

Specific Comments (by section #):

1.2 Project/EIS Background – Document states, "This SEIS is intended to specifically identify potential impacts and explore ways to minimize identified significant adverse environmental effects of herbicide application." Actually this document identifies adverse impacts, but does little to minimize or treat them seriously.

1.3 Project Description and Mapping – The number of sites and their area is a large increase compared with Bemus Bay last summer. At a specified point, the toxic concentrations from multiple sources all add together. Of particular concern for CI is the area of Sunset Bay and Warner Bay, which are much closer to CI, and north of Long Point. A South wind will generate a Northerly current, which will transport herbicide directly toward CI's water intake, which is north of the Bell Tower. In the Southern Basin, the diluted Renovate concentrations are at the safe limit (Table 4-1).

3.1.1 Ground water - I would be worried if I had a private well near the lake where herbicides were applied. The water source for these wells is the lake. Granted that flowing through the ground can have a filtering effect, but underground channels would eliminate it. Water from wells near the lake needs to be tested.

3.1.2 Surface Water - Document states, "water generally flows from north to south and empties into the Lake's outlet in its southeastern corner where it drains into the Chadakoin River", with no mention of wind driven currents which dominate when the wind is over 5 mph.

3.1.3 Water Quality – This section is really surprising. It reports on how the lake is "impaired" for potable water, swimming and recreation. Instead of addressing the real topic of why adding toxic chemicals to our drinking water supply is safe.

3.7.1 Public Water Supply – Document states, "The number of private residences using surface water as a drinking water supply is unknown and likely dwindling." Implying that this not important. Map shows public water intakes sites, and then moves on, instead of discussing how wind driven surface currents can transport toxic chemicals in a surface layer to public drinking water intakes.

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4.7.1 Public Water Supply – Document states, "The labels for the proposed herbicides state that they should not be placed within 600 feet to 1300 feet (depending on type and concentration) from a water supply intake. Don't know how this was derived, but it depends on many factors, and it's not "one size fits all". Without a dispersion study, you have no idea whether this is safe or not. It could be many times that distance. It depends on the amount deposited, the current direction and speed, and the turbulence in the water that causes the spreading/dilution of the deposited concentration.

Document also states "The Chautauqua Utility District intake is located over 2 miles from the nearest treatment area and is north and uplake of the treatment area. Concentrations of the herbicides to be applied and the dilution modelling show that the concentrations at this intake we be several orders of magnitude less than the drinking water standards. The Plan also includes not using Renovate in the areas closest to this water intake." My earlier comments about full lake dilution and North-South current apply. These crude estimates are way off – need dispersion modeling in the surface layer. It is possible that with a South wind that concentrations could exceed safe values.

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John F. Dilley, PhD

March 16, 2018

Ellery Town Clerk

From: Shar Trenkamp <shar@trenkamp.com>
Sent: Friday, March 16, 2018 3:14 PM
To: ellerytc@windstream.net
Subject: Supplemental Environmental Impact Statement (SEIS)

Rebecca Haines, Town Clerk

Dear Ms. Haines and to Others Whom it May Concern:

I, as a property owner in Ellery along Chautauqua Lake, have serious concerns regarding SEIS, which I have read in its entirety. It is well done, well thought through, and well presented. But, it also raised several serious concerns about its potential far-reaching impact. My family, including five grandchildren, utilize our lake throughout the summer season as do many other multi-generational families.

My first concern is in regard to page 102, 4.8, UNAVOIDABLE Adverse Environmental Impacts. It seems to me that this change of habitats for native plant and fish life along with rare and threatened species could well lead to and present new and more unforeseen complicated issues. This is a lake, which though the study indicates the projected treatment area is controlled in scope, is still a lake. Water is amorphic at best and any treatment will translate to the rest of the lake in varying amounts.

Secondly, I am concerned about how the town and other lake communities will be communicating with the public regarding the timing of any chemical treatments. General public notification will not reach most of the population using the lake for recreational purposes. SEIS indicated that there would be no posting in private areas. I strongly believe ALL property owners should be notified well in advance as to dates and times of applications should this move forward. I, for one, will not allow my grandchildren in treated water for several days following any application.

I have several additional concerns, but these two are at the top of my list. I hope you will take these concerns seriously and address them accordingly. Thank you.

Sincerely,
Frances Trenkamp

Ellery Town Clerk

From:	Bowman, Jan <JanBowman@mail.sunyjcc.edu>
Sent:	Friday, March 16, 2018 2:20 PM
To:	'Ellerytc@windstream.net'
Cc:	'region9@dec.ny.gov'; 'abby.snyder@dec.ny.gov'; 'david.denk@dec.ny.gov'; 'michael.clancy@dec.ny.gov'; 'michael.nierenberg@dec.ny.gov'; 'maureen.brady@dec.ny.gov'; 'mark.passiute@dec.ny.gov'; 'anne.rothrock@dec.ny.gov'; 'connie.adams@dec.ny.gov'; 'paul.mckeown@dec.ny.gov'
Subject:	DSEIS Comments for Chautauqua Lake
Attachments:	BowmanDSEIS Comments S18.pdf

Dear Ms.Haines,

Thank you for the opportunity to comment on the Draft SEIS for Chautauqua Lake herbicide treatment. I have attached the comments that I have had time to pull together which are fairly general due to the tight time frame (even with the extension). I would have liked to have had more time to provide a more detailed biological assessment, but I have faith that others will be able to address this need.

Thank you,
Jan Bowman
Professor of Biology
Environmental Science Program Coordinator
Jamestown Community College

To: Rebecca Haines, Ellery Town Clerk
Subject: Written Comments for the Draft SEIS for herbicide Application to Chautauqua Lake
Submitted by: Janis Bowman
2017 Hoag Road, P.O. Box 3
Ashville, NY 14701
fishin2@windstream.net
Date: March 16, 2018

I am a lifelong resident of Chautauqua County having grown up in Jamestown and now residing in Ashville. I have been on the lake fishing my entire life, and my biological studies as a graduate student put me on the lake in a research capacity back in 1989, resulting in a publication of my research on the macrophyte diversity of Chautauqua Lake. I have since continued to conduct research on Chautauqua Lake with my students over nearly 30 years. To say that I know the lake and its ecology well would be an accurate statement. I appreciate this opportunity to comment on the Draft SEIS and thank you for extending the deadline to allow me to do so. I'm afraid that there was still not enough time to fully review and comment on the many shortcomings and errors in the DSEIS, but I have highlighted those that I've had time to address. I'm hoping others will cover those that I have not had time to include in this letter. As I said during the public comment meeting, I am very disturbed by the rushed approach that is preventing sound scientific review of a document that is likely to serve as a new baseline that may very well be used to guide future lake management. After reviewing the DSEIS, I strongly suggest that the Town of Ellery, as lead agency, not accept this document as written. The final SEIS must consist of sound data as its baseline, and the many places where opinion is stated as fact need to be removed. There are numerous places where that has been done, and though that may be acceptable for Opinion Editorials in our local paper, it is not acceptable for a scientific document like a SEIS. Without sound data, many of the "conclusions" that have been cited as factual are without merit. The lack of proper (or any) referencing is also problematic. Please note and address the following concerns:

- One of the statements made about the SEIS is that it is intended to put herbicides "in the toolbox." The MMS already provides for herbicide use under very carefully considered conditions and with specific limitations as determined by a local group of scientists who know the lake, its history, and understand lake ecology. It's already in the toolbox, so what is the purpose of this SEIS document if not to challenge what scientists have carefully determined for our lake and to push for large scale treatment for personal gain with a disregard for lake ecology? A SEIS is a wonderful idea at this point, but this document will not serve us well.

- The MMS is referenced on page 8, paragraph 3, last sentence with wording that does not make sense. This needs to be rectified because it is unclear: "As a result, the MMS did not create a method through which the included herbicide weed management tool could not be utilized." What???? This is a document that will be used as documentation in the future, and the history AND the science need to be properly presented.

- Studies have not been conducted (or suggested in the DSEIS) on the negative synergistic effects of using the proposed herbicides together. The lack of documented impacts on fish in all stages of development (especially young fry and reproductively mature fish) needs to be addressed in the SEIS. The process at this point should be looking to determine impacts and make sure that what is proposed is truly safe. This document does not address this. Drift, affects on wetlands, drinking water, fish reproduction, macroinvertebrate diversity and population densities as just a few aspects of herbicide impacts that have not been measured. There are too many questions unanswered for a massive broad stroke approach to herbicide application. What's the rush? Do it right!

- On page 2, it says "The proposed action has been designed with mitigations built into the treatment plan to minimize adverse impacts. The result is a limited number of significant impacts requiring additional mitigation." The statement is made, but I don't see specifics on what those significant impacts are and how they will be mitigated. There are numerous general statements of this sort throughout the document, but the details are missing. Without the details, such statements are without merit.

- On page 2, section 1.2 it says "The Lake is in many ways two distinct bodies of water," and then further in the document the unique (separate) ecosystems within the lake are recognized. The approach of the document is to treat specific areas as though these areas are not connected. But chemicals don't stop at a wall. Many variables will affect drift and concentration, and these areas ARE very much connected. The Lake is one body with many smaller functioning parts that impact the whole. Much like the human body, you cannot impact one organ without impacting others and consequently affecting the organism as a whole. The approach being taken, and the Town of Ellery as lead in this process, is inappropriate.

- In various places, the statement that the lake has declined in health and is the worst it's ever been is not based on fact. It is based on opinion which has no place in a SEIS. Statements like this need to be backed up with actual plant density data by species collected over time. Chautauqua Lake is a dynamic lake where the plant growth in an area may be very dense one year and nearly non-existent the next. Fishermen were actually struggling to find weed lines in some traditionally good fishing areas this past summer, indicating that the density had actually decreased. Basing the herbicide treatment of the entire lake on a study that was poorly conducted on ONE bay is not sound science. That makes no scientific sense and poses a potential threat to human health, the health of wildlife, ecosystem structure and functionality, and the health of our fishery. Editorial comments such as provided on page 6, second paragraph have no place in a SEIS. Also on page 9 paragraph 2 the document attempts to "document" conditions by referencing newspaper articles, which are editorials placed in the paper with no scientific basis. Who wrote the article referenced on page 9? The only reference says "Post Journal, 2017." An Opinion Editorial by the CLP? **This is totally inappropriate** when creating a SEIS that is meant to truly document FACTS and guide future actions. This document is so full of such statements that the time afforded for comment is way to short to allow proper adjustment of this approach. Frankly, the document needs to be rewritten based on facts and good science before it should be used to guide any management of the lake.

- Page 6, last paragraph: The fact that *Potamogeton crispus* naturally dies back prior to July first and is on the decline by the end of June means that the pre-treatment data collected in May was already not representative of the true macrophyte conditions in Bemus Bay by the time the treatment occurred a month later (end of June). Then to declare that the treatment was a success is a misrepresentation of what truly occurred. Also, plant densities had shifted for not just *P. crispus*, but for other plant species as well. One month is a significant period of time for change to occur on a lake like Chautauqua Lake. The scientific conclusions are not valid due to poor scientific design. Also, there are other *Potamogeton* species in Bemus Bay that are native and important for fish spawning. No chemicals should be used during fish spawning time for multiple reasons, including the impacts of losing weed beds needed for successful spawning, not to mention possible chemical effects on the eggs, fry, and other stages of development that have not been tested.

- Pages 6-7, last sentence: "The NYSDEC did not require the Town of Ellery and Village of Bemus Point to survey invertebrates following treatment because there was no natural ecological baseline in the Lake that would justify such a survey." What? The macroinvertebrates are a key part of a food chain needed to support a fishery and sustain many wildlife, including birds, amphibians, etc. Macroinvertebrate data DOES exist, and if what has been documented is not sufficient for a reasonable baseline, then conducting a survey BEFORE chemical treatment should be part of the SEIS. How do we know impacts if we are so quick to dump in chemicals that we don't determine what is there before we destroy it (or don't destroy it). How do we know? Studies such as this should be part of our plan, and once this information is known, then and only then should we be applying management techniques such as herbicide use.

- Page 7, 4th paragraph: "....the major contributor to lake nutrients, internal loading, phosphorus in the sediments, which accounts for 54% of the required reduction, is not being actively addressed." This is not true. Harvesting of plant mass reduces what COULD be present as the plants decompose. When the plants are mechanically harvested, that source of internal nutrients is reduced. However, if the plants are chemically destroyed, they will decompose in their entirety and add to the internal loading on a larger scale. Also, the loss of plants that take up the excess nutrients will leave more for algae and cyanobacteria which will increase the risk of HABs.

- Page 8, last paragraph: "Over the past twenty-five years, since CLA's annual herbicide application program ended, the invasive weeds- primarily but not limited to Eurasian watermilfoil and curlyleaf pondweed- have increased in density and areal extent." That is simply not true. It's dynamic from year to year, and if a statement like this is going to be put into a SEIS, it needs to be backed up with data that scientifically documents it. Opinions, once again, have no place here. I have noted some years where it's hard to find weed lines (like last summer), and in this very document it is mentioned that an herbicide treatment planned for Burtis Bay did not take place because there were not enough plants to warrant it. There is a LOT of opinion and unsubstantiated information worked into this document which should render it invalid as a SEIS.

- No herbicide treatment should be made prior to July first. Allow the "weed beds" to be present for successful fish spawning. Survey the macrophyte density and diversity in late June and treat as quickly as possible if warranted before the plant communities change as happened in 2017 in Bemus Bay. By the time treatment occurred, there was little need. The *Potamogeton crispus* was all but gone, the milfoil was greatly decreased, and the predominant plant in the bay was *Potamogeton pusilus* (a native). Then, within a week of treatment, conduct a follow-up survey. Also make note of macrophyte density found on shore (dead "weeds"), fish kills, etc. Document the full effects. Also, make sure that the "before" sites are the same sites surveyed for "after." This was not properly done by SOLitude in 2017.

- The SOLitude report should not be used as a basis for this SEIS. It is riddled with scientific procedural and analysis errors. It is severely flawed and should not provide any baseline for the SEIS or future actions. An independent agency should conduct the research without any conflict of interested. SOLitude assessed the need for herbicides that it would profit from providing.

- Scientific names should be italicized. Proper scientific format should be appropriately used in a SEIS.

- The Cyanobacteria Advisories table on page 28 illustrates the dynamic nature of such events. Dropping back in 2015, but showing the worst year yet this past summer. Interestingly, this is when Bemus Bay was treated with herbicide, and algal blooms were noted as late as November this past year by aerial imaging.

- Generally the removal of invasive plants does not encourage natives to reestablish themselves. A disturbance normally opens the area up for more invasives because they can typically outcompete natives. The concluding paragraph is scientifically misleading without references where this has been documented to have occurred. If that is a goal, it is likely an unrealistic one.

- Identify the specific authors of the SEIS.

Just as an illustration that the data pulled together in this document is questionable, on page 38 the table of species, common names, and additional information such as "Introduced" and "No longer present in the lake" is inaccurate. It states that the Paddlefish is "No longer in the lake," yet the DEC had been stocking it in Chautauqua Lake from 1998 up to 2010. "Through the summer of 2010, about 13,000 fingerling paddlefish have been stocked in New York waters, including Chautauqua Lake and Conewango Creek." (https://www.dec.ny.gov/animals/77478.html) And just a few years ago, a paddlefish was caught on the lake! This document is full of statements and information that is not valid. This cannot be used as a baseline moving forward with the management of Chautauqua Lake. It's a historical document as much as a guiding one. The science must be sound and the information accurate. The accelerated timeline by which this process has been pushed is crippling the quality of the project, which does have merit if done carefully and properly.

There are many other, more specific, comments that I wish I had time to make, but again as I have noted repeatedly verbally and in writing, the timeline was too condensed to provide a full analysis and set of comments on this lengthy, and heavily editorialized, document.

Sincerely,
Janis L. Bowman
Professor of Biology

Comments on the Draft Supplemental Environmental Impact Statement (Feb 2018):

Chautauqua Lake is known worldwide for its fishing and recreation and is a Class A drinking water source. The lake is highly productive and contains diverse populations of plants and animals. There are no data suggesting that this is changing or that plant mass is detrimental to lake health. The plant mass is a nuisance to boat users in some areas, but it can be managed effectively with insects (weevils, etc) and mechanical harvesting. These methods should be expanded before toxic chemicals are used without absolute knowledge of their impacts in this lake. The draft Supplemental Environmental Impact Statement (Feb 2018) does not adequately describe the environmental impacts of the proposed herbicide treatments. It contains numerous unsubstantiated statements whose conclusions are erroneous and/or lacking scientific backing and evidence. Overall, the syntax is vague and noncommittal, which cannot be taken as fact and is not appropriate in scientific reports. The authors do not supply scientific evidence that their actions (see attached comments)

- will not increase Harmful Algae Blooms
- will not pollute drinking water supplies
- will not affect fish, bird or invertebrate populations
- will not disperse to areas outside the treatment zones
- will not harm the overall lake health or improve aesthetics

Below are directly quoted examples of vague and speculative statements that need to be confirmed before large scale herbicide treatments are executed:

Page 62- The number of private residences using surface water as a drinking water supply is **unknown and likely dwindling**.

Page 73- It is possible that the herbicide treatment **could affect** oxygen concentrations.

Page 84- In particular, those species partially or fully dependent on macrophyte beds for spawning in multiple months including May **might be impacted** by the proposed treatment plan.

Page 98- If these users exist, they **may be far enough** downstream that the concentrations of herbicides would fall below the minimum levels required for irrigation.

Page 101- These users **could potentially be affected** if the herbicide exceeds levels that are safe for human consumption.

Page 102- The dissolved oxygen **could impact** aquatic organisms while the nutrients **may contribute to existing algal blooms**.

Page 103- During the treatments, there **may be some effect** on fish-spawning and rearing because the treatment timing overlaps with fish spawning periods and identified spawning habitat in the Lake for a number of species.

Page 108- The proposed project **may have a small impact** to this plant that could be found in the treatment areas.

Page 119- Levels of herbicides will quickly dissipate after treatment, and **no long-term adverse impacts are anticipated**.

Page 121- Although **some environmental impacts may result** from the proposed application of herbicides (see Section 4.0), these impacts will be effectively mitigated (see Section 5.0).

This does not constitute an "Impact Statement." Rather it is merely a discussion promoting the use of herbicides and is not a scientific review of the impacts to Chautauqua Lake and downstream. The authors downplay the effectiveness of weed harvesting and blame that for the propagation of invasive species; however, their statements are not supported with scientific data and do not include all reasons why weed fragments may exist and to what extent floating weeds account for invasive species propagation. They also do not include evidence that herbicide usage will not increase harmful algae blooms or whether herbicide treatments will be effective in all areas due to unknown groundwater influence.

Overall the document demonstrates that there is an absence of understanding and points out the need for research devoted to 1) identification and reduction of nutrient sources, 2) waterbody dispersion / transport modeling, 3) water budget / surface and groundwater modeling, 4) accounting of water users and usage, 5) wildlife population surveys, 6) current harmful algae blooms and their mitigation options, and 7) how to enforce excess nutrient reductions. Until then, lakeshore property owners should physically remove weeds themselves if they are a nuisance according to Sections 8.3 and 8.4 of the MMS without the use of toxic chemicals whose impacts are unknown. The use of herbicides is not an effective tool for the goals stated: consider other lakes (specifically in NH) that have been using herbicides for decades and have not eradicated invasive species and consider lakes (specifically in OH) that have exaggerated harmful algae blooms by trying new "tools" and causing worse conditions due to the lack of science beforehand.

The water quality issues across the country are caused by the "pass it downstream" mentality. Chautauqua Lake is at the very top of the Gulf of Mexico Watershed, and the only people creating issues here are within the county. By using herbicides, we are merely passing our excess nutrient problem—that we created-- downstream, making it even harder for downstream communities to have good water quality and contributing to the dead zone in the Gulf. It is my hope that we can focus the extraordinary effort already put forth by the many Lake organizations toward a better solution with immediate improvement to our lake and to all water users downstream.

Peter Beeson, PhD
Jamestown, NY

(Attached: DSEIS with additional comments in margin and extra pages removed)

1.0 INTRODUCTION AND PROJECT BACKGROUND

1.1 PROPOSED ACTION

The Towns of Ellery, North Harmony, Busti and Ellicott, and the Villages of Bemus Point and Lakewood have proposed to undertake the application of United States Environmental Protection Agency (EPA)- and New York State Department of Environmental Conservation (NYSDEC)-approved herbicides on target areas of Chautauqua Lake (the Lake) to control invasive aquatic plant.

In response to public complaints about the density of invasive macrophytes—including curlyleaf pondweed and Eurasian watermilfoil—in the Lake, the Town of Ellery Town Board (Ellery Town Board), in coordination with other municipalities surrounding the Lake and the NYSDEC, is seeking to resume herbicide application in target areas of Chautauqua Lake. The NYSDEC has stated that no permits for future aquatic herbicide use in Chautauqua Lake will be granted prior to completion of an updated Supplemental Environmental Impact Statement (SEIS) pursuant to the State Environmental Quality Review Act (SEQR), codified as amended at Article 8 of the Environmental Conservation Law and set forth in NYSDEC implementing regulations at 6 NYCRR Part 617. Therefore, the Ellery Town Board, as the Lead Agency, has required the preparation of a SEIS to update the evaluation of the potential environmental impacts of the use of specific herbicides in target locations of Chautauqua Lake.

The Ellery Town Board has classified the Action as a Type 1 action under SEQR based on a determination that it will ultimately involve the physical disturbance (application of herbicides) of ten or more acres. This threshold for a Type 1 action is set forth at 6 NYCRR § 617.4(b). The Ellery Town Board is completing a coordinated environmental review of the proposed action as required by SEQR. On December 11, 2017, upon receiving the consent of all Involved Agencies, the Ellery Town Board established itself as Lead Agency and issued a Positive Declaration. A copy of the Positive Declaration issued by the Ellery Town Board, indicating that a SEIS would be prepared for this action, is included in Appendix A.

Any application of herbicides would be in accordance with permits received from the NYSDEC and in accordance with the New York State product labels. The herbicides being evaluated are Aquathol® K (active ingredient endothall), Navigate (active ingredient 2,4-D), and Renovate 3 (active ingredient triclopyr). All three herbicides have been subjects of herbicide specific supplemental environmental impact statements approved by the NYSDEC and have been used extensively in Lakes throughout New York State. Aquathol® K and Navigate are evaluated in a Programmatic Environmental Impact Statement included in Appendix B, while a herbicide specific supplemental environmental impact statement for Renovate is attached as Appendix C.

The proposed action has been designed with mitigations built into the treatment plan to minimize adverse impacts. The result is a limited number of significant impacts requiring additional mitigation.

1.2 PROJECT/EIS BACKGROUND

Chautauqua Lake, an approximately 13,000-acre glacial Lake situated within Chautauqua County—New York State's westernmost county—formed between 10,000 and 12,000 years ago. The Lake includes 42-miles of shoreline across nine municipalities: the Towns of Busti, Chautauqua, Ellery, Ellicott, and North Harmony, and the Villages of Bemus Point, Celoron, Lakewood, and Mayville. The Lake drains into the Chadakoin River in the City of Jamestown at the southern end of the Lake. At its widest point the Lake is 2 miles in width and its longest point is17 miles in length. The Lake and some landmarks surrounding the lake are depicted in Figure 1-1. Figure 1-2 illustrates the municipalities that surround the lake.

The Lake is, in many ways, two distinct bodies of water. It is divided into two basins separated by a narrows of approximately 900 feet in width. The Village of Bemus Point is located on the eastern side of the narrows, and the hamlet of Stow in the Town of North Harmony is located on its west shore. The north basin has a maximum depth of 75 feet, while the south basin is much shallower, with a maximum depth of approximately 19 feet. The two basins have different characteristics. The south basin of Chautauqua Lake is eutrophic. A eutrophic lake is characterized by abundant nutrients that support a dense growth of algae and rooted plants, the decay of which can deplete the waters of oxygen. It is relatively shallow and has low clarity; a notable amount of plant life exists within it. By comparison, the north basin of Chautauqua Lake is mesotrophic. A mesotrophic lake is characterized by beds of submerged aquatic plants and medium levels of nutrients. The north basin is deeper, has more clarity, and less plant life than the south basin. The north basin drains to the south basin.

For thousands of years, streams throughout the Chautauqua Lake watershed have been transporting sediments from upland areas to Chautauqua Lake, ultimately depositing them on the Lake's bottom. (CCDPD, 2000). In particular, the south basin has a layer of rich sediments at its bottom as a result of how it was formed and the timing with which the glaciers that formed the Lake retreated. The south basin's shallow depth and inherently rich bottom sediment layer have created an environment that is especially susceptible to the proliferation of aquatic plants, also known as macrophytes and/or "submerged aquatic vegetation," are commonly called "weeds." Many plants at high densities in both the north and south basins of the Lake are non-native to Chautauqua Lake and are considered invasive.

Submerged aquatic vegetation has been a documented problem in Chautauqua Lake for over 100 years. For as long as visitors have been drawn to the Lake for aesthetic, educational, and recreational purposes, residents, tourists, elected officials, community organizations, and government bodies have struggled to implement an

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Author: User1 Date: 3/14/2018 2:55:36 PM
This statement requires a reference

Author: User1 Date: 3/14/2018 2:55:45 PM
This statement requires a reference

It has long been recognized that tourism and the summer economy was of vital importance to the municipalities that surround the Lake, and the region as a whole. There has been a history of concerned citizen groups taking steps to ensure that the Lake remained ecologically healthy and clean. Initially paddle-boats on the Lake were retrofitted with weed cutting attachments. Over time, the mechanical harvesting operations became more sophisticated and, today, there are eight mechanical weed harvesters operating on the Lake. The Chautauqua Lake Association (CLA), a non-profit organization has historically been responsible for administering weed management programs.

Herbicides began to be used as an important tool to manage the proliferation of weeds in the Lake in 1955—first by the NYSDEC from 1955 to 1959; then by CLA from 1960 to 1992. Herbicide applications were performed in accordance with existing NYSDEC regulations, including the requirement to obtain a permit after the adoption of Article 15 of the Environmental Conservation Law, as implemented in NYCRR Part 327, and, as of 1981, in compliance with the 1981 "Programmatic Environmental Impact Statement on Aquatic Vegetation Control Program of the Department of Environmental Conservation Division of Lands and Forests" (1981 PEIS). The 1981 PEIS is attached as Appendix B.

In 1985, the use of aquatic herbicides in Chautauqua Lake came under NYSDEC scrutiny for a number of reasons, including the intent to increase the size of the area being treated and other concerns. As a result, in 1986, CLA committed to the NYSDEC that it would conduct a specific SEIS for the use of aquatic herbicides on Chautauqua Lake. The CLA's commitment was memorialized in a decision issued by the NYSDEC Commissioner that same year. The resulting SEIS, which supplemented the 1981 PEIS, was completed in 1990 by Chautauqua County Department of Planning and Development (CCDPD) (1990 SEIS). (CCDPC, 1990). The 1990 SEIS is attached as Appendix D.

The 1990 SEIS focused on the use of the aquatic herbicides Aquathol® K and Diquat as a means of integrated pest management. It identified mitigations, and evaluated alternative methods for in-Lake macrophyte control and assessed their appropriateness for Chautauqua Lake. Based on the analysis in the SEIS, CCDPD determined that continued annual application of herbicides along selected portions of the Lake's shoreline was a timely, efficient, and cost-effective control of nuisance aquatic vegetation growths with minimal adverse impacts to the aquatic environment. A series of criteria were proposed to regulate future applications of aquatic herbicides, including limitations on timing, geography, and type of product. It was noted that the specific choice of herbicide product should remain flexible, as new products become available.

The last time herbicides were applied on the Lake as part of an annual weed management program was in 1992. Although CLA applied for an aquatic pesticide

This page contains no comments

permit in 1996, the NYSDEC refused to grant a permit to apply Diquat on the Lake because of concerns regarding Diquat's effect on fish. To date, CLA continues its annual mechanical harvesting method of weed control.

The severity of the submerged aquatic vegetation worsened through the late 1990's and into the early 2000's, as weed management relied solely on harvesting. By the close of the 20th century, the weed problem was becoming more and more noticeable to residents and visitors. Newspaper articles such as *The Weeds That Swallowed Chautauqua Lake*, *Weed* Woes, *CLA Mulls Herbicides Spray Program For 1999,* etc. documented the proliferation of invasive submerged aquatic vegetation in the Lake.

By 2002, the condition of the Lake had deteriorated to the point that a group of citizens formed the Chautauqua Lake Partnership (CLP) for the express purpose of dealing with Eurasian watermilfoil and curlyleaf pondweed. CLP received a permit from the DEC to apply Aquathol® K in 70 acres of the Lake, in accordance with the 1990 SEIS, and undertook the herbicide application. Although the NYSDEC approved the 2002 application, it was with the understanding that the 1990 SEIS would need to be updated thereafter before future applications of herbicides would be allowed to reflect the changing ecology of the Lake and the availability of new herbicide products.

It would be fifteen years until herbicides would be applied in the Lake again. In 2017, CLP merged with a group of Bemus Bay property owners to form the current organization—a 501(c)(3) organization with a mission of improving Chautauqua Lake water quality and enjoyment. One of CLP's projects is to address the increasing levels of Eurasian watermilfoil and curlyleaf pondweed in the Lake. In June 2017, the NYSDEC granted permits to the Town of Ellery and the Village of Bemus Point to conduct a Data Collection Project pursuant to 6 NYCRR § 617.5(c)(18) regarding the application of Aquathol® K and Navigate (2,4-D) to three areas of Bemus Bay (a total of approximately 30 acres). The performance of a data collection project is a Type II action exempt from SEQR.

In accordance with these permits, the Town and Village, with the assistance of CLP, applied varying concentrations of the two herbicides to study the efficacy, effect, and drift of the herbicides. Following the application of the herbicides, SOLitude Lake Management (SOLitude) assessed the results of the project and concluded that the herbicides were effective. SOLitude further concluded that the areas of the Lake in which a combination of Aquathol® K and Navigate (2,4-D) were applied saw the greatest reduction in Eurasian watermilfoil densities. (SOLitude Dec. 2017) (Appendix E). Following the herbicide application, both SOLitude (Id.) and the NYSDEC (personal and email communication with Michael Nierenberg) recorded a distinct difference in macrophyte density between the areas of Bemus Bay that had been treated with herbicides and those that had not been treated. SOLitude's December 2017 report is attached as Appendix E. The NYSDEC did not require The Town of Ellery and Village of Bemus Point to survey invertebrates following treatment because there was no natural

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Author: User1 Date: 2/19/2018 12:01:47 PM -05'00'
NO. natural die-off is not a result of herbicides.

Author: User1 Date: 2/19/2018 12:03:58 PM -05'00'
These 2 can NOT be applied together. Their synergistic effects are not known. It might have "seemed" most effective because it was misused and created a very toxic environment.

Author: User1 Date: 2/19/2018 12:07:27 PM -05'00'
and now there is still no baseline, and there will never be because of non-scientific approach.

ecological baseline in the Lake that would justify such a survey. (*See* SOLitude June 2017) (Appendix F).

The proliferation of macrophytes throughout the Lake continues to impede residents' and visitors' enjoyment of the Lake for boating, swimming, and other recreational activities. The problem has been exacerbated as development and tourism have increased demand to use the Lake for recreational purposes at the same time as changing land use patterns and agricultural practices have created an environment where macrophytes proliferate, resulting in severe conflict. Today, less than 11% of the shoreline is undeveloped. Agricultural practices within the Lake's watershed have artificially accelerated the growth of the underwater weeds by introducing large amounts of phosphorus (which is a primary ingredient in the fertilizers used by the farmers) into the Lake, effectively fertilizing the weeds and supporting their growth.

To address issues relating to nutrient loads to the Lake, in 2010, Chautauqua County adopted the Chautauqua Lake Watershed Management Plan (CLWMP). The plan encompassed long-term management strategies for a broad range of issues affecting the Chautauqua Lake watershed, taking "a holistic approach to watershed management by addressing the negative impacts caused by development, agricultural practices, and other activities within the watershed."

In 2012, the *Total Maximum Daily Load (TMDL) for Phosphorus in Chautauqua Lake* was prepared for the EPA and NYSDEC. This report focused on the loading of phosphorus to Chautauqua Lake. Excess phosphorus can result in algal blooms, which can damage the aesthetics and ecology of the Lake. Test samples of the Lake confirmed elevated levels of phosphorus in both basins, which violated the state guidance value. Both basins of Chautauqua Lake were deemed impaired waterbodies in 2004, due to the water quality issues caused by phosphorus. "Based on this listing and their designation as high priority waters for TMDL development, a TMDL for phosphorus is being developed to address the impairment for both Chautauqua Lake North and South." (Cadmus 2012).

Fully implementing the recommendations of the CLWMP and the TMDL will most likely take decades, with significant positive impacts longer, especially as clarified in the TMDL. What is more, "NYS DEC recognizes that TMDL designated load reductions alone may not be sufficient to address all concerns of eutrophic lakes, such as invasive weeds." (Cadmus, 2012). In addition, the major contributor to lake nutrients, internal loading, phosphorus in the sediments, which accounts for 54% of the required reduction, is not being actively addressed.

Chautauqua Lake also participates in the NYSDEC overseen Citizens Statewide Lake Assessment Program (CSLAP), which compiles periodic reports on water quality from data collected by sampling volunteers. The data collected from May through October records the degree of Lake eutrophication. As of the date of this SEIS, the most current report for both the north and south basins of Chautauqua Lake available on the

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Author: User1 Date: 2/19/2018 12:08:50 PM -05'00'
SHOW THIS STUDY. The use of herbicides have impeded my 'enjoyment' way more than weeds

Author: User1 Date: 2/19/2018 12:11:25 PM -05'00'
Quantify this. "Large" is not scientific.

Author: User1 Date: 2/19/2018 12:13:17 PM -05'00'
How does killing macrophytes effect algae growth? won't that leave more phosphorus available for the algae to use?

Author: User1 Date: 3/14/2018 2:55:54 PM
Pretty strong statement without any comparisons to other waters.

NYSDEC website is from 2015. That report noted that the Lake remains impaired for potable water, swimming, and recreation due to the presence of algal blooms. The algal blooms also affect its aesthetics, which, according to the 2015 report, are rated stressed/poor. The 2015 CSLAP report further categorizes the Lake as threatened/fair for aquatic life, habitat and fish consumption due to invasive plants and high pH levels. The 2016 CSLAP report only covers the north basin of Chautauqua Lake. Results are similar to those reported in the 2015 report with the exception that high pH is not noted as an issue for aquatic life.

Most recently, in 2017, after a decade long process, Chautauqua County issued the Macrophyte Management Strategy (MMS) for the Lake. The MMS sought to "develop a holistic, science-based framework for managing macrophytes in Chautauqua Lake in an integrated manner that accommodates human needs and values, while preserving the natural needs and values." The MMS was unique in that it was developed utilizing an Ecosystem-Based Management (EBM) approach in that it recognizes that numerous factors influence the ecosystem, including human and environmental factors. It was meant to be adaptable to continued changes in the Chautauqua Lake ecosystem, including changes in human needs and desires as they relate to the Lake and its environment.

The MMS divided the Lake into 288 management zones, classifying each of them based upon their own unique ecological, social, and other characteristics. Maps of these management zones are included in Appendix G. This approach helped to establish a customizable framework for managing submerged aquatic vegetation within each of the management zones. It recognizes that the 13,000-acres that comprise the Lake are quite diverse in ecological scope, and each zone could potentially require somewhat different management techniques. Some of the strategies outlined in the MMS were clearly long-term (e.g. reducing nutrient loading from the surrounding watershed/ change agricultural practices within the watershed), while others were more focused on the immediate future (e.g. continue utilizing mechanical harvesting as a technique for managing problematic weed growths). The MMS identified the use of aquatic herbicides as an appropriate management technique within over 50% of the Lake's management zones. While the MMS provides useful information to help evaluate the use of herbicides, it did not update the 1990 SEIS, nor did it include a strategy for implementing the varying macrophyte management strategies it recommends. As a result, the MMS did not create a method through which the included herbicide weed management tool could not be utilized. In addition, by the time it was published, the MMS was based on data that, in some cases, were a decade old.

Over the past twenty-five years, since CLA's annual herbicide application program ended, the invasive weeds—primarily but not limited to Eurasian watermilfoil and curlyleaf pondweed—have increased in density and areal extent. The growth of these invasive and native macrophytes has become so problematic that the recreational use of and movement through the Lake in these areas is difficult or impossible. Swimming,

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Author: User1 Date: 2/19/2018 12:17:02 PM -05'00'

This does not mean you should not follow it. as it was not followed in Bemus Bay 2017.

Author: User1 Date: 2/19/2018 12:20:14 PM -05'00'

and is the only method that removes excess nutrients for the lake. Herbicides do not, and makes the nutrients available for HABs growth.

canoeing, kayaking, power boating, fishing, and Lake aesthetics are all being negatively affected.

On June 18, 2017, the *Jamestown Post-Journal* reported that "time is ticking away on this summer season for homeowners and businesses in Bemus Bay who are looking for relief from weeds that are choking off access to Chautauqua Lake" and the journalist aptly noted that "use of herbicides is included in the Chautauqua Lake Macrophyte Management Strategy as a tool that can be used on Chautauqua Lake. What could good is a tool if it is never taken out of the box?" (Post-Journal, 2017)

Certain municipalities around the Lake, including the Town of Ellery, intend to undertake the application of EPA- and DEC-approved herbicides in target areas in the Lake, Subject to the completion of this SEIS, completion of the SEQR process and receipt of aquatic pesticide permits from the NYSDEC. The purpose of this SEIS is to add aquatic herbicides back to the "toolbox" of management techniques that may be used to deal with the invasive weeds on the Lake and to more efficiently and effectively control invasive weed d that are currently inhibiting use of Chautauqua Lake.

This SEIS is intended to specifically identify potential impacts and explore ways to minimize identified significant adverse environmental effects of herbicide application. The SEIS also evaluates potential alternatives to the proposed action.

1.3 PROJECT DESCRIPTION AND MAPPING

The project will entail the application of EPA- and DEC-approved herbicides (Aquathol® K, Navigate, and/or Renovate 3) in target areas of Chautauqua Lake. Figure 1-3 illustrates proposed target areas. The target areas for herbicide application roughly include:

- Bemus Bay
- Bemus Point
- Bly Bay
- Burtis Bay
- Busti/Lakewood
- Stockholm/Greenhurst
- A portion of the Stow shoreline on the Lake's west shore
- Sunrise Cove
- Sunset Bay
- Warner Bay

The proposed activity will be undertaken in compliance with all applicable NYSDEC regulations and requirements and in accordance with the herbicide product labels to minimize potential impacts.

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The application of the herbicides is intended to address nuisance macrophyte growths, consisting primarily of the curlyleaf pondweed and Eurasian watermilfoil. Both species are non-native, exhibit aggressive growth characteristics, and degrade or impede recreational use and aesthetic conditions of Chautauqua Lake.

Consistent with its mission, CLP conducted over 75 educational meetings, presentations, mailings, and events beginning in November 2016 to raise awareness of Lake issues and garner support for its 2017 and 2018 activities. CLP assisted the Town of Ellery and Village of Bemus Point in the application of herbicides to Bemus Bay in June 2017 as part of a NYSDEC permitted Data Collection Project. The Data Collection Project demonstrated that herbicides could effectively reduce the density of Eurasian watermilfoil in the Lake. (SOLitude Dec. 2017) (Appendix E).

As a result of the positive results of the Data Collection Project and this community outreach, ten lakeshore communities requested inclusion in CLP's 2018 herbicide treatment plans. These communities enlisted the support of their municipal representatives in the four Towns and three Villages included in this SEIS. Each Town and Village then unanimously passed a resolution supporting the SEIS and SEQR process.

As part of the 2018 herbicide application program, SOLitude conducted preliminary weed density/type and bottom sediment depth surveys offshore of the majority of these communities in June and October 2017. Further surveys will be conducted in spring 2018. Surveys included (and will include) weed density/type and bottom sediment depth. Treatment areas included in the Treatment Plan maps were selected based on (1) invasive weed (curlyleaf pondweed and Eurasian watermilfoil) concentrations, (2) community input on noxious weed interference with aesthetics, swimming, boating, fishing, and other recreational pursuits, (3) lake bottom sediment depth since deep sediments are more conducive to nuisance level plant growth, and (4) community input on weed fragment accumulation and associated algae growth and odor. Proposed target areas for the application of herbicides are shown on Figure 1-3.

1.4 PROJECT PURPOSE, NEED, AND BENEFIT

The application of the herbicides (Aquathol® K, Navigate, and/or Renovate 3) is intended to control invasive macrophyte populations, particularly the curlyleaf pondweed and Eurasian watermilfoil. The goal of the Project is to enhance the use of the Lake for recreational purposes and improve the ecological health of the Lake.

The need for the application of aquatic herbicides within Chautauqua Lake stems from the excessive growth of invasive macrophytes in the target areas. The growth of these invasive macrophytes has become so problematic that the recreational use of and movement through portions of the Lake is difficult or impossible. Swimming, canoeing, kayaking, power boating, fishing, and Lake aesthetics are being negatively affected. The weeds can be thick enough that they impede boats, and can create a hazard for

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Author: User1 Date: 3/14/2018 3:18:03 PM
The DSEIS appears to refer only to 2018 thus is NOT usable into the future. There is no time-line within this document. Time windows and years of repeated treatments must be included.

Author: User1 Date: 2/19/2018 11:52:48 AM -05'00'
how does this stop HABs?

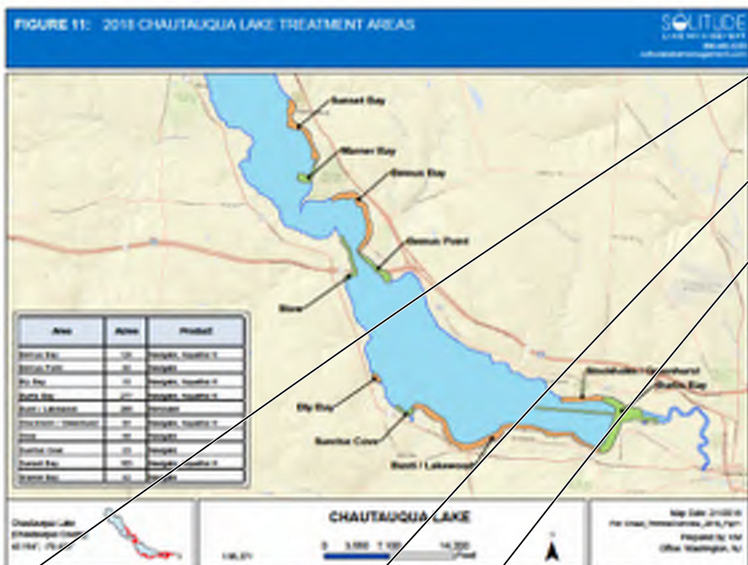
Author: User1 Date: 2/19/2018 11:27:57 AM -05'00'
show phenology of these species and how they correspond to proposed treatment dates

Author: User1 Date: 2/19/2018 11:30:51 AM -05'00'
where is the supporting data? need appendix and survey and sample size results. The "users" of these areas have stated an inconvenience, but do not support use of herbicides.

Author: User1 Date: 2/19/2018 12:21:35 PM -05'00'
quantify and show study

inexperienced swimmers. In addition, dislodged macrophyte fragments create hazardous floating masses on the Lake surface, and wash up onto the shoreline of the Lake. These masses accumulate and rot, resulting in a foul odor which interferes with residential and commercial property uses on or near the shore and several hundred feet downwind of the shore.

Figure 1-3: Proposed Target Areas



In addition to the harmful impacts on recreational use of the Lake, the weeds create negative impacts on the Lake's ecosystem. The problem self-perpetuates, as the annual plant die-off, along with dislodged fragments, sink and accumulate on the Lake bottom. The resulting accumulation of dead organic material consumes oxygen in the bottom sediment. Nutrients released from the decomposing macrophytes feed additional macrophyte and algae growth.

This SEIS seeks to address the negative impacts of excessive invasive macrophyte growth on Chautauqua Lake, and result in beneficial impacts to the Lake ecology, as well as tourism, recreation and public enjoyment of the Lake.

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Author: User1 Date: 2/19/2018 11:32:42 AM -05'00'
This will not be improved by using herbicides. Shorelines have an odor. are you going to stop the geese and fish from discharging their waste too?

Author: User1 Date: 3/14/2018 3:40:10 PM
herbicide application is restricted to 200 feet off shore or 6 feet of water, whichever comes first.

Author: User1 Date: 2/19/2018 12:23:03 PM -05'00'
what is the supporting studies? include references.

Author: User1 Date: 2/19/2018 12:24:13 PM -05'00'
this will be algae decaying instead. the excess nutrient issue still exists.

Author: User1 Date: 2/19/2018 12:26:37 PM -05'00'
show the study that herbicides are beneficial? alleviating a nuisance in not ecologically beneficial.

2.0 ENVIRONMENTAL REVIEW OF PROJECT PURSUANT TO SEQR

2.1 LEGISLATIVE INTENT OF SEQR

Pursuant to Article 8 of the New York State Environmental Conservation Law, all discretionary decisions of a state, regional, or local agency to approve, fund, or directly undertake an action that may affect the environment are subject to review under SEQR. SEQR, as implemented by 6 NYCRR Part 617, requires the consideration of environmental factors in the early stages of an agency's planning, review, and decision-making processes. By incorporating a systematic, interdisciplinary approach to environmental review early in the process, impacts can be identified and projects or actions can be modified, as needed, to avoid or minimize potential, significant adverse impacts to the environment. The intent of SEQR is to require agencies to balance the protection and enhancement of the environment, human, and community resources with social, economic, and environmental factors in their decision-making process.

An important tool to the SEQR process is the drafting of an EIS, or in this instance an SEIS to supplement past EISs. If an agency determines that a proposed action may have significant environmental impacts, the agency issues a Positive Declaration and a draft SEIS (DSEIS) is prepared to evaluate those impacts, explore ways to minimize adverse environmental effects, and to identify potential alternatives to the proposed action. A copy of the Positive Declaration issued by the Town of Ellery, indicating that a DSEIS will be prepared for this action, is included in Appendix A.

An important aspect of SEQR is its public participation component. Opportunities for public participation include optional public scoping of the DSEIS, a mandated SEQR public hearing on the DSEIS, a mandated 30-day public comment period after issuance of the DSEIS, and a mandatory review period after completion of the FSEIS before Findings are completed. These opportunities allow other agencies and the public to provide input into the environmental review process.

2.2 IDENTIFICATION OF INVOLVED AND INTERESTED AGENCIES

The SEQR process includes three types of agencies: the Lead Agency, Involved Agencies, and Interested Agencies. Involved Agencies are those that have the authority to fund, approve, or directly undertake an action related to the project. 6 NYCRR §617.2(s). The Lead Agency is the Involved Agency that has the responsibility, under SEQR, to coordinate the environmental review process for the proposed action. The Town of Ellery Town Board is functioning as the Lead Agency for the purposes of this action. Through the Coordinated Review process, other Involved Agencies are given the opportunity to provide comments on the proposed action and concur with this designation.

Interested Agencies are agencies or organizations that do not have authority to fund, approve, or directly undertake an action related to the project, but who may have an

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interest in participating in the SEQR review process. 6 NYCRR §617.2(t). For this project, in an effort to reach potential stakeholders, we have also listed Interested Parties. Interested Parties, as defined here, are organizations or entities who have no authority related to the project, and who are not official governmental agencies, but who nonetheless have an interest in being part of and participating in the SEQR process.

The following is a list of Involved Agencies, Interested Agencies, and Interested Parties that requested receipt of all SEQR notices and mailings

Involved Agencies (Listed Alphabetically):

1. New York State Department of Environmental Conservation
2. Town of Busti
3. Town of Ellery
4. Town of Ellicott
5. Town of North Harmony
6. Village of Bemus Point
7. Village of Celoron
8. Village of Lakewood

Interested Agencies (Listed Alphabetically):

1. Ashville Fire Department
2. Bemus Point Central School District
3. Chautauqua County
4. Chautauqua County Department of Health and Human Services
5. Chautauqua County Planning Board
6. Chautauqua County Sheriff's Office
7. Chautauqua County Soil & Water Conservation District
8. Chautauqua Lake Central School District
9. Chautauqua Utility District
10. City of Jamestown
11. Dewittville Fire Department
12. Ellery Center Volunteer Fire Company
13. Fluvanna Volunteer Fire Station
14. Jamestown Public Schools
15. Lakewood-Busti Police
16. Maple Springs Volunteer Fire Station
17. New York State Department of Agricultural and Markets
18. New York State Department of State
19. New York State Department of Transportation
20. New York State Office of General Services
21. New York State Office of Parks, Recreation, and Historic Preservation
22. New York State Police
23. Panama Central School District
24. Southwestern Central School District
25. Town of Busti Fire Department

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26. Town of Chautauqua
27. Town of Ellicott Police Department
28. Town of Pomfret
29. Town of Stockton
30. Village of Bemus Point Volunteer Fire Department
31. Village of Celoron Volunteer Fire Department
32. Village of Lakewood Fire Department
33. Village of Mayville

Interested Parties (Listed Alphabetically):

1. Audubon Community Nature Center
2. Bear Lake Association
3. Cassadaga Lakes Association
4. Chautauqua Fishing Alliance
5. Chautauqua Institution
6. Chautauqua Lake Association
7. Chautauqua Lake Fishing
8. Chautauqua Lake Partnership
9. Chautauqua Lake & Watershed Alliance
10. Chautauqua Watershed Conservancy
11. Roger Tory Peterson Institute of Natural History

2.3 SUMMARY OF PUBLIC AND AGENCY INVOLVEMENT

On November 9, 2017, at a public meeting, the Ellery Town Board resolved to issue a letter of intent to declare itself Lead Agency to Interested and Involved Agencies and completed Part 1 of the Full Environmental Assessment Form (FEAF). The Ellery Town Board sought to be the Lead Agency based on the fact that it would approve a resolution to fund and undertake the application of herbicides along areas of the Lake that border its jurisdiction. The Ellery Town Board then conducted a Coordinated Review to obtain other agency input on this decision.

On December 11, 2017, at a public meeting, the Ellery Town Board declared itself Lead Agency, determined that the proposed action (herbicide treatment) may have potential significant environmental impacts, and issued a Positive Declaration requiring the preparation of an SEIS. The Ellery Town Board called for a public scoping meeting, issued a draft scoping document that established the preliminary list of issues to be addressed in the SEIS and sent the required notice and draft scope to the Involved and Interested Agencies and Interested Parties. After an appropriate comment period, revisions were made to the scope to reflect public and agency input and the final scoping document was adopted by the Ellery Town Board at a public meeting on January 11, 2018.

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Step 1 - Determination of SEQR Applicability

All discretionary decisions of a state, regional, or local agency to approve, fund, or directly undertake an action that may affect the environment are subject to review under SEQR. SEQR, as implemented by 6 NYCRR Part 617, requires the consideration of environmental factors in the early stages of the planning, review, and decision-making processes of state, regional, and local agencies.

Step 2 - Determination of Type of Action

After reviewing the FEAF, the Town of Ellery Town Board (and the NYSDEC) determined that this project (application of herbicides to target areas of Chautauqua Lake) is a Type I action under SEQR and required preparation of an SEIS. Type I actions are those that meet or exceed established thresholds listed in 6 NYCRR § 617.4. In this instance, the proposed action is a Type I action because it involves the physical alteration (here, application of herbicides) in an area of ten or more acres.

Step 3 - Declaration of Lead Agency

On November 9, 2017, the Ellery Town Board issued a letter of intent to declare itself Lead Agency to Interested and Involved Agencies and completed Part I of a FEAF. As part of its declaration of intent to serve as Lead Agency, the Ellery Town Board also declared its intention to file a Positive Declaration for the purposes of SEQR, thus acknowledging that a SEIS would need to be completed based upon the proposed action.

As part of its responsibility as Lead Agency, the Ellery Town Board obligated itself to coordinate the review of the proposal–that is, as Lead Agency, the Ellery Town Board is responsible for the organization and conduct of scoping. The Involved Agencies have an obligation to give their agency's perspective and to participate in the scoping process. By including the public, as well as other agencies in the scoping process, the Ellery Town Board obtained additional information and specialized knowledge that may reduce the likelihood of additional issues arising during the public review period of the DSEIS.

Step 4 - Selection of Lead Agency

As an Involved Agency, the NYSDEC requested that the Ellery Town Board utilize a full 30-days to receive comments on the proposed action, and the Town obliged. After receiving the consent of all Involved Agencies, on Monday, December 11, 2017, the Ellery Town Board declared itself Lead Agency.

Step 5 - Positive Declaration

Based on the requirement of the NYSDEC, the Ellery Town Board issued a Positive Declaration, requiring the preparation of a Supplemental EIS (SEIS).

Step 6 - Formal Scoping Document

Scoping is an optional step in the SEQR process. In the interest of increasing opportunities of public comment, the Ellery Town Board elected to conduct public

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scoping for the proposed action. The purpose of completing a formal scoping document was to identify the important environmental impacts that are to be considered in the DSEIS. A DSEIS, generally, is a specific environmental assessment of the proposed action that supplements a prior EIS or SEIS that is outdated and/or did not adequately address environmental concerns. This DSEIS supplements the 1981 PEIS, 1990 SEIS, and herbicide specific EISs issued by the NYSDEC. On December 11, 2017, the Ellery Town Board released a Draft Scoping Document, and called for Public Scoping. A Public Scoping Meeting was held on Thursday, December 28, 2017 to gather public input on specific areas for study in the draft document. Substantive comments received during the Public Scoping Meeting and thereafter until January 5, 2018 were incorporated in the final scoping document. On Thursday, January 11, 2018 the Ellery Town Board approved the final written scope.

Step 7 - Draft SEIS for Lead Agency Acceptance

Once scoping was completed, this DSEIS was prepared to address the issues and concerns identified in the Scoping Document. The DSEIS identifies the relevant impacts of the proposed action, discusses measures that will be utilized to mitigate or lessen these impacts, and evaluates reasonable alternatives to the proposed action.

Step 8 - Draft SEIS Accepted by Lead Agency for Public Review

The Ellery Town Board is responsible for determining when the DSEIS is complete and ready for public review. The Ellery Town Board will then call for a public hearing on the DSEIS to allow for additional public input into the process.

Step 9 - Public Comment

The Ellery Town Board is required to collect comments on the DSEIS for a minimum of 30 days. The comments will be compiled, organized, and made part of the public record. Thereafter, the Ellery Town Board will make a formal determination on which comments are substantive and which are not and finalize the scope for the final SEIS (FSEIS).

Step 10 - FSEIS (Responsibility of Lead Agency)

The Ellery Town Board will cause the FSEIS to be prepared. The FSEIS will address any revisions or supplements to the DSEIS, summaries of substantive comments received and their source, and the Lead Agency's responses to all substantive comments. Once the FSEIS is prepared to the satisfaction of the Ellery Town Board, the Ellery Town Board will accept the document and make all appropriate notifications and filings in accordance with 6 NYCRR § 617.12.

Step 11 - Agency Findings

The final step in the SEQR process with regards to an EIS or SEIS is the issuance of the Findings Statement, which will conclude the SEQR process. In order for the Ellery Town Board or any of the Involved Agencies to take action (i.e., resolving to undertake the application of herbicides to areas of Chautauqua Lake that border its jurisdiction contingent upon receipt of a permit from the NYSDEC), the Ellery Town Board (or Involved Agency) must positively demonstrate within its Findings Statement, that the proposed action will minimize or avoid adverse environmental effects to the maximum extent practicable and that the proposed action will incorporate practicable measures that were identified through the SEQR process.

The Findings must be based on facts and conclusions that are derived from the FSEIS, the comments received from the public, agency comments, hearing records, and the approved FSEIS. The Findings Statement will identify the considerations that have been weighed and the Lead Agency's rationale for its approval or disapproval of the proposed action.

2.5 REASONS SUPPORTING AND OBJECTIVES OF THE PREPARATION OF A DSEIS

A SEIS was prepared in 1990 to evaluate the potential impacts of applying herbicides in Chautauqua Lake as a means of weed control. That document now requires updating to reflect new conditions, products and circumstances. An updated SEIS was also a requirement of the NYSDEC prior to allowing new permits to apply any herbicide. A supplemental EIS was determined to be appropriate, in that the original SEIS contains useful and relevant information. The objective of preparing a SEIS is to determine whether identified potential impacts can be mitigated, reduced, or avoided altogether.

In addition, the SEIS is required to evaluate alternatives to the proposed action. The alternatives evaluated herein include:

No Action Alternative

-No herbicide treatments and the continuance of weed harvesting; and
-No herbicide treatments and no weed harvesting (requested by NYSDEC).

Different Herbicides

-Alternative herbicides and locations.

Application Alternatives

-Amounts, frequency, timing, etc.

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Author: User1 Date: 2/19/2018 12:30:00 PM -05'00'
What about addressing sources of excess nutrients as the first alternative?

Author: User1 Date: 2/19/2018 12:32:29 PM -05'00'
SOLitude has shown in Bemus Bay 2017, that they do not follow chemical dosage instruction. both in amounts, dispersion methods, and mixing of herbicides limitations written on the label.

Author: User1 Date: 2/19/2018 12:33:42 PM -05'00'
What is the timing? there is no mention. if it's after natural die-off, as it was in Bemus Bay 2017, then what's the point?

3.0 ENVIRONMENTAL SETTING

Chautauqua Lake is an approximately 13,000-acre glacial Lake located in western New York. The Lake in its entirety is situated within Chautauqua County, New York State's westernmost county, and the Lake's approximately 42 miles of shoreline crosses nine municipal jurisdictions including the Towns of Busti, Chautauqua, Ellery, Ellicott, North Harmony and the Villages of Bemus Point, Celoron, Lakewood, and Mayville. The Lake drains into the Chadakoin River at the southern end of the Lake. Chautauqua Lake is a glacial Lake, formed between 10,000 and 12,000 years ago.

The Lake is unique for its high elevation. Chautauqua Lake sits at 1,308' above sea level. Chautauqua Lake is divided into two basins - north and south. The north and south basins are separated by "the narrows," a slight gap in the land masses that separate the two basins that measures just over 900' feet in width. The Village of Bemus Point is located on the east side of this gap and the hamlet of Stow is located on its west side.

Chautauqua Lake Sunset (Photo Courtesy of Town of Busti)

The maximum depth of the north basin is approximately 75' and the maximum depth of the south basin is approximately 19'. At its widest point the Lake is 2 miles in width and its longest point the 17 miles in length.

Over the history of the Lake, streams throughout the Chautauqua Lake watershed have been transporting sediments from upland areas to Chautauqua Lake, ultimately

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Author: User1 Date: 2/19/2018 12:35:47 PM -05'00'
this is what all watersheds do. it is exacerbated by poor land management, that continues.

depositing them on the Lake's bottom. In addition, the south basin was left with a layer of rich sediments at its bottom as a result of the method by which the glaciers that formed the Lake retreated and the timing of that retreat. The south basin's shallow depth and inherently rich bottom sediment layer created an environment that is and was especially favorable for the proliferation of macrophytes.

The watershed receives approximately 46 inches of rain a year that is relatively evenly distributed during all months of the year. (Bergman Associates 2010 2010) The south basin volume (mean depth= 3.5m, max depth= 6m) is approximately one third the volume of the north basin (mean depth = 7.8m, max depth=23m). The north basin flows into the south basin. The residence time of water in the Lake is 2.0 years in the north basin and 0.4 years in the south basin (Cadmus 2012). The Lake is shallow and does not develop a stable thermocline much of the time; however, the deep holes in the north basin do stratify, at times, and anoxia—the lack of dissolved oxygen in the water —occurs there.

Dissolved oxygen depletion in the deeper portions of the north basin was observed as early as 1937, while anoxia was first reported in the early 1970's (Bloomfield 1978). Increases in deep water phosphorus concentrations during periods of anoxia (CSLAP 2016) suggest a reservoir of redox sensitive sediment binding capacity (likely iron) for phosphorus, thus indicating that phosphorus is released from the sediments under anoxic conditions.

The north basin exhibits lower phosphorus concentrations than the south basin and has done so since at least 1975 (Bloomfield 1978); however, both basins have sufficient phosphorus and chlorophyll *a* and a low enough Secchi transparency (a measure of water turbidity) to be classified as eutrophic (See Figure 3-1, EcoLogic 2017, below). In this context, "eutrophic" conditions are those in which a body of water is rich in nutrients and support a dense algae and plant population, the decomposition of which can restrict available space for aquatic life to live or kills animal aquatic life by depriving it of oxygen. The south basin is more eutrophic than the north basin. (CSLAP 2016). Nutrient, chlorophyll *a and* Secchi transparency values presented in the CSLAP (2016) report were similar to those presented in EcoLogic (2017); however the CSLAP report classifies the north basin of Chautauqua Lake as mesotrophic, or having a moderate amount of dissolved nutrients.

Phosphorus concentrations have increased in both basins over the past three decades. (CSLAP 2016). Both basins have consistently had phosphorus values over the state guidance value for phosphorus of 20 µg/l which has resulted in a listing of the Lake as not supporting designated uses in NYSDEC's 2004 Clean Water Action Section 303(d) list. (Cadmus 2012). The TMDL has been completed which calculates the reductions in phosphorus loading required but full implementation has not occurred. Neither the north nor south basins were listed on NYSDEC's 2016 Clean Water Act Section 303(d) list.

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Author: User1 Date: 2/19/2018 12:38:09 PM -05'00'
Solve this first

Author: User1 Date: 2/19/2018 12:39:28 PM -05'00'
Estimates. not "calculates," this is an important distinction.

Author: User1 Date: 3/14/2018 2:56:07 PM
Once a TMDL is completed, the water body is removed from the 303(d) list

Table 3-1. Water Quality Indicator Thresholds and Chautauqua Lake Conditions (adapted from EcoLogic 2017).

	Lake Quality Indicators*			Chautauqua Lake Conditions (2012)	
	Oligotrophic	Mesotrophic	Eutrophic	North	South
Upper waters, summer average Total Phosphorus, (µg/l)	<10	10-35	35-100	47	80
Upper waters, summer average chlorophyll-a, (µg/l)	<2.5	2.5-8	8-25	19	45
Upper waters, annual peak chlorophyll-a, (µg/l)	<8	8-25	25-75	27.5	83.3
Summer average Secchi disk transparency (m)	>6	6-3	3-1.5	2.14	1.28
Summer minimum Secchi disk transparency (m)	>3	3-1.5	1.5-0.7	1.08	0.63

*Source: Janus and Vollenweider 1981 for ranges; NYSDEC 2013 for 2012 CSLAP results

3.1 HYDROLOGY AND WATER RESOURCES

3.1.1 GROUNDWATER

Groundwater is water stored underground beneath the earth's surface. An aquifer is an area of groundwater that has sufficient volume to serve as a dependable water supply. According to the CLWMP, three types of aquifers are found within the Chautauqua Lake watershed, as shown in the Figure 3-1. Most of the aquifers within the Chautauqua Lake watershed are confined, meaning they are sandwiched between two layers of impermeable materials that constrain flow of water in or out of the aquifer (shown in dark green in Figure 3-1). Also known as artesian aquifers, confined aquifers are less vulnerable to surface water contamination. The light green areas in Figure 3-1 are unconfined aquifers, meaning there is no upper confining layer.

The aquifer at the southern end of the Lake services the City of Jamestown. Jamestown's Board of Public Utilities draws groundwater from this aquifer to service approximately 47,000 customers, including residents in Jamestown and seven other communities, including the Villages of Celoron and Lakewood, and portions of the Town of North Harmony. The Village of Mayville's groundwater system produces excess capacity and the Village stores this excess capacity in three storage tanks, one of which holds 600,000 gallons and two of which hold 200,000 gallons each. The Town of Chautauqua and the Town of North Harmony are both principally serviced by well water drawn from the aquifers. That the Village of Bemus Point and the Town of Ellery are completely serviced by individual wells. (Town of Busti, et al 2011). All wells surrounding the Lake are expected to be located in the aquifers showing on Figure 3-1.

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Author: User1 Date: 2/19/2018 12:45:52 PM -05'00'
This section is a gross over simplification. what does this mean for the use of herbicides?

This page contains no comments

be pre-registered prior to digging. Wells in existence prior to 1999 generally are not registered with the NYSDEC and thus do not appear on the NYSDEC maps.

The CLWMP notes that approximately 60 different entities use groundwater for potable water needs. (Bergman Associates 2010). The U.S. Geological Survey (USGS) maintains monitoring wells in Chautauqua County to assess groundwater quantity and quality. These monitoring wells are currently located in Panama and Falconer. (USGS Groundwater Watch, 2018).

3.1.2 SURFACE WATER

The Chautauqua Lake watershed is extensive, covering 160-square miles. It is divided into fourteen sub-watersheds. The Lake is fed by eleven tributaries: Ball Creek, Bemus Creek, Big Inlet, Dewittville Creek, Dutch Hollow Creek, Goose Creek, Lighthouse Creek, Little Inlet, Maple Springs Creek, Mud Creek, and Prendergast Creek. Water generally flows from north to south and empties into the Lake's outlet in its southeastern corner where it drains into the Chadakoin River. Once water enters the Chadakoin River, it flows through the Warner Dam in the City of Jamestown, prior to confluence with the Cassadaga Creek, Conewango Creek, and, ultimately, the Allegheny River. The Allegheny River drains into the Ohio River, which drains into the Mississippi River, prior to entering the Gulf of Mexico and then the Atlantic Ocean.

The primary source (78%) of water into the Lake is surface water runoff from the Chautauqua Lake watershed. (Bergman Associates 2010). The second largest source (17%) of inflow is precipitation that falls directly onto the Lake. (Id.) Groundwater flow provides a minimal portion of the inflow, and that is mainly into the north basin. The silty and clayey bottom of the southern basin hinders the flow of groundwater into the Lake. (Id.). Therefore, it is unlikely that groundwater represents a significant source of inflow of water into the lake. Ninety percent of the outflow from Chautauqua Lake is through the Chadakoin River. Most of the remaining 10% of outflow is through surface evaporation. A very small portion of outflow is due to diversions from local water supply utilities or residential uses. (Id.).

Another way to understand watershed dynamics is the concept of a "water budget." A water budget estimates water quantities in terms of gains (water added to the lake from various sources, such as rain or stream flow) and losses (e.g. evaporation and outflow through the River). In 2000, the Lake's annual water budget included 2 billion cubic feet of precipitation, 7 billion cubic feet of tributary water, 1 billion cubic feet of runoff into the north basin, 2 billion cubic feet of runoff into the south basin, and 1 billion cubic feet from other sources - for a total annual Lake input of approximately 13 billion cubic feet of water. (CCDPDC, 2000).

3.1.3 WATER QUALITY

Chautauqua Lake is classified as a Class A potable waterbody. Based on NYSDEC definitions, Class A waters can serve as a source of drinking water, although appropriate treatment may be needed to meet New York State drinking water standards. With regards to nutrients, New York State drinking water standards require that nutrients cannot be present "in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages" (Cadmus 2012). With a water quality classification of A, both the north and south basins of the Lake must also be suitable for fish propagation and survival.

Most of the residents around the Lake rely on well water (groundwater from aquifers) for their water supply—not water from the Lake. Exceptions include the Chautauqua Utility District (Chautauqua, NY), the Chautauqua Heights Water District Number 2 (Dewittville, NY), and an unknown number of residences.

In 2004, Chautauqua Lake was classified as an "Impaired Waterbody" by the NYSDEC in accordance with Section 303(d) of the Clean Water Act (CWA). The NYSDEC found that both the north and south basins were impaired for water supply, public bathing, and recreation. As a basis for their determination/classification, the NYSDEC noted that major pollutants included phosphorus, harmful algal blooms, algal/plant growth, and aquatic invasive species that were present in the Lake. (NYSDEC, WI/PWL Fact Sheets – Chautauqua Lake Watershed, 2014). In 2012, a Total Maximum Daily Load (TMDL) calculation for the Lake was completed by the NYSDEC, with a target value of 20ug/L of phosphorus in epilimnetic (surface) waters of Chautauqua Lake in the summer. Neither the north nor south basins were listed on NYSDEC's 2016 Clean Water Act Section 303(d) list however the TMDL target is not being met.

According to the 2015 CSLAP report, both the north and south basins of the Lake remain impaired for potable water, swimming, and recreation due to the presence of algal blooms. The algal blooms also affect its aesthetics, which, according to the 2015 report, are rated stressed/poor. The 2015 report further categorizes the Lake as threatened/fair for aquatic life, habitat and fish consumption due to invasive plants and high pH levels. The Figure 3-2 on the following page is from the from the 2015 CSLAP Report. The 2016 CSLAP report only covers the north basin of Chautauqua Lake (Figure 3-3a). Results are similar to those reported in the 2015 report with the exception that high pH is not noted as an issue for aquatic life in the summary table.

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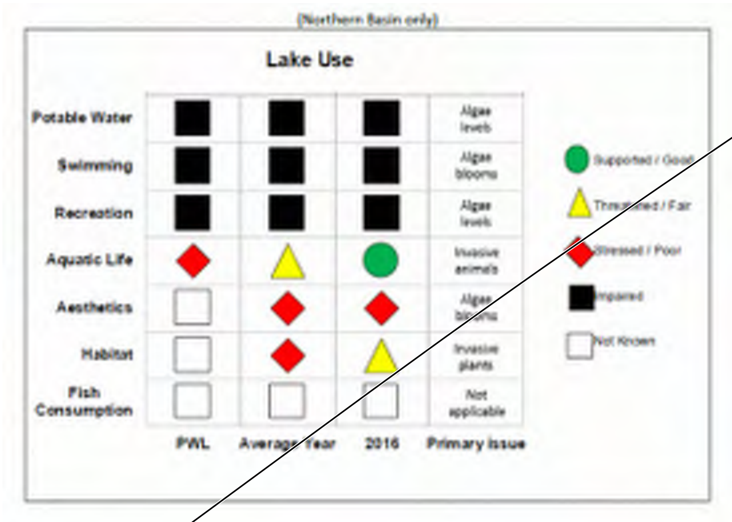
Author: User1 Date: 2/19/2018 12:51:09 PM -05'00'
so why put herbicides in it?

Author: User1 Date: 2/19/2018 12:51:50 PM -05'00'
treatments do not include removal of herbicides.

Author: User1 Date: 2/19/2018 12:52:35 PM -05'00'
herbicides reduce this function

Author: User1 Date: 2/19/2018 12:55:08 PM -05'00'
quantify capture zones of wells near the lake shore to ensure herbicides are not being drawn through.

Figure 3-3: 2016 CSLAP



3.2 AQUATIC AND TERRESTRIAL ECOLOGY

It is essential to understand the dynamics of aquatic ecology to understand how different factors effect ecology and how the ecology, in turn, impacts the water quality of Chautauqua Lake. For much of the past 100 years, Chautauqua Lake has experienced changes in the aquatic community due primarily to nutrient loading and both deliberate and undesired/unintended introduction of plants and animals. Attempts have been made to actively manage invasive aquatic plants for many years. Efforts to control Eurasian watermilfoil and curlyleaf pondweed have been a significant part of these efforts.

It should also be recognized that the aquatic community of Chautauqua Lake is not static. For example, over the years, in addition to non-native plant species, zebra mussel, Asian clam, milfoil weevils, and numerous fish species have joined or been introduced into the ecological community of the Lake. The fish community of Chautauqua Lake includes an apex predator (muskellunge), which is historically native to the Lake but now almost exclusively reared in a NYSDEC maintained fish hatchery, and native largemouth and smallmouth bass. It also includes numerous species that have been introduced as early as 1886 and as recently as 2008 including walleye, Black crappie, carp, golden shiner, gizzard shad, white perch, and paddlefish. All of these species, in concert with invasive zebra mussels, have a potential effect on nutrient

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Author: User1 Subject: Highlight Date: 3/14/2018 3:31:25 PM
Where is this "understanding?" There is not mention of what the function of seaweed is in this lake. How does clearing large areas effect the ecology?

cycling and ultimately the amount of algal growth observed. Through predation, the fish community can cause cascading effects through the food web that result in changes in algal growth and nutrient cycling (Carpenter et al 1987). For example, in Chautauqua Lake, grazing effects including filtering by zebra mussels might explain a partial disconnect between observed chlorophyll *a* concentrations and phosphorus concentrations.

The information presented herein provides recent information on the current state of the Lake's aquatic ecology as of the date of this report.

3.2.1 AQUATIC VEGETATION

Chautauqua Lake features numerous types of aquatic vegetation, including but not limited to algae, submerged aquatic vegetation (underwater macrophytes), and emergent aquatic vegetation, which are plants that break the surface of the water and grow up and out of the water, such as cattails (*Typha latifolia*).

Algae

Algae range in size from microscopic to larger algal masses that often appear to be plants when floating on or near the surface. There are both attached forms (filamentous and periphyton) and free-floating forms (phytoplankton). They are found throughout Chautauqua Lake and are most prolific in areas which receive higher concentrations of nutrients and sunlight. Algal blooms occur on Chautauqua Lake, changing the color of the water, increasing turbidity, and resulting in large decaying masses. Benthic filamentous algae are found in Chautauqua Lake, where "it can appear as brown or green mats of vegetation that can reach the surface." (SOLitude June 2017) (Appendix F).

While the entire Chautauqua Lake watershed is not developed, small intensively developed portions of the watershed as well as agricultural runoff add significant amounts of phosphorus to the Lake (Bergman Associates 2010).

As a result of excessive nutrient loading, algal blooms are common in Chautauqua Lake and there is dissolved oxygen depletion in the deeper sections of the Lake. In addition to direct impacts to organisms that require oxygen for respiration, low oxygen levels at the sediment-water interface result in phosphorus release from the sediments, an additional major source of phosphorus to the Lake. As the summer growing season goes on, total phosphorus concentrations increase, chlorophyll *a* concentrations increase, and Secchi transparency decreases (CSLAP 2016). Nutrient limitation of phytoplankton (algae) cycles between phosphorus and nitrogen; however, efforts to control algal blooms (and aquatic plant growth) have focused on phosphorus which is typically more easily controlled than nitrogen. The total nitrogen to total phosphorus ratio is relatively low at times, which favors many of the more objectionable species of phytoplankton (cyanobacteria) that can fix nitrogen from the atmosphere.

This page contains no comments

The CLWMP was developed to control phosphorus loading, in part, because in-Lake management measures to control algal and macrophyte growth were not by themselves improving the situation. This watershed plan is part of a long-term strategy that will take many decades to implement and is unlikely, on its own, to produce the required results (see the TMDL report, Cadmus 2012). The TMDL , developed a couple years later, identified phosphorus reduction requirements needed in order to meet the target surface water phosphorus concentration. Agriculture and Internal (sediment loading) account for 25% and 54%, respectively, of the required reductions. No active efforts are currently underway to address the internal loading reduction.

Algal, and more specifically, cyanobacteria blooms have been reported for many years in Chautauqua Lake. In the mid-1930s, cyanobacteria blooms of *Coelosphaerium, Aphanizomenon and Gloeotrichia* during the months of July, August, and September were observed. Algaecides were used to control these early blooms. Peak "chlorophyll *a,"* in 1975, was near 100 ug/l suggesting a very intense bloom.

NYSDEC has been tracking harmful algal bloom data on Chautauqua Lake since 2012 (Table 3-2). In the past six years, the Lake has been on the advisory list for 10 to 18 weeks per year, typically from late June/early July through late September/October. pH is often elevated during algal blooms on Chautauqua Lake (CSLAP 2016).

Table 3-2: Cyanobacteria Advisories Issued for Chautauqua Lake.

Year	Date First Listing	Date Last Listing	Weeks on list
2012	8/4/2012	10/10/2012	11
2013	7/16/2013	11/4/2013	16
2014	6/30/2014	9/28/2014	15
2015	7/3/2015	9/25/2015	10
2016	7/15/2016	10/28/2016	16
2017	6/25/2017	10/27/2017	18

Source: http://www.dec.ny.gov/chemical/83332.html

The 2012 TMDL was developed after the NYSDEC classified Chautauqua Lake as "impaired" on NYSDEC's CWA Section 303(d) list of impaired waterbodies due to cyanobacteria blooms caused by nutrient enrichment there (Cadmus 2012). In reaching this classification, available data for Chautauqua Lake and its tributaries and upstream Lakes were reviewed.

Phosphorus and chlorophyll *a* concentrations have shown considerable variability over recent years. It is likely that some of this variability is due to weather and rainfall runoff variability and that additional variability is related to transient disturbances in the watershed (such as development and agriculture or roadway projects) or episodes of intense internal loading releases of phosphorus. In general, concentrations of phosphorus in the tributaries are moderate to high. Excessive nutrient loading is responsible for both excessive algal growth and macrophyte growth in Chautauqua

Lake (Bergman Associates 2010, Cadmus 2012, CSLAP 2016, EcoLogic 2017). The TMDL has been completed which calculates the reductions in phosphorus loading required to improve the status of the Lake but implementation is still in process. Chautauqua Lake still exhibits the same water quality characteristics that led to its "impaired" listing.

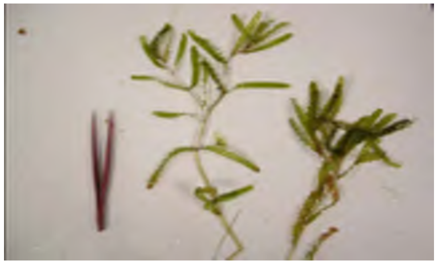
General Aquatic Ecology of Macrophytes

Macrophytes are rooted plants, with stems, branches, leaves, and flowers. They are found throughout Chautauqua Lake and are most prevalent in the littoral zone (those portions of the Lake in which sunlight reaches the bottom). Chautauqua Lake is approximately 13,000-acres in size and approximately 5,000-acres of the Lake are considered to be located within the Lake's littoral zone, meaning that approximately 38% of the Lake is susceptible to macrophyte growth. Littoral zones for Chautauqua Lake are shown on Figure 3-4. The 1990 SEIS described how two invasive species of macrophytes, curlyleaf pondweed and Eurasian watermilfoil, has taken over the littoral zone of the Lake:

> The exotic (introduced) species, curlyleaf pondweed (Potamogeton crispus) and Eurasian watermilfoil (Mryiophyllum spicatum), have become dominant in Chautauqua Lake, and reach nuisance proportions (according to the CLA and Lakefront property owners) during the summer recreation season. These species are highly competitive and are capable of infesting areas of the littoral zone at the exclusion of other less vigorous species. They are the major nuisance macrophytes because they grow in very dense stands, they grow to the water surface, and they interfere with boating, swimming, and angling.

(CCDPCD, 1990 SEIS) (Appendix D).

Both curlyleaf pondweed and Eurasian watermilfoil are invasives that came to the United States from Eurasia. Curlyleaf pondweed fragments can survive once cut and are viable as sources of dispersion, but they are mostly promulgated through buds called "turions" that are shed from the plant once mature and settle at the bottom of the Lake until germination occurs. Once fully grown, curlyleaf pondweed often extends above the surface of the Lake and forms into mats. Its stems "often reach the surface by mid-June. Its submersed leaves are oblong, and attached directly to the stem in an alternate pattern. The margins of the leaves are wavy and finely serrated, hence its name. No floating leaves are produced." Curlyleaf pondweed can "tolerate turbid water conditions better than most other macrophytes." (SOLitude, June 2017) (Appendix F).



Curlyleaf Pondweed

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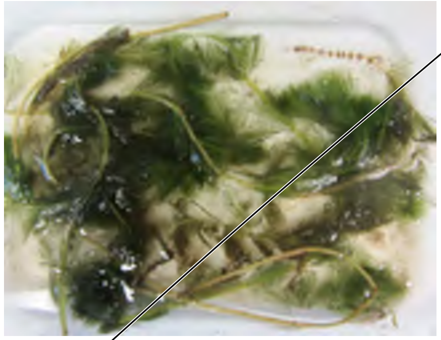
Author: User1 Date: 2/19/2018 1:10:07 PM -05'00'
they are invasive, they will be first to move into an area of native plants inadvertently killed by herbicides. Making next year's stand larger. Cite new hampshire's losing battle against milfoil using 2,4-d.

Author: User1 Date: 2/19/2018 1:04:09 PM -05'00'
what are the phenologies of these two and when is the best time to treat and does it interfere with fish spawning?

Eurasian watermilfoil is similar in that its fragments can survive once cut. Fragments can be transported by various means and can settle at Lake bottom, take root, and fully establish as viable plants (complete with stems, branches, and leaves). (NYSDEC Div. of Water, 2005). In addition to dispersion through fragmentation, Eurasian watermilfoil also spreads through buds that detach from the plant's root crown. Eurasian watermilfoil is similar to curlyleaf pondweed in that it grows and extends above the surface of water growing into mats. The stems of Eurasian watermilfoil "branch repeatedly at the water's surface creating a canopy that can crowd out other vegetation, and obstruct recreation and navigation." (SOLitude June 2017) (Appendix F). It is a particularly harsh weed for native macrophytes as its "ability to grow in cool water and at low light conditions gives it an early season advantage over other native submerged plant." (NYSDEC Div. of Water, 2005). In 1989 "dense stands of Eurasian watermilfoil made the entire southeastern quarter of the southern basin impassable to boat traffic." (*Id*.).



Eurasian Watermilfoil

In general, more weeds appear earlier in the summer in the Lake's southern basin than in the northern basin. This is due to the southern basin's shallower depth (maximum depth of approximately 19'). Macrophytes, generally, play an important role in the Lake's ecosystem by providing refuge and structure to fish and, in some instances within the littoral zone, serving as important spawning areas for them. Algae cling to macrophytes, as do any number of macroinvertebrates which use the weeds as a habitat. These invertebrates are often important food sources for fish in various life stages (Scheffer 2004). Aquatic plants that have become too dense, however, are problematic for fish, as they can inhibit fish growth. Overly dense macrophytes can also cause the overpopulation of the smaller fish that inhabit the macrophyte beds and deprive the larger fish (predators) of an important food source (due to the lack of clear hunting lanes) and a vital link in the Lake's food chain. Native macrophytes are an important part of the Lake's ecosystem and the invasive species outcompete them in many parts of the littoral zone. (SOLitude June 2017) (Appendix F).

Excessive nutrient loading is responsible for excessive macrophyte growth in Chautauqua Lake (Bergman Associates 2010, Cadmus 2012, CSLAP 2016, EcoLogic 2017). As stated in the MMS (Ecologic 2017), "Nutrient cycling and biological interactions in sediments and water column of shallow and weedy sections of Chautauqua Lake may contribute to maintaining elevated nutrient levels and

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Author: User1 Date: 2/19/2018 1:07:06 PM -05'00'
isn't Eurasian watermilfoil controlled somewhat by weevils. foster this method before herbicides?

Author: User1 Subject: Highlight Date: 3/14/2018 2:39:53 PM
Where is this "understanding?" There is not mention of what the function of seaweed is in this lake. How does clearing large areas effect the ecology?

undesirable plant growth long after external loading is reduced." The macrophyte beds are currently nutrient rich as the result of years of nutrient and sediment loading to the Lake. Macrophytes derive much of their nutrients from the sediments although they may take some nutrients from the water column (Wagner 2004). As a result, a reduction in water column nutrient concentrations may not, by themselves, be sufficient to reduce macrophyte biomass.

The long-term accumulated mass of nutrients in the sediments may fuel macrophyte growth into the foreseeable future even with substantial reductions in nutrient loading to the Lake. Annual growth of macrophytes will return a large portion of their accumulated nutrients to the sediments as they die at the end of the growing season. External nutrient loading reduction is likely necessary for the long-term reduction in macrophyte biomass in the Lake but it may not be sufficient in and of itself in the shorter term to reduce macrophyte growth. Short term reductions in nutrient loading may also result in less algal growth and a clearer Lake which may make conditions more favorable for macrophytes, particularly at depth.

Macrophyte Identification and Density in Proposed Treatment Areas

To assess the aquatic plant community in the Lake's southeastern and central littoral zones, SOLitude conducted surveys of several bay/shoreline areas in Fall, 2017. The purpose of these surveys was to document the presence and relative abundance of native and invasive aquatic plants and Lake bottom sediment depth, focusing on areas of concern to the Lake user community. The invasive plants of concern were Eurasian watermilfoil (Myriophyllum spicatum) and curlyleaf pondweed (Potamogeton crispus).

At each survey area, a point-intercept survey method was implemented to assess the plant community. This survey methodology can be replicated to track changes in the vegetation community and used to plan for future control methods in the Lake. A georeferenced grid data layer was placed over an orthophoto of each site and data collection points were placed at each vertex. A GPS was used to locate each data point in the field, where a physical drag with a throw-rake was performed at each point and an underwater camera was used to assess the plant density and visually relate to the rake-toss results. The following data was collected at each point: water depth, aquatic plant species, relative density of each species, and overall aquatic species density. Due to the late timing of the survey, most plant density was categorized as trace to sparse, as plant growth had already begun to decline for the season. Significantly greater density is anticipated in the late spring/early summer as seen in the Bemus Bay Pre-treatment survey done in May 2017.

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Author: User1 Subject: Highlight Date: 3/14/2018 2:40:01 PM
Is this quantified?

Author: User1 Subject: Highlight Date: 3/14/2018 2:40:09 PM
Needs citation. Where is this from? Are there scientific studies showing this? and how long will it remain? What is "foreseeable" in scientific lingo, month, years, decades?

Author: User1 Subject: Highlight Date: 3/14/2018 2:40:15 PM
WHAT? reducing nutrients will increase weed growth anyway?

As a counter point that is just as unsubstantiated, so why don't we just add black dye to the littoral zone, blocking all light, to prevent the weeds from ever growing?

Author: User1 Date: 2/19/2018 1:17:54 PM -05'00'
why was this late. there is no excuse for this. if this is a research project done by professionals, this should have been done correctly.

Author: User1 Date: 2/19/2018 1:12:37 PM -05'00'
what constitutes as trace or sparse. this is misleading and not scientific.

Author: User1 Date: 2/19/2018 1:19:25 PM -05'00'
pondweed declined completely by treatment date, why was it still carried out.

Results of the surveys are summarized below and contained in Appendix H:

Bemus Bay: Eurasian milfoil and curly-leaf pondweed were documented at 75% and 46% of the surveyed data points, respectively. The majority of overall vegetation densities occurred at Sparse and Medium categorizations, and is typically relative to the lateness in the growing season. The Bay also supported native vegetation dominated by common waterweed (*Elodea canadensis*) and benthic filamentous algae, with lesser densities of coontail (*Ceratophyllum demersum*), water stargrass (*Zosterella dubia*), slender naiad (*Najas flexilis*), forked duckweed (*Lemna trisulca*), white water lily (*Nymphaea odorata*), leafy pondweed (*Potamogeton foliosus*), needle spikerush (*Eleocharis acicularis*), and Richardson's pondweed (*Potamogeton richardsonii*).

A rocky and sandy band occurs within the first 10-15ft of the shoreline, with benthic filamentous algae present within the majority of the shoreline data point locations. Outwards of 10-15ft becomes a medium to dense bed of milfoil, curlyleaf pondweed, and common waterweed. The growth extent of both invasive species continued further into the bay passed the allotted survey grid. Aside from the notable densities of common waterweed and coontail, the density of native vegetation was low, comprising <10% of the Bay. Waterweed and coontail growth were still fairly suppressed by the overgrowth of Eurasian milfoil and curly-leaf pondweed.

Bemus Point: Eurasian milfoil was documented at 55% of the surveyed data points, while Curly-leaf Pondweed was documented at 29%. The majority of overall vegetation densities occurred at trace and sparse categorizations, as would be expected late in the growing season. The Point also supported native vegetation dominated by common waterweed (*Elodea canadensis*) and coontail (*Ceratophyllum demersum*), with lesser densities of water stargrass (*Zosterella dubia*), slender naiad (*Najas flexilis*), white waterlily (*Nymphaea odorata*), tape grass (*Vallisneria Americana),* and benthic filamentous algae.

Bly Bay: Eurasian watermilfoil was documented at 24% of the surveyed data points, while curlyleaf pondweed was documented at 19%. The Bay also supported native vegetation dominated by common waterweed (*Elodea canadensis*) and coontail (*Ceratophyllum demersum*), with lesser densities of water stargrass (*Zosterella dubia*), slender naiad (*Najas flexilis*), white waterlily (*Nymphaea odorata*), tape grass (*Vallisneria Americana*), and benthic filamentous algae.

Burtis Bay: Eurasian watermilfoil was documented at 94% of the surveyed data points, while curlyleaf pondweed was documented at 45% of the surveyed data points. The Bay also supported native vegetation dominated by common waterweed and coontail, with lesser densities of water stargrass, slender naiad, tape grass, benthic filamentous algae, white-stemmed pondweed (*Potamogeton praelongus*), and Richardson's pondweed (*Potamogeton richardsonii*).

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Author: User1 Date: 3/14/2018 2:56:17 PM
How do you categorize dense when stated above overall densities are sparse or medium?

Author: User1 Date: 3/14/2018 3:31:43 PM
misleading. if trace is a microscopic amount it does not warrant herbicide action.
likely a conflict when the sales company is collecting data and performing treatment.

Author: User1 Date: 3/14/2018 2:56:26 PM
Should include a percent comparison of native veg

Busti and Lakewood Bay: Eurasian watermilfoil was documented at 62% of the surveyed data points, while curlyleaf pondweed was documented at 12%. The Bay also supported native vegetation dominated by common waterweed and water stargrass, with lesser densities of benthic filamentous algae, slender naiad, white waterlily, tape grass, coontail, white-stemmed pondweed, and Richardson's pondweed.

A rocky and sandy band occurs within the first 10-15ft of the shoreline, with benthic filamentous algae present within the majority of the shoreline data point locations. The extent of both invasive species continued further into the bay past the survey zone. Aside from the notable densities of Common Waterweed and Water Stargrass, the density of native vegetation was low. Waterweed and water stargrass growth were still fairly suppressed by the overgrowth of Eurasian watermilfoil.

Offshore Point Stockholm and Greenhurst: Eurasian watermilfoil was documented at 56% of the surveyed data points, while curlyleaf pondweed was documented at 52% of the surveyed data points. The Bay also supported native vegetation dominated by common waterweed and coontail, with lesser densities of white-stemmed pondweed, slender naiad, white waterlily, tape grass, water stargrass, and Richardson's pondweed.

On the ends of the bay a medium to dense bed of milfoil, curlyleaf pondweed, and common waterweed was present. The extent of the invasive species continued further into the bay past the survey zone. Aside from the notable densities of common waterweed and slender naiad, the density of native vegetation was low. Waterweed and slender naiad growth were still fairly suppressed by the overgrowth of Eurasian watermilfoil and curlyleaf pondweed.

Offshore Stow: Eurasian watermilfoil was documented at 53% of the surveyed data points, while curlyleaf pondweed was documented at 18% of the surveyed data points. The Bay also supported native vegetation dominated by common waterweed and coontail, water stargrass, with lesser densities of forked duckweed (Lemna trisulca), slender naiad, white waterlily, tape grass, water stargrass, and Richardson's pondweed.

Outwards of 10-15 feet, a sparse to medium bed of Eurasian watermilfoil, curlyleaf pondweed, and common waterweed was found. The extent of both invasive species continued further into the bay passed the survey zone. Aside from the notable densities of common waterweed and coontail, the density of native vegetation was relatively high, with 72% of the sites containing native vegetation.

Sunrise Cove: Eurasian watermilfoil was documented at 37% of the surveyed data points, while curlyleaf pondweed was documented at 8% of the surveyed data points. The Bay also supported native vegetation dominated by common waterweed and water stargrass, with lesser densities of benthic filamentous algae, slender naiad,

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Author: User1 Date: 3/14/2018 2:56:32 PM
This comparison should be included in all areas.

white waterlily, tape grass, coontail, white water crowfoot (*Ranunculus aquatilis*), forked duckweed, and Richardson's pondweed.

The extent of both invasive species continued further into the bay past the survey zone. Aside from the notable densities of common waterweed and water stargrass, the density of native vegetation was high.

Warner Bay: Eurasian watermilfoil was documented at 69% of the surveyed data points, while curlyleaf pondweed was not collected. The Bay also supported native vegetation, including common waterweed, coontail, water stargrass, slender naiad, tape grass, benthic filamentous algae, Richardson's pondweed, and white-stem pondweed.

A rocky and sandy band occurs within the first 10-15 feet of the shoreline, with benthic filamentous algae are present within the majority of the shoreline data point locations. Outwards of 10-15 feet, a medium to dense bed of Eurasian watermilfoil exists on the southern part of the bay. Aside from the notable densities of benthic filamentous algae and tape grass, the density of native vegetation was low.

In addition to the survey performed by SOLitude Lake Management in the areas noted above, Racine-Johnson Ecologists also performed a survey of aquatic plants throughout the Lake's littoral zone in Fall 2017. Solitude identified 13 aquatic macrophyte species found in the survey zones. Racine-Johnson identified an additional 9 aquatic macrophyte species found in the Lake. These are as follows:

- Water Moss (*Fontinalis sp.*)
- American Water-willow (*Justicia Americana*)
- Southern naiad (*Najas guadalupensis*)
- Spatterdock (*Nuphar variegata*)
- Hill's Pondweed (*Potamogeton hillii*)
- Small Pondweed (*Potamogeton pusillus*)
- Robbin's Pondweed (*Potamogeton robbinsii*)
- Sago Pondweed (*Stuckenia pectinata*)
- Horned Pondweed (*Zannichellia palustris*)

Racine-Johnson's 2017 Plant Survey report also lists all aquatic plants found in several surveys of the Lake, starting as early as 1937 (NYSDEC). Eight separate aquatic plant surveys noted a minimum of 16 plants species (1989, IT Corp.) to a maximum of 32 species (2003-2008. R. Johnson). The most common group of plants not found in 2016 and 2017, but present in past surveys were from the pondweed family. In all, ten species of native pondweeds were found in the Lake at some time previously, but not in 2016 or 2017.

3.2.2 WILDLIFE / RARE THREATENED AND ENDANGERED SPECIES

Chautauqua Lake supports a diverse natural ecology, but it does not have any designated Significant Coastal Fish and Wildlife Habitats. The primary habitats in and

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Author: User1 Date: 3/14/2018 2:56:40 PM
Should include NYS Species of Greatest Conservation Need (SGCN) that may use the Lake directly or indirectly. For example, Musky, snapping turtle, spiny softshell turtle, clubshell, paddlefish

near the Lake are lacustrine and riverine. The area is surrounded by deciduous trees, shrub/scrub, grassland, developed properties, recreational features and some cultivated fields that are located away from the Lake. The wildlife community of Chautauqua Lake includes a variety of mammals, birds, reptiles and amphibians. Most species are common to New York State unless noted below.

Fish/ Fishery/Fish Spawning areas

Chautauqua Lake is a world class fishery, recognized regionally, nationally, and internationally as offering anglers some of the best freshwater muskellunge and walleye fishing opportunities in the United States.

Chautauqua Lake's reputation as a prime destination for muskellunge is not unfounded, with anglers from across the United States travelling to the Lake to chase "muskies" each year. "[D]espite high Lake usage and angling pressure," the Lake maintains a large stock of muskellunge and walleye due to the efforts of the NYSDEC at a fish hatchery located on Prendergast Boulevard in the Village of Mayville. The Prendergast Hatchery spawns rears both muskellunge and walleye for the purposes of stocking Chautauqua Lake and other waterbodies in the region. It is one of twelve NYSDEC fisheries in New York State and it is also among the most intensively managed fisheries in New York. The NYSDEC collects muskellunge eggs from the Lake the first week in May of each year and spawns then rears the eggs to maturity at the Prendergast Hatchery. (Personal conversation with Michael Clancy, NYSDEC),

Evidence indicates that in recent decades, few to no muskellunge are naturally reared in the Lake. Between 1968 and 1971, over 80% of muskellunge were hatchery reared (Mooradian and Shepherd, 1973 as cited in Bloomfield, 2013), with only 20% of muskellunge naturally-spawned. In December 2017 correspondence with NYSDEC's regional staff at the Prendergast Point fish hatchery, it was noted that the vast majority of adult muskellunge fish caught in NYSDEC's trap nets (to obtain eggs and sperm for fertilization in the hatchery) are originally hatchery-raised fish. It was further noted that survival of fish spawned and reared naturally in the Lake is on the order of 1%. (Conversation between Dr. Tom Erlandson and Paul McKeown NYSDEC Region 9 former fisheries biologist). However, the NYSDEC has advised that the NYSDEC fishery staff has not given up on naturally spawned muskellunge returning to the Lake. It should be noted that on lakes like Chautauqua Lake, where the shoreline is developed (here 89%), muskellunge are not likely to spawn. Both Tom's Point and Prendergast Point are undeveloped, as is the north/east side of the lower Lake/outlet (on the Fluvanna side across from Celoron). These areas are classified as wetlands and could support in-Lake muskie spawning if the plan evolves away from hatchery based spawning.

A 1987 report by the Fish and Wildlife Service determined 94 habitat variables which affected natural muskellunge spawning success among which are: "eutrophication, sedimentation, high suspended solids, changes in submerged aquatic vegetation species, loss of woody cover and shoreline development. All of these factors have

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Author: User1 Subject: Highlight Date: 3/14/2018 3:32:11 PM
Show this study. How does this statement enhance argument for using herbicides?

Author: User1 Date: 3/14/2018 2:56:47 PM
Should clarify the walleye population is almost entirely maintained by natural reproduction.

Author: User1 Date: 3/14/2018 2:56:53 PM
Hatchery staff have in the recent past have set pound and trap nets in Bemus Bay to collect spawning muskies.

been and continue to be of considerable concern for Chautauqua Lake." (Ward, 2013). In addition, the introduction of walleye is ~~believed to have played a role in the~~ declines in muskellunge naturally spawned in the Lake.

In addition to muskies, Chautauqua Lake is a warm waterbody that generally supports a warm water fish community. In 1902, species reported included muskellunge, bluegill, largemouth bass, brown bullhead, black bullhead and carp (introduced). By 1937 paddlefish, shortnosed gar, bowfin, black bullhead and red fin sucker had likely disappeared; however, eleven new species were found. Most notable among them was calico bass or black crappie (*Pomoxis nigromaculatus*). Walleye were first introduced in 1903 although a second introduction in the 1930's may have been required for them to become an established member of the fish community in the Lake.

Table 3-3, which lists the various types of fish species occurring/documented within the Lake, was derived from the 1990 SEIS (CCPDP 1990) (Appendix D). It is not necessarily an exhaustive list, but one that does summarize all the species of fish that were documented in the Lake up until that point in time. Three (3) of the species included in the table once inhabited the Lake, but were thought to be extinct in Chautauqua Lake. (Id.). In addition, the blackchin shiner (*Notropis heterodon*) was historically confirmed in Chautauqua Lake in 1937. Although this species has a global rank of G5 (demonstrably secure globally), it has a New York State conservation rank of S1 (especially vulnerable in New York State). It is unknown if this species currently exists in Chautauqua Lake.

Table 3-3: Fish Species, Chautauqua Lake (Adapted from CCDPD 1990)

Binomial Name	**Common Nomenclature**
Ambloplites rupestris	Rock Bass
Amia calva	Bowfin ***(NO LONGER PRESENT IN THE LAKE)***
Campostoma anomalum	Stoneroller Minnow
Carassius auratus	Goldfish ***(INTRODUCED)***
Caproides cyprinus	Quillback Carpsucker
Catostomus commersoni	White Sucker
Coregonus artedi	Cisco
Cottus bairdii	Mottled Sculpin
Clinostomus elongatus	Reside Dace
Culaea inconstans	Brook Stickleback
Cyprinus carpio	Carp ***(INTRODUCED)***
Dorosoma cepedianum	Gizzard Shad ***(INTRODUCED)***
Esox americanus	Grass Pickerel ***(INTRODUCED)***
E. Lucius	Northern Pike ***(INTRODUCED)***
E. masquinongy	Muskellunge
Etheostoma caeruleum	Rainbow Darter
E. exile	Iowa Darter
E. flabellare	Fantail Darter

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Author: User1 Date: 3/14/2018 2:57:01 PM
REFERENCE

Author: User1 Date: 3/14/2018 2:57:16 PM
SGCN

Author: User1 Subject: Comment on Text Date: 3/14/2018 3:32:33 PM
it is UNKNOWN. how can you state the environmental impact if it is unknown.

Binomial Name	Common Nomenclature
E. nigrum	Western Johnny Darter
E. olmstedi	Tesselated Darter
Fundulus diaphanus	Banded Killlfish
Hypentelium nigricans	Northern Hog Sucker
I. nebulosus	Brown Bullhead
I. punctatus	Channel Catfish ***(INTRODUCED)***
Labidesthes sicculus	Brook Silversides
Lepisosteus oculatus	Spotted Gar
L. osseus	Longnose Gar
L. platostomus	Shortnose Gar ***(NO LONGER PRESENT IN THE LAKE)***
L. gibbosus	Pumpkinseed Sunfish
L. macrochirus	Bluegill Sunfish
Micropterus dolomieu	Smallmouth Bass
M. salmoides	Largemouth Bass
Morone chrysops	White Bass ***(INTRODUCED)***
Morone americana	White Perch ***(INTRODUCED)***
Moxostoma anisurum	Silver Red Horse
M. macrolepidotum	Shorthead Redhorse Sucker
Notemigonus chrysoleucas	Golden Shiner
Notropis atherinoides	Emerald Shiner
N. cornutus	Common Shiner
N. heterodon	Blackchin Darter
N. heterolepis	Blacknose Minnow
Notriopis hudsonius	Spottail Shiner
N. spilopterous	Spotfin Shiner
N. volucellus	Mimic Shiner
Noturus miurus	Brindled Madtom
Perca flavescens	Yellow Perch
Percina caproides	Logperch
P. maculate	Blackside Darter
Pimephales notatus	Bluntnose Minnow
P. promelas	Fathead Minnow
Polyodon spathula	Paddlefish ***(NO LONGER PRESENT IN THE LAKE)***
Pomoxis annularis	White Crappie ***(INTRODUCED)***
P. nigromaculatus	Black Crappie ***(INTRODUCED)***
Rhinichthys atratulus	Western Blacknosed Dace
Oncorhynchus mykiss	Rainbow Trout ***(INTRODUCED)***
Salmo trutta	Brown Trout ***(INTRODUCED)***
Salvelinus fontinalis	Brook Trout
Schilbeodes marginatus	Mad Tom
Semotilus atromaculatus	Creek Chub
Stizostedion vitreum	Walleye ***(INTRODUCED)***
Umbra limi	Central Mudminnow

Most of the fish living within the Lake spawn during the spring and the first months of summer. Fish spawning habitat was mapped and presented in the 1990 SEIS (Appendix D). The mapping is primarily substrate based and, as such, the mapping units are assumed to be still similar to those reported in that document. The macrophyte beds of Chautauqua Lake provide spawning habitat for some fish species, refuge for small species and early life stages, substrate for macroinvertebrates, and used for food, shade, and cover.

Another useful table comes from the MMS. In this table the preferred spawning habitats of some of the most common fish found in Chautauqua Lake are briefly described and the spawning periods are listed. (EcoLogic 2017). The MMS also includes mapping of spawning areas that were obtained from the NYSDEC (see Appendix I).

Table 3-4: Spawning Habitats (adapted from EcoLogic 2017)

Common Nomenclature	Spawning Habitat	Spawning Period
Black Crappie	Mud, Sand, Gravel Near Vegetation	May-June
Bluegill	Fine Gravel, Sand	May-July
Brown Bullhead	Silt, Sand w/Cover	May-June
Channel Catfish	Silt Cobble w/Cover	May-July
Gizzard Shad	Vegetation	May-July
Largemouth Bass	Gravel, Silt/Clay	May-June
Muskellunge	Vegetation	April-May
Pumpkinseed	Gravel, Sand w/Vegetation	May-July
Smallmouth Bass	Gravel w/Cover	May-June
Walleye	Gravel, Cobble	March-April
White Perch	No Preference	April-May
White Sucker	Gravel	April-May
Yellow Bullhead	Silt, Sand w/Cover	May-July
Yellow Perch	Vegetation	April-May

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Author: User1 Date: 2/19/2018 1:22:07 PM -05'00'
then why consider herbicides to eliminate this function?

Birds

The National Audubon Society has designated Chautauqua Lake an Important Bird Area (IBA) due to its use by migrating and wintering waterfowl. The Audubon Society reports that, at least, 270 species of birds have been documented in the Chautauqua Lake area. A list of these species and the most recent (12/17) bird count are contained in Appendix J.

Invertebrates

The Chautauqua Lake invertebrate community currently contains a variety of zooplankton, native and introduced aquatic macroinvertebrates, crayfish, worms, and mollusks. The Lake also contains both the invasive Asian clam and invasive zebra mussel.

Zooplankton have the ability to regulate phytoplankton populations through direct ingestion and cycling of nutrients (Carpenter et al. 1987). Several qualitative data sets on zooplankton populations in Chautauqua Lake have been located. Two early studies (1937 and 1975) showed numbers and taxa of zooplankton (Bloomfield 1978). Both studies showed that the major groups of zooplankton were present; however, data are insufficient to make conclusions about the role of zooplankton in the food web of Chautauqua Lake.

Few data exist on the macroinvertebrates (aquatic insects) of Chautauqua Lake. Early reports (Erlandson unpublished cited in Bloomfield 1978) state that there are lower densities of macroinvertebrates in the southern basin than the northern basin (1972-74). The MMS suggests that herbivorous insects that consume some plants such as Eurasian watermilfoil are more abundant in macrophyte beds along undisturbed shorelines due to the availability of shore vegetation for habitat during winter months. This results in a more diverse macrophyte assemblage in the Lake in these sites (Ecologic 2017). Racine-Johnson Aquatic Ecologists (2008) identify a moth (*Acentria ephemerella*), a weevil (*Euhrychiopsis lecontei*), and a native caddis fly (*Nectopsyche albida*) as species found in Chautauqua Lake that feed on Eurasian watermilfoil.

Recent studies of the mussel population (Racine-Johnson 2016) provided a list of mussels (except zebra mussels) found during their survey. These species are listed in Table 3-5. Locations of specific collections can be found in Figures 3-5 through 3-8. Filtering of the water column by the population of zebra mussels has resulted in clearer conditions in the Lake which, in turn, has resulted in colonization of macrophytes to deeper water depths (EcoLogic 2017). The invasive mussels have also led to reduced populations of native mussels.

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Author: User1 Date: 3/14/2018 3:32:47 PM
What will be in impact of herbicides to them if ingested within 24-hours?

Author: User1 Date: 3/14/2018 3:32:50 PM
what's the effect of 2,4-d on this? how is it made worse with mixing two herbicides?

Rare, Threatened, and Endangered Species

The NYSDEC's *Nature Explorer* indicated that there *may be* locations of rare plants and/or animals located in or around the Lake. In addition, the New York State Natural Heritage Program was consulted. The species identified in the *Nature Explorer* are:

Table 3-6: Potential Rare Plants/Animals

Binomial Name	Common Nomenclature	Last Year Documented	Notes
Gavia immer	Common Loon	2005	Species of Special Concern
Littorella uniflora	American Shore-Grass	1937	
Monarda clinopodia	Basil-Balm	1963	
Notropis heterodon	Blackchin Shiner	1937	Endangered
Potamogeton hillii	Hill's Pondweed	2017	Threatened
Ptychobranchus fasciolaris	Kidneyshell Mussel	2008	Endangered
Stuckenia filiformis	Slender Pondweed	1936	Endangered

The common loon (*Gavia immer*) was last documented in Chautauqua Lake in 2005. It is listed as a state species of special concern with a state conservation rank of S4 and a global rank of G5. This species may still be present on Chautauqua Lake.

The Kidneyshell mussel (P*tychobranchus fasciolaris*) was not found by Racine-Johnson in 2016 but was confirmed in Chautauqua Lake in 2008. This species has a state conservation rank of S2 and a global rank of G4G5.

In addition to the species listed in NYSDEC's *Nature Explorer*, to date, other threatened or endangered species or species of special concern have been identified. The pied billed grebe (*Podilymbus podiceps*) is a threatened species in New York State and was located at several sites in 2002 and 2003 (Ecologic 2017). The spiny soft-shell turtle (*A. spinifera*), which is listed on NYSDEC's list of species of a special concern, has been observed in the outlet of Chautauqua Lake and several nesting locations have been identified in the Lake (B. Nystrom personal communication 2014 as cited in EcoLogic 2017).

Potamogeton hillii (*Hill's pondweed*) is listed as threatened in New York State. It was first noted in 1886 in New York. The plant has long, narrow leaves and prefers alkaline waters. The plant is found from late Spring (mid-June) through early Fall, and is best identified when fruiting, since it is readily confused with similar species such as Leafy Pondweed. Hill's Pondweed populations can fluctuate widely, and at times have been known to disappear entirely. (NY Natural Heritage Program). It has been found in a number of locations in Chautauqua Lake in 2004, 2007, 2012 (one occurrence) and Spring 2017 (Ecologic 2017, Racine-Johnson 2017). It was not found though in the Fall 2017 Racine-Johnson survey.

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Author: User1 Date: 2/19/2018 1:25:14 PM -05'00'
these exist in Bemus Bay. what was the effect of the treatment in 2017?

The paper pondshell mussel (*Utterbackia imbecillis)* was found in 2016 by Racine-Johnson (2017). They also report that this species was last reported in the lake in 1895. It was found in the north end of the north basin.

NYSDEC's Natural Heritage Program was contacted, and provided a listing from their database. In addition to the species listed above, their database also noted that there are two Bald Eagle nests located within ½ mile of Chautauqua Lake. Bald eagles are listed as threatened in New York State

3.2.3 WETLANDS

Wetlands are land areas, such as swamps or marshes that are saturated by surface or groundwater sufficient to support and that under normal circumstances do support distinctive vegetation adapted for life in saturated soil conditions. 33 U.S.C. § 328.3(b). Wetlands are habitats for many species of plants and animals and are typically associated with hydric soils. New York State classifies areas as freshwater wetlands based solely on the presence of hydrophytic vegetation.

The NYSDEC Environmental Resource Mapper depicts a number of NYSDEC mapped freshwater wetlands adjacent to Chautauqua Lake (Figure 3-9 below). It is possible that additional, non-mapped areas that meet the regulatory definition of wetlands are present near the Lake.

Figure 3-9: Wetlands

Source: NYSDEC Environmental Mapper

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Author: User1 Date: 3/14/2018 2:57:24 PM
Should also list/show any ACOE regulated wetlands

Author: User1 Date: 3/14/2018 3:33:06 PM
it is more than "possible," and what happens when the herbicides drift into them?

This page contains no comments

The following table lists DEC regulated wetlands attached to the Lake:

Table 3-7: NYSDEC Mapped Wetlands Attached to the Lake

Classification	General Location	Municipality
LW-10 (1)	Jones Avenue and Gifford Avenue	Village of Celeron
LW-11 (1)	State Route 430/Fluvanna Avenue	Village of Celeron
LW-1 (1)	Loomis Bay Road	Town of North Harmony (Ashville)
CH-1 (1)	Lakeland Road	Town of North Harmony (Stow)

In addition, there are a number of wetlands adjacent to the Lake or within 500 feet of the Lake:

Table 3-8: NYSDEC Mapped Wetlands Adjacent to or within 500 Feet of the Lake

Classification	General Location	Municipality
LW-6 (2)	Across Pleasant Avenue (in Park)	Town of Ellery
LW-2 (2)	Across State Route 395	Town of Ellery (Maple Springs)
CH-2 (2)	Prendergast Creek Inlet	Town of Chautauqua
HF-4 (2)	Across Sea Lion Drive, Sandlewood Lane	Village of Mayville

.

3.3 AGRICULTURAL RESOURCES

Chautauqua County is strongly agricultural, and farms account for over one-third (~35%) of all the land in the County. According to the Cornell University Cooperative Extension (CUCE), Chautauqua County has the highest number of farms in New York State and the sale of crops and livestock in Chautauqua County accounts for approximately $110,705,000 in revenue. CUCE also found that for "every dollar of income created by the agricultural industry, $2.29 is generated in the community" and that there were "887 principal operators of farms" in Chautauqua County. (CUCE, *Chautauqua County Farm Facts*).

Within the Chautauqua Lake watershed, however, agriculture makes up a smaller proportion of the lands, and only about 15% of the acreage in the watershed is in agricultural use, according to the CLWMP. Chautauqua County Agricultural District #8 encompasses lands in the Towns of Chautauqua and Ellery surrounding Chautauqua Lake to the east, the north, and the west. There are lands in the Town of North Harmony that fall within Agricultural District #6, and lands in Ellicott in Agricultural District #11. These lands, however, are not in close proximity to the Lake's shore. Figure 3-10 depicts Agricultural Districts in Chautauqua County.

A closer examination of the individual parcels surrounding the Lake utilizing Planning Chautauqua's geographic information system (GIS) portal revealed that there are no parcels classified by tax data as agricultural that immediately abut the Lake. The vast majority of the properties immediately abutting the Lake are classified by the tax assessor as uses other than agricultural (e.g. single family residential, rural, estate, seasonal, mobile home, vacant land; community/public service, wild, forested, recreation & entertainment, etc.). However, while agricultural parcels tend to be located inland of the major roadways circling the Lake, aerial photography shows that there are clearly some parcels in agricultural use less than a mile from the Lake.

Agriculture is a major economic pillar in Chautauqua County and changing aspects of the farming practices within this important regional economic sector to reduce phosphorus loading, as recommended in the CLWMP, are expected to take decades of cooperation, education, and coordination with area farmers to fully implement.

3.3.1 FARMLAND

Of the approximately 160 square miles that make up the Chautauqua Lake Watershed, roughly 14.9% is classified by Chautauqua County as having an agriculture land use, which equates to 23.8 square miles or 640 acres of agricultural lands located within the Chautauqua Lake Watershed. (CLMC 2010). Prior to their conversion for the purposes of cultivation, much—if not all—of the lands within the Lake's watershed would have been forested/woodlands. Agriculture peaked from about 1880 to 1920. (EcoLogic, 2017). Today, the dairy industry dominates the agricultural market in Chautauqua County and accounts for well over half of all agricultural related production county-wide. Vineyards also play an important role in agricultural economy in as much as Chautauqua County is one of the top five grape producers in New York State. The vineyards allow for agri-tourism, bringing tourists to the vineyards that also serve as wineries for tours, wine-tastings, and special events, such as weddings.

3.3.2 AGRICULTURAL PRACTICES AND IRRIGATION FROM THE LAKE

The Chautauqua Lake watershed extends well beyond the parcels directly abutting the Lake. The main goal of the CLWMP is to improve the water quality of the Lake "by reducing the inflow of nutrients and sedimentation that causes the problematic growth of aquatic vegetation, the outbreak of algal blooms, and the loss of navigable water routes." The CLWMP's sixth overall goal is including specific language about implementing "sound land use practices and policies for private landowners, farmers, and municipalities that benefit the watershed." (EcoLogic, 2017).

The MMS fully acknowledges that the "ongoing mechanical harvesting program, biological control methods (e.g. moths) and the U.S. Army Corps of Engineers Aquatic Weed Study are positive efforts that are needed" to continue supporting the goal of making the Lake a desirable destination for those residents and tourists that are seeking water based recreation. However, none of these efforts "address the underlying problem of nutrient contamination from lands surrounding the Lake, which is the primary driver" of the growth of submerged aquatic vegetation in the Lake. (EcoLogic, 2017).

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Author: User1 Date: 2/19/2018 2:18:35 PM -05'00'

near-shore residential yards, treated as golf course greens, contribute a substantial amount of fertilizer and herbicides. Bemus Point being one of the greatest offenders. CLP should focus on eliminating community yard fertilizers.

Author: User1 Date: 3/14/2018 3:33:12 PM

how does using herbicides in the lake improve this time-line? CLP should help in this effort to make sure it happens faster.

One of the biggest drivers of nutrient contamination comes from modern farm practices. Phosphorus within agricultural fertilizers, including manure, washes into the Lake and serves as an accelerator to nuisance plant species in the Lake. Where eutrophication may naturally occur over centuries, phosphorus accelerates the process dramatically. A process that may have naturally occurred over several centuries, is now occurring in a much reduced time frame—several decades, as reflected in the documented worsening conditions on the Lake.

The MMS notes that reducing or preventing the nutrients from entering the Lake "may also reduce the dominance of Eurasian watermilfoil, which is an exotic, nuisance plant species." (EcoLogic, 2017). The Lake's health is put into jeopardy as a result of these nonpoint source pollutants, which, in part, led to the Lake being classified as an "Impaired Waterbody" by the NYSDEC in 2004. The NYSDEC found that both the north and south basins were impaired for water supply, public bathing, and recreation. As a basis for their determination/classification, the NYSDEC noted that "major" pollutants/sources included phosphorus, harmful algal blooms, algal/plant growth, and aquatic invasive species. (EcoLogic, 2017). Therefore, in 2012, a Phosphorus TMDL in the Lake was completed by the NYSDEC to address issues related to nutrient loading.

Another issue relating to Agriculture is whether or not property owners abutting or near the Lake are drawing water from the Lake for irrigation purposes. This question is difficult to ascertain with any certainty. The NYSDEC notes that there are no known permitted agricultural users drawing water from Chautauqua Lake for irrigation purposes. However, the annual reporting requirements for agricultural users who use surface or groundwater for agricultural purposes apply only to enterprises which meet the threshold for requiring an agricultural withdrawal permit. Users who withdraw less than 100,000 GPD are not subject to this requirement. It does not appear that farmers are pulling water directly from the lake but there may be small farming operations downstream of the Lake using water from downstream waterbodies for irrigation purposes.

3.3.3 PRESENT USE OF HERBICIDES IN THE WATERSHED

With the exceptions of small scale herbicide treatments in 2002 and 2017, permitted use of herbicides has not occurred in Chautauqua Lake since 1992. Presently, invasive macrophytes are as pervasive and widespread as they have ever been. The Chautauqua Lake watershed encompasses approximately 160 square miles and within that area there are 23.8 square miles that are classified by Chautauqua County as agricultural. At this time, an indeterminate number of the farms within this area are utilizing herbicides to help thwart invasive weeds from overrunning their fields to maximize the production of healthy crops. For those farms operating within the watershed which do use herbicides (and/or other pesticides), herbicides must be applied in full accordance with label restrictions and any applicable local, state, and federal laws (it can be supposed that some of these materials are getting into the Lake via runoff from the farms). With regards to nutrient loading, there is no legal requirement for farms to reduce their use of phosphorous laden fertilizers or comply with the voluntary reductions set forth in the 2010 CLWMP and the 2012 TMDL.

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Author: User1 Date: 2/19/2018 1:32:03 PM -05'00'
what is being done about this? why aren't CLP's efforts directed at fixing the problem?

Author: User1 Date: 3/14/2018 2:57:33 PM
Unless they have data documenting this time frame they should delete it.

In addition to fertilizer run-off from farms, residents previously used (and some may continue to use) fertilizers on areas of their lawns abutting the Lake. In some cases, these fertilizers run off and enter directly into the Lake and contribute to the Lake's nutrient loads. Individual property owners along the Lake shore may also be applying, in violation of state law, aquatic herbicides/pesticides directly into areas of the Lake abutting their shoreline in an effort to combat invasive macrophytes. Both 2,4 D and triclopyr are common components of household herbicide products for land application and are likely used in the watershed.

3.4 LAND USE AND ZONING

Chautauqua Lake is owned by the people of New York State and managed by the New York State Office of General Services. The NYSDEC has approval authority for activities on or near the Lake pursuant to Article 15 of the New York State Environmental Conservation Law and Section 401 of the Federal Water Pollution Control Act. The municipalities that surround the Lake have no zoning authority over the approximately 13,000-acres that make up the waterbody itself. However, there are nine municipalities with property within their respective jurisdictions that surround the Lake and have land use control and zoning authority over the lands that encompass the Lake's shoreline.

3.4.1 REGIONAL AND TOWN LAND USE PATTERNS

The municipalities along the Chautauqua Lake shoreline are the Towns of Busti, Chautauqua, Ellery, Ellicott, and North Harmony and the Villages of Bemus Point, Celoron, Lakewood, and Mayville. The Lake drains into the Chadakoin River, which is located in the City of Jamestown.

The last county-wide comprehensive plan for the County, the *Chautauqua 20/20 Comprehensive Plan*, was completed in 2011. In accordance with Section 272-a of New York State Town Law and Section 7-722 of Village Law, Towns and Villages have the power to undertake comprehensive planning and to adopt a plan to help promote the health, safety, and general welfare of the municipality, and to give due consideration to the needs of the people of the region of which the Town or Village is a part.

Section 284 of New York Town Law and Section 7-741 of Village Law allows communities to perform inter-municipal cooperation in comprehensive planning, allowing for Villages and Towns to complete comprehensive planning processes jointly. The Town of Ellicott and the Villages of Celeron and Falconer completed their 2010 plan together.

A comprehensive plan serves as the basis for a given municipality's zoning law and informs that municipality's future land use map/vision map. The following table depicts which of the municipalities located on Chautauqua Lake have comprehensive plans:

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Author: User1 Subject: Highlight Date: 3/14/2018 2:39:06 PM

This is an important point and is lost in the farmland and herbicides section. Residential fertilizer use, especially along Bemus Bay, is widespread. What is being done about this?

Author: User1 Date: 2/19/2018 2:01:02 PM -05'00'

behavior in aquatic environments vary. 2,4-d not in contact with air and microbes in soil can remain for the duration of its half-life- only 1/2 gone by 40 to 130 day.

Author: User1 Date: 2/19/2018 1:29:07 PM -05'00'

Jane: States the people of NYS own the lake. Therefore, the Town of Ellery does not have the authority to act as lead agency for a lake document.

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Table 3-9: Comprehensive Plans

Municipality	Plan	Status
Town of Busti	Town of Busti Comprehensive Plan	2013
Town of Chautauqua	Town of Chautauqua Plan, Including the Village of Mayville	On Hold, 2017
Town of Ellery	Unknown	NA
Town of Ellicott	Town of Ellicott Comprehensive Plan, Including the Villages of Celeron & Falconer	2010
Town of North Harmony	Town of North Harmony Comprehensive Plan	2010
Village of Bemus Point	Strategic Action Plan	2012
Village of Celoron	Included in the Town of Ellicott Comprehensive Plan	2010
Village of Lakewood	Village of Lakewood Comprehensive Plan	2016
Village of Mayville	Included in the Town of Chautauqua Plan	On Hold, 2017

3.4.2 EXISTING LAND USE

In 2017, the MMS noted that Chautauqua Lake watershed "is home to approximately 19,000 year-round residents, with about two-thirds living close the Lakeshore." (EcoLogic 2017). The U.S. Census Bureau estimates that the number of residents living in Chautauqua County has declined from 134,905 in 2010 to 129,504 in 2016, a loss of 5,401people. This is consistent with long-term trends in Chautauqua County. The County's population peaked in 1970 at 147,305 and has lost population in every U.S. Decennial Census since that time.

There are a mix of land uses surrounding the Lake. Residential land uses dominate the shoreline. The majority of residential development consists of single-family homes, including both permanent and seasonal structures. Residential types vary, but includes single-family homes, cottages, townhouses, condominiums, seasonal residences and cottage communities. The Chautauqua Institution, located on the west shore of the Lake in the Town of Chautauqua is a unique gated residential community that operates internationally known cultural-educational programming during the summer season. There are an estimated 400 year-round residents at the Institution, but the summer population is as many as 10,000.

Land uses within the Villages are a mix of residential, business, civic and recreational. The Village of Mayville is the County seat. Along the Lakeshore in Mayville, there are a number of commercial businesses, including several restaurants, lodging, and retail stores. Lakeside Park is a 14.3 acre park with a swimming beach, a boat launch, and various recreational facilities. A rails-to-trails park that connects from park north to the village line. Waterfront related uses in Mayville include a dock for the Chautauqua

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Belle, a National Register-listed steamboat that operates on the Lake, and the Chautauqua Marina. The other Villages along the Lake also include a mix of residential and business uses, with most businesses catering to the tourism economy, along with public uses, such as schools, government buildings, and other civic uses. The Villages of Lakewood and Celoron at the southern end of the Lake are influenced by their proximity to the City of Jamestown, and have a greater mix of uses, including a large retail concentration near the Chautauqua Mall in Lakewood, and a cluster of marine-related uses in Celoron. Bemus Point is a small village with a tourism focus. It has a number of restaurants, a hotel, museums, and businesses catering year round residents and to visitors to the region.

Land uses outside the villages tend to be primarily residential, with a scattering of businesses, such as marinas, restaurants, gift shops and lodging. There are many recreational uses, such as golf courses and summer camps located around the Lake, including youth camps, religious retreats and campgrounds. Marine uses include several marinas, boat liveries, and boat launches. The NYSDEC owns a fish hatchery and a boat launch at Snug Harbor and wetlands conservation areas at Stow and Cheney's. New York State Parks, Recreation, and Historic Preservation owns Midway Park, a seasonal amusement park located on the east shore of the Lake, and Long Point State Park. Both state parks are located in the Town of Ellery. There are also several municipal parks along the Lake and areas of vacant lands, including a large wetland complex where the Lake meets the Chadakoin River. As discussed above, there are some agricultural operations located upland within the Chautauqua Lake watershed, but no farms located directly on the Lake. There are few industrial-like uses along the Lake, primarily in the villages.

3.4.3 ZONING

Each of the municipalities on the shoreline of Chautauqua Lake has zoning. Zoning districts located on Chautauqua Lake are generally targeted at residential, with some areas of commercial. The zoning districts in each of the municipalities along the shoreline are listed in table 3-10:

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Table 3-10: Zoning

Municipality	Zoning Districts on Chautauqua Lake Shoreline
Town of Busti	LR - Lakeshore Residential; and LC - Lakeshore Commercial
Town of Chautauqua	RR - Residential Recreational; RL - Residential Lake; R - Residential; B - Business; and C1 - Chautauqua Institution
Town of Ellery	R1 - Single Family Residential; R2 - Two Family Residential; R3 - Multiple Residential; R1WB - Residential, Warner Bay; and B3 - Lakeside Business
Town of Ellicott	R - Residential; and M – Mercantile
Town of North Harmony	R4 - Seasonal Residential; R1 - Single Family Residential; R3 - Multifamily Residential; and R5 - Hotel Multiple
Village of Bemus Point	R1 - Low Density Single Family; R2 - Medium Density Single Family/Duplex; R3 - Medium Density Town House/Apartments; B1 - Retail Business; and P - Parks/Recreation/Conservation
Village of Celoron	R1 - Single Family Residential; C2 - Shoreline Commercial; C3 - Central Business/Shoreline Commercial; and CR - Cultural Recreation
Village of Lakewood	R1 - Single Family Residential; R2 - Multiple Family; and B2 - Highway Business
Village of Mayville	R1 - Single Family Residence; R3 - Lakeside Residential; B2 - Lakeside Business; and P – Parks

3.5 OPEN SPACE AND RECREATION

Chautauqua Lake is a significant recreation tourist destination. The Chautauqua Institution has a national draw, and other area recreational resources, attracting visitors from throughout the northeast, eastern Midwest, and Southern Ontario. The Chautauqua region is a year-round destination, although the Lake is primarily utilized during the summer months. During the summer season, the Lake plays host to all types of watercraft including: motorboats, sailboats, jet-skis, kayaks, canoes, and paddleboards. Residents and visitors alike use the Lake for swimming, fishing, hunting, wading, and simply enjoying its aesthetics and natural setting.

Tourism, tied to recreation on and use of the Lake, has a positive economic impact on each of the municipalities surrounding the Lake and on Chautauqua County's economy as a whole, serving as one the County's fastest growing economic sectors, bringing in millions of dollars on an annual basis. As noted in the MMS and the LWRP, tourism is very important to Chautauqua County's economy, and Chautauqua Lake is a critical tourism asset for the region. New York State Senator Catherine Young noted "Our local economy and tax base depends heavily on having a clean and healthy lake. Chautauqua Lake is an economic engine that brings in millions of tourism dollars, grows our small businesses, generates tax revenues, and enhances our quality of life." (EcoLogic 2017). Visitors to Chautauqua County spent an estimated $171 million in 2011 (id.) A 2015 report for the Convention and Visitors' Bureau determined that daily visitor spending is an average of approximately $470 per family/party per day. (CCVB Marketing and Conversion Report, Huang, 2015). A white paper on Tourism Planning by the County's Visitor's bureau identifies direct spending by visitors to the County at $188.75 million per year.

In addition to tourists, second home owners and related spending is also very important to the local economy. The MMS notes that Lakeshore properties generate more than one-quarter of local property taxes, despite making up only 1% of the County's residential parcels (EcoLogic 2017). In addition, second home owner annual spending impact is estimated at $41.5 million (2007 tourism data, Tourism Economics Reports for the New York State Division of Tourism, as quoted in "Tourism Planning & Development Directions for Chautauqua County, Nov. 2008).

The proliferation of invasive weeds and the near shore and shoreline accumulation of rotting/stinking weed fragments threatens tourism and the benefits it brings to the Lake and the surrounding communities.

3.5.1 PARKS AND RECREATION

Chautauqua Lake is a publicly-accessible, publicly-owned waterbody with numerous parks, boat launches, swimming areas, and marinas located along its shores that provide the public with access to the Lake and numerous sources of recreation.

Public parks located on the Lake include Midway State Park, Long Point State Park, and Lucille Ball Memorial Park. A number of small municipal parks also surround the Lake. The New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) oversees Midway State Park and Long Point State Park. Thousands of users of both Midway State Park and Long Point State Park are drawn to them by their prime Lakefront location and easy access to the water. People use the parks for swimming (Long Point State Park features a beach that is staffed with lifeguards), boating, canoeing, kayaking, and fishing. The two NYSOPRHP parks are vital connections

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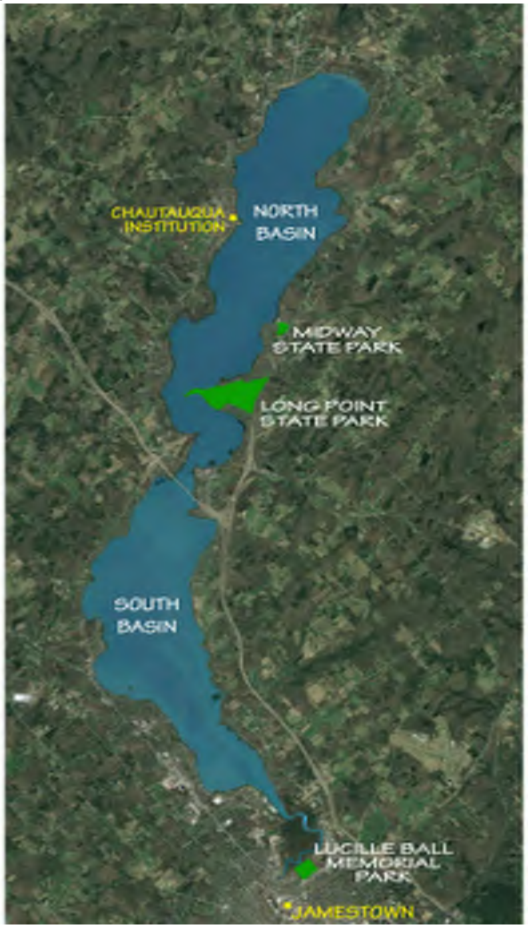
between visitors and the Lake, providing some of the only publicly-accessible recreational opportunities on the Lake.

Figure 3-11: Parks



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3.5.2 OTHER OPEN SPACE RESOURCES AND PUBLIC USES

The Lake is a year-round destination, although the primary tourist season is during the summer months, with June, July, August, and September serving as the primary months in which visitors go to the Lake for recreation.

Public access to the Lake is located at various locations around the Lake, including Bemus Point, Prendergast Point, Stow, Long Point State Park, and Midway State Park. Many privately-owned or quasi-public facilities, such as the Chautauqua Institution, Allegheny Highlands Council Boy Scout Camp, the YMCA Camp, and marinas along the shore offer the public access to the Lake. Access points to the Lake are set forth in the following table from the 2011 LWRP.

Table 3-11: Chautauqua Lake Access Points

Location	Municipality	Type(s) of Access	Ownership
Creative Marine	Mayville	Boat Launch, Docking	Private
Lakeside Park	Mayville	Boat Launch, Swim, Scenic, Fishing	Village
Chautauqua Marina	Mayville	Boat Launching, Docking	Private
Elmwood Road	Chautauqua	Small Boat Launch	Town
Chautauqua Institution	Chautauqua	Scenic, Swimming	Private
Knights Road	Chautauqua	Small Boat Launch	Town
Meadows Rd R.O.W.	Chautauqua	Small Boat Launch	Town
Prendergast Point	Chautauqua	Boat Ramp, Scenic, Boating, Shoreline Fishing	NYS DEC
Snug Harbor Marina	Chautauqua	Boat Launch, Docking	Private
Long Point State Park	Ellery	Marina, Boat Ramp, Swim, Scenic, Shoreline Fishing	NYS OPRHP
Tom's Point	North Harmony	Scenic, Shoreline Fishing	NYS DEC
Bemus Point Park	Bemus Point	Docks, Scenic, Swimming	Village
Ball Creek Park	North Harmony	Scenic, Fishing	Watershed Conservancy
DEC Launch Site	Bemus Point	Boat Ramp, Shoreline Fishing	NYS DEC
Shore Acres	Bemus Point	Boat Ramp, Docking	Private
Cheney's Point	N. Harmony	Public Small Boat Launch, Shoreline Fishing	Town
Cheney Farm	Ellery	Shoreline Fishing	NYS DEC
Ashville Marina	N. Harmony	Boat Launch, Docking	Private
Vukote Park	Busti	Scenic	Town
Smith Boys Marina	Busti	Boat Ramp, Docking, Shoreline Fishing	Private

Location	Municipality	Type(s) of Access	Ownership
Lowe Park	Lakewood	Scenic	Village
Hartley Park	Lakewood	Swim, Scenic	Village
Lakewood Community Park	Lakewood	Boat Ramp, Scenic	Village
Burtis Bay Park	West Ellicott	Scenic, Shoreline Fishing	Town
Lucille Ball Park	Celoron	Boat Ramp, Scenic, Handicap Access Dock	Village
Holiday Harbor	Celoron	Boat Ramp, Docking	Private
Midway State Park	Ellery	Docking, Amusement Park	NYS OPRHP

Public beaches are located at the Village of Mayville Park, Chautauqua Institution, Lakewood, Celoron, and Long Point State Park. According to the 1990 SEIS, "[d]ue to the extensive public and private development of Chautauqua Lake, nearly all of the shoreline must be considered to be possible, swimming, boating, and fishing areas." (CCPDC 1990) (Appendix D). In recent years, due to the proliferation of cyanobacteria, public beaches have been closed and the public has been advised against swimming in portions of the Lake.

3.6 HISTORIC AND ARCHAEOLOGICAL RESOURCES

Chautauqua Lake is surrounded by many historic and cultural resources. Many of the resources are officially recognized through local historic designation or through listing on the National Register of Historic Places. Other local historic and cultural resources, while undesignated, still play an important role in the area's built environment, helping a strong "sense of place," which contributes to making the region as a desirable and marketable regional and international tourist destination. In 2007, Chautauqua County, including Chautauqua Lake, was branded as "The World's Learning Center." This designation recognized the area for having "an unusually high number of natural resource assets and unique attractions." One asset, the Chautauqua Institution, has served "more than 135 years as a learning vacation destination." (Planning Chautauqua 2011). The Chautauqua 20/20 Comprehensive Plan recognized that the health of the Lake was critical for successful brand implementation. It was noted that The World's Learning Center brand relied "on and supports the incredible natural environment and recreational offerings that our area as long been famous for." (Planning Chautauqua 2011).

The historic resources located on the Lakeshore include several listings on the National Register, shown in the table, below. Each of these National Register listings can be subdivided into two general categories: historic resources and archaeological resources, although it is important to note these categories are not mutually exclusive, as some listings might have extant historic resources and also have known, buried archaeological resources.

There are currently five listings on the National Register of Historic Places located on the shores of Chautauqua Lake and one listing on the New York State Register of Historic

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Places. Each of these listings were found to meet one or more the National Register criterion, which are described in general terms below:

Criteria A: Resources associated with events that have made a significant contribution to the patterns of our history (Broad Patterns);

Criteria B: Resources associated with the lives of significant persons in our past (Important People);

Criteria C: Resources that embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose individual components may lack distinction (Distinctive Type/Historic District); and

Criteria D: Resources that have yielded or may be likely to yield, information that is important in history or prehistory (Archaeological).

Table 3-12: Listings on the National Register of Historic Places

Name	Municipality	Criteria/Criterion	Year Listed
Chautauqua Institution Historic District	Chautauqua	A (Broad Patterns); C (Distinctive Type/Historic District)	1973
Lewis Miller Cottage (also in the Chautauqua Institution Historic District)	Chautauqua	A (Broad Patterns); B (Important People); C (Distinctive Type/Historic District)	1966
Midway Park	Ellery	A (Broad Patterns); C (Distinctive Type/Historic District)	2009
Pennsylvania Railroad Station	Mayville	A (Broad Patterns); C (Distinctive Type/Historic District)	1993
Point Chautauqua Historic District	Mayville	A (Broad Patterns); C (Distinctive Type/Historic District)	1996

The Chautauqua Institution Historic District and the Lewis Miller Cottage are also two of 139 National Historic Landmarks (NHLs) located in upstate New York State. The NHL designation indicates a higher level of significance, as there are only 2,500 National Historic Landmarks in the United States, compared to approximately 90,000 National Register listings. The Chautauqua Institution Historic District was designated a National Historic Landmark in 1989. The Lewis Miller Cottage was designated a National Historic Landmark in 1966.

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3.6.1 HISTORIC RESOURCES

The 2011 LWRP identified several other properties within the waterfront area that are of local importance. These properties are not on the National Register, but help contribute to the historic character of the communities surrounding Chautauqua Lake.

Table 3-13: Additional Historic Resources

Resource	Address	Community
Holland Land Company Vault	Erie Street	Mayville
Minturn Mansion (razed, but foundation remains)	Long Point State Park	Ellery
Stow Ferry	Stow Ferry Road	North Harmony
Bemus Point Casino	Lakeside Drive	Bemus Point
Hotel Lenhart	Lakeside Drive	Bemus Point
Sorg Mansion	W. Terrace Street	Lakewood
Sheldon Hall	Griffith's Point	Ellery
Steamboat Docking	Italian Fisherman Site	Bemus Point
Ice Houses	Ashville Bay	North Harmony
Tom's Point – Indian Mounds	Stow	North Harmony
First State Fish Hatchery	Greenhurst	Ellery
Old Trolley Barns	Route 394	Mayville
Old Trolley Station – Lighthouse Grocery	Route 394	Mayville
Oddfellows Hall (Skillmans)	Main Street	Bemus Point
County Clerk Office (Grapevine Restaurant)	Erie Street	Mayville
Bush House and Boathouse	W. Lake Street	Lakewood
Celoron Amusement Park site	Boulevard Street	Celoron
Packard Cottages	W. Terrace Avenue	Lakewood
Watson Estate	Stow	North Harmony
Neits Crest – Ruth Jackson	Route 394	North Harmony
Busti Victorian Center		Busti
Grange Hall	Mill Street	Busti
Packard Estate	Terrace Avenue	Lakewood

Source: Chautauqua Lake Local Waterfront Revitalization Program

3.6.2 ARCHAEOLOGICAL RESOURCES

There is one identified archaeological resource near Bemus Point in the Village of Bemus Point that is listed on the New York State Register of Historic Places. It is the Bemus Point Site, which was listed in 1980, for its archeological value. The exact locations of archeological sites are not made public to protect them from looting.

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3.7 WATER SUPPLY AND INFRASTRUCTURE

3.7.1 PUBLIC WATER SUPPLY

According to the DEC, there are currently a number of facilities on or within two miles of the Lake that utilize more than 100,000 GPD of water and are therefore required to obtain a facility water withdrawal permit. Not all of these users draw surface water from the Lake: some draw from groundwater only, and some utilize a combination of surface water and groundwater. The facilities located within two miles of the Lake that are permitted to withdraw more than 100,000 GPD are shown in Table 3-14, below and on Figure 3-12 (indicated by blue squares).

Table 3-14: Water Withdrawal Permits

Name	Location	Water Source	
City of Jamestown	Jamestown	Groundwater	Public Water Supply
Jamestown BPU-Power	Jamestown	Surface Water	Power – fossil fuel (no longer in operation?)
Moon Brook County Club	Ellicott	Surface Water and Groundwater	Recreational – golf course
Long Point State Park	Ellery	Groundwater	Institutional
Mayville Village	Mayville	Groundwater	Public Water Supply
Chautauqua Golf Club	Chautauqua	Surface Water	Recreational – golf course
Chautauqua Utility District	Chautauqua	Surface Water	Public Water Supply
DEC Chautauqua Fish Hatchery at Prendergast Point	Chautauqua	Surface Water and Groundwater	"Other"

The only public facility with a DEC permit that is using surface water for a drinking water source is the Chautauqua Utility District, which provides water to the Chautauqua Institution. The Chautauqua Heights Water District is a private water district that supplies drinking water to its customers. Other permitted users who draw water from Chautauqua Lake are using it for other purposes, such as irrigation at golf courses.

It should be noted that other entities are drawing surface water from the Lake at amounts that fall below the threshold for requiring a permit. The above map does not include all of the users pulling water from the Lake. Systems serving private condominiums developments on the Lake (i.e., Point Chautauqua) also rely on Lake water, as do a small number of private residences. The 2011 LWRP estimated that 25 Lakefront property owners draw surface water from the Lake for drinking water supply. The 2011 LWRP does not cite any sources related to that estimate. The 2017 MMS stated that 19 private property owners, as identified in 1989, may have hoses and/or pipes that draw water from the Lake to their private homes. The vast majority of residents surrounding the Lake depend upon groundwater, either from public supply or private wells, for drinking water supplies. Municipal systems dependent on well water include the Village of Mayville and the City of Jamestown systems. Jamestown's system also provides water service to the Villages of Celoron and Lakewood, and portions of the Towns of Ellicott, Busti and North Harmony. The remainder of the area is serviced via private wells.

The number of private residences using surface water as a drinking water supply is unknown and likely dwindling. The Sanitary Code of the Chautauqua County Health District notes "for all new construction of dwellings or other structures requiring potable water where a municipal public water system is available and accessible, the source of potable water serving said dwelling or structure, shall be from the municipal public water system." (Sanitary Code of Chautauqua County, Article V and Article III). In addition, in instances in which a single-family detached home with a private intake directly from Lake is sold or transferred, the owner has the responsibility of providing a "water supply which conforms to microbiological standards for potable water and should implement any recommendations prescribed by the Public Health Director to bring the water system into compliance with the standards contained in Part 5 of the New York State Sanitary Code or 10 NYCRR Part 75," (*Id*.) although there are some exemptions (e.g. tax foreclosures, transfers among family members). Despite these legal requirements, the Chautauqua County Department of Health and Human Services does not maintain records of homes with private water intakes into the Lake.

Figure 3-12: Map of Water Withdrawal sites

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Author: User1 Subject: Highlight Date: 3/14/2018 2:41:05 PM
if it's "unknown," how can you say it is "likely dwindling?"

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Dozens of individual registered wells are located within close proximity of the Lake. According to the NYSDEC Well Mapping data, within approximately 2,000 feet of the Lake, there are approximately nine wells in the Town of Ellicott, seventy-two wells in the Town of Ellery, thirty-seven wells in the Town of Chautauqua, and twenty-one wells in the Town of North Harmony. There are numerous additional wells that are not registered with the NYSDEC.

3.7.2 WASTEWATER DISPOSAL

Chautauqua Lake is serviced by a number of municipal sewer districts, although, there are large portions of the Lakeshore that still use private septic systems. Wastewater discharge is a concern, because, as the 2011 LWRP notes, “too much wastewater discharge into a waterbody can cause high nutrient flux, leading to algal blooms and fish kills.” (Town of Busti, et al, 2011).

The following map, from the 2011 LWRP depicts the Lake and which portions of it are serviced by municipal sewer districts:

The southern basin of the Lake is serviced by the South and Center Chautauqua Lake Sewer District, which, according to the 2011 LWRP, discharges its effluent into the Chadakoin River. Communities served by this district are the Villages of Bemus Point, Lakewood and Celoron, and portions of the Towns of Busti, Ellery, Ellicott and North Harmony. The South and Center Chautauqua Lake Sewer District’s treatment facility has a maximum treatable capacity of up to 4.1 million gallons per day, although as of 2011, it operated at approximately half of its maximum capacity. Most of the wastewater that is treated derives from residential users. (*Id*.).

The Lake’s northern basin is serviced by two treatment facilities: the Chautauqua Utility District and the North Chautauqua Lake Sewer District. According to the LWRP, the Chautauqua Utility District can handle up to .84 million gallons per day. The North Chautauqua Lake Sewer District has a maximum capacity of .75 million gallons per day. (*Id*.). Both of the sewer districts serving the Lake’s northern basin discharge effluent directly into the Lake.

It has been reported that the establishment of these sewage facilities, along with some greater enforcement of private sewage systems, have resulted in a reduction in the number of households discharging wastewater directly into the Lake. Several other developments around the Lake have installed facilities to address wastewater generated by their developments.

NYSDEC requires users who discharge more than 1,000 gallons per day into the Lake to acquire a State Pollution Discharge Elimination System (SPDES) permit. According to the NYSDEC Environmental Facilities Navigator on-line mapping system, the following entities have water discharge sites on Chautauqua Lake.

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Figure 3-13: Sewer Districts

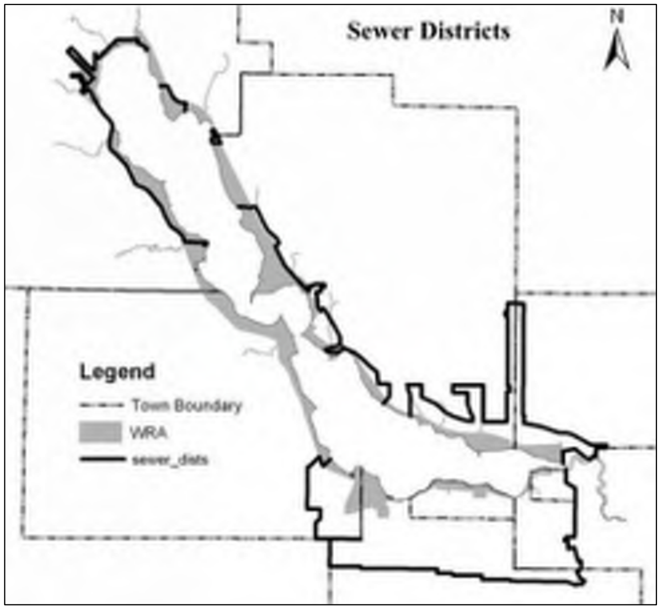

Table 3-15: Treated Sewage Discharge Sites

Name	Location	Municipality
Chautauqua Utility District (Chautauqua Institution)	South Lake Drive	Town of Chautauqua
North Chautauqua Lake Sewer District	Clark Street	Village of Mayville
Chautauqua Fish Hatchery	5875 Prendergast Road	Town of Chautauqua
Chautauqua Heights Sewer District	Route 430	Town of Chautauqua
Camp Onyahsa (YMCA Camp)	East Lake Road	Dewittville (Town of Chautauqua)
South and Center Chautauqua Lake Sewer District	Gifford Avenue	Village of Celoron

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The 2011 LWRP also identified additional facilities that were required to obtain a SPDES permit for the purposes of discharging 1000 gallons per day, or more, into the Lake, as follows (Town of Busti, et al 2011):

Table 3-16: Additional Water Discharge Sites

Name	Location	Municipality
Bayberry Landing	5301 East Lake Road	Town of Ellery
Mallard Cove	East Side Route 394	Town of Chautauqua
Brookwood	East Side Route 394	Town of Chautauqua
Crosswinds	Route 430	Town of Ellery
Lake Chautauqua Lutheran Camp	Route 17	Town of Ellery
Chedwel Club	Route 430	Town of Ellery

Source: Chautauqua County Department of Health, Division of Environmental Health, per LWRP

3.8 COMMUNITY PLANS

3.8.1 MUNICIPAL PLANS

A comprehensive plan serves as the basis for a given municipality's zoning law and informs a given municipality's future land use map/vision map. Most of the municipalities surrounding Chautauqua Lake have completed some comprehensive planning, as described in Section 3.4.1 of this DSEIS.

3.8.2 COUNTY AND REGIONAL PLANS

Chautauqua Lake Watershed Management Plan (CLWMP) - 2010

The CLWMP encompasses long-term management strategies for a broad range of issues affecting the Chautauqua Lake watershed. It takes "a holistic approach to watershed management by addressing the negative impacts caused by development, agricultural practices, and others activities within the watershed." Fully implementing the recommendations of the CLWMP will most likely take decades as they are focused on addressing problems within the watershed as a whole. In particular, the plan provides recommendations intended to address the sources of nutrient loading and sedimentation to the Lake. Perhaps the CLWMP's most important and relevant recommended action was the development plan to manage the problem of invasive species in Chautauqua Lake.

Chautauqua Lake Macrophyte Management Strategy (MMS) - 2017

The intent of the MMS was to "develop a holistic, science-based framework for managing macrophytes in Chautauqua Lake in an integrated manner that accommodates human needs and values, while preserving the natural needs and values." The MMS was completed in 2017 but relies on the data collected by Racine-Johnson Aquatic Ecologists in 2007 and by EcoLogic in 2012. The MMS was unique in that it was developed utilizing an Ecosystem-Based Management (EBM) approach. It was meant to be adaptable depending to continued changes in the Chautauqua Lake ecosystem, including changes in human needs and desires as they relate to the Lake and its environment.

The MMS divides the Lake into management zones, classifying each of them based upon their own unique ecological characteristics. By doing so, it helped to establish a customizable framework for managing submerged aquatic vegetation within each of the management zones, recognizing that was no "one size fits all" solution. It notes that the 13,000-acres that comprise the Lake are quite diverse in ecological scope and each zone could potentially require slightly different management techniques, dependent upon their own unique context. Some of the strategies outlined in the MMS are clearly long-term (i.e., reduce nutrient loading from the surrounding watershed/change agricultural practices within the watershed) and others were more focused on the immediate future (i.e., continue to utilize mechanical harvesting as a technique for managing problematic weed growths). The MMS identified the use of aquatic herbicides as an appropriate management technique within many of the Lake's management zones.

Chautauqua Lake Local Waterfront Revitalization Plan (LWRP)- 2011

The LWRP was adopted by the nine municipalities that surround Chautauqua Lake (the Towns of Busti, Chautauqua, Ellery, Ellicott, and North Harmony and the Villages of Bemus Point, Celoron, Lakewood, and Mayville) in 2011 in a cooperative effort to implement strategy for controlling and managing development on the Lake's waterfront in a manner consistent with the State's Coastal Zone Management program.

The LWRP identified "opportunities" and "constraints" for each of the municipalities and identified specific waterfront projects for the communities to implement. It includes an extensive inventory of conditions, and tailors the State's waterfront revitalization policies to local circumstances. The LWRP also recommends proposed land and water uses and waterfront development projects for each of the participating communities.

Chautauqua 20/20 Comprehensive Plan - 2011

The last county-wide comprehensive plan for the County, the Chautauqua 20/20 Comprehensive Plan, was completed in 2011. The Chautauqua 20/20 Comprehensive Plan recognized that the health of the Lake was critical for successful brand implementing its strategic branding/marketing campaign for Chautauqua Lake as "The World's Learning Center."

Integrated Sewage Management Plan for Chautauqua Lake - 2014

Recognizing that phosphorus was a major cause of toxic algal blooms and the proliferation of invasive weed growth in Chautauqua Lake, in 2014, Chautauqua County adopted the Integrated Sewage Management Plan for the purposes of developing practical, cost-sensitive strategies to reducing the amount of wastewater entering Chautauqua Lake and protecting the quality of nearby groundwater.

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4.0 POTENTIAL ENVIRONMENTAL IMPACTS

4.1 DESCRIPTIONS OF PRODUCTS

To gain an understanding of the potential impacts of herbicide treatments to the Lake, the following presents information about each of the proposed herbicide products.

4.1.1 AQUATHOL® K

Description of Product

Endothall is the active ingredient in the aquatic herbicide, Aquathol® K, labeled for use in lakes and ponds. Aquathol® K has been commercially available since the 1950s as a post-emergent, systemic herbicide. Although systemic, endothall has contact herbicide characteristics in that it is relatively fast acting and requires a shorter exposure time than other systemic herbicides (fluridone, penoxsulam, bispyribac). It is a broad-spectrum aquatic herbicide found to control a wide range of species including both monocotyledons and dicotyledons. The major invasive species controlled by Aquathol® K are crested floating heart [*Nymphoides cristata (Roxb.)*], curlyleaf pondweed (*Potamogeton crispus* L.), Eurasian watermilfoil (*Myriophyllum spicatum* L.) and hydrilla [*Hydrilla verticillata (L.F)*]. Aquathol® K is available in both liquid and granular formulations.

Mechanism of Action/Efficacy

Endothall's mechanism of action is unlike any other commercial herbicide, it is a serine/threonine protein phosphatase inhibitor (Bajsa et al. 2011). Symptoms exhibited on the plant include rapid loss of root integrity as well as browning and defoliation until complete collapse of the plant roughly 3-4 weeks after application. Aquathol® K has previously been referred to as a contact herbicide due to the noted quick knock down and control of the target weeds. Recent research has reclassified endothall as a systemic herbicide and demonstrates translocation within key invasive species, i.e. hydrilla and Eurasian watermilfoil, is much greater than other systemic herbicides such as fluridone, penoxsulan and triclopyr (Ortiz et al. 2017).

Aquathol® K has been shown to be extremely effective in controlling numerous invasive and nuisance aquatic plant species. Eurasian watermilfoil was found to be controlled at 3.0 ppm with a 12 hour exposure time (Netherland, Green and Getsinger 1991). Curlyleaf pondweed is extremely sensitive to Aquathol® K, with treatments as low as 0.5 ppm achieving near complete control (Skogerboe and Getsinger 2002). Complete control of coontail (Ceratophyllum demersum) was achieved with an application rate of 4.0 ppm Aquathol® K (Skogerboe and Getsinger 2002). Monoecious hydrilla (Hydrilla verticillata) was shown to be controlled with Aquathol® K at 2 and 4 ppm with exposure times ranging from 24 to 72 hours (Poovey and Getsinger 2010). Treatments of 2 ppm with 48 hour exposure and 3 ppm with 24 hour exposure reduced hydrilla shoot biomass by 88 to 98% (Netherland, Green and Getsinger 1991).

Description of Use

All endothall products are labeled for use in ponds and lakes, which may or may not experience flowing water, by the EPA. Prior to any treatment, calculating surface acreage and an average depth of the potential treatment area will increase treatment efficacy by more precisely calculating herbicide treatment needs. Calculating herbicide needs for all Aquathol® K applications should be calculated for treatment to the entire water column, i.e. if the treatment area is an entire 1 acre pond with 5 feet average depth, then the calculated treatment area is 5 acre/ft. In situations where there is the potential for high water exchange, it is recommended to treat no less than 5 acre blocks. If needed, Aquathol® K is labeled for repeat or back to back treatments in a short time frame (12-24 hour) to help achieve the desired concentration/exposure time for effective target species control. Subsurface vegetation should be treated as evenly as possible by broadcasting with granular formulations or with liquid formulations using surface or subsurface methods. To ensure drift does not adversely impact non-target or crop species, it is recommended that these herbicides be applied on relatively calm days. All equipment should be calibrated carefully to ensure the proper amount of herbicide is applied. Some dilution with carrier water will give better distribution of the material.

Surfactants are not necessary when using endothall products to control submersed vegetation. Consult the latest label for proper application rates.

Aquathol® K has no restriction on swimming, fishing or animal consumption on the EPA label. The lack of a fishing restriction is due to the level of safety seen in acute toxicity studies on fish. An application rate 30 times the maximum labeled application rate was determined as the LC50 rate on the sensitive rainbow trout fry (Serdar 1993). The only federal restriction on the product is a maximum contaminant level (MCL) of 0.1 ppm for the use of endothall treated water for potable uses. In NY, additional restrictions on swimming until the day after application, and for potable water use (MCL of 0.005 ppm) are required. An NYSDEC aquatic Pesticide Permit is required for use of Aquathol® K in NY.

Solubility

Endothall solubility remains stable under test conditions at concentration levels up to approximately 60% of the solubility in water buffered at pH levels 5, 7 and 9, through 21 days at 25°C.

Fate of Product in the Aquatic Environment

Endothall is primarily broken down through microbial degradation and ultimately degenerates into water, carbon dioxide and organic acids through the Krebs cycle. The half-life of endothall is marginally dependent on water temperature and plant biomass (faster dissolution in warmer water with above average plant biomass).

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4.1.2 RENOVATE 3

Description of Product

In November 2002, SePRO Corporation received Federal EPA registration for Triclopyr TEA salt under the trade name Renovate 3® (EPA Reg. No. 62719-37-67690). The Renovate 3® label specifies selective control of nuisance and exotic plants such as Eurasian watermilfoil (Myriophyllum spicatum). Triclopyr is formulated as a solution in water. Intentionally added inert or "other" ingredients in triclopyr formulations include water and triethanol amine (TEA). The water serves as the primary diluent/solvent in the liquid product while the TEA is used to form the salt of the technical grade active ingredient. There are no known impurities identified by the manufacturers or the EPA that are known to be of toxicological or environmental concern.

Mechanism of Action / Efficacy

Triclopyr is a plant growth hormone of the auxin type. An auxin-type herbicide interferes with growth after the plant emerges. It contacts leaves, where sugar is produced, and moves to roots, tips, and parts of the plant that store energy, thereby interrupting growth. Since the movement of sugars from the leaves to other parts of the plant is essential for growth, this type of herbicide has the potential to kill simple perennial and creeping perennial weeds with only one or two foliar applications. Bending and twisting of leaves and stems is evident almost immediately after application. Delayed symptom development includes root formation on dicot stems: misshapen leaves, stems and flowers; and abnormal roots (EPA, 1998) (Purdue, 2000).

Renovate 3® controls invasive aquatic macrophytes including Eurasian watermilfoil (Myriophyllum spicatum), parrotfeather (Myriophyllum aquaticum), alligatorweed (Alternanthera philoxeroides), and purple loosestrife (Lythrum salicaria). Renovate 3® does not control desirable native species like rushes (Juncales spp. and Scirpus spp.), cattails (Typha spp.), duckweed (Lemna spp.), Flatstem pondweed (Potamogeton zosteriformis), Coontail (Ceratophyllum demersum), Southern naiad (Najas guadalupensis), American pondweed (Elodea canadensis) and water paspalum (Paspalum fluitans), and most species of algae including the green algae (Spirogyra spp., Cladophora spp., Mougeotia spp. Volvox spp., Closterium spp. and Scenedesmus spp.), Chara spp. and Anabaena spp. (Getsinger et al, 2000; Woodburn et al, 1993; Petty et al, 1998 and Green et al, 1989, Foster et al, 1997, Woodburn, 1988 and Houtman, 1997).

Description of Use

Renovate 3®, ((3,5,6-tricholoro-2-pyridinyl) oxyacetic acid) is an aquatic herbicide that utilizes a systemic mode of action used to control submerged, floating and emergent aquatic plants in both static and flowing water. There are no water use restrictions per the NY Special Local Needs (SLN) label during or following application for fishing, but the NY label does require a 3 hour swimming restriction. Weed control and selectively to non-target plants can be controlled based on selection of application rates and herbicide placement (water injected or foliar). An NYSDEC aquatic pesticide permit is required for use of Renovate in NY.

Application Considerations

For control of Eurasian watermilfoil (Myriophyllum spicatum) and other susceptible submerged weeds in ponds, lakes, reservoirs, and in non-irrigation canals or ditches that have little or no continuous outflow, apply Renovate 3 as either a surface or subsurface application. Rates should be selected to provide a triclopyr concentration of 0.75 to 2.5 ppm acid equivalent in treated water. Use higher rates in the rate range in areas of greater water exchange. These areas may require a repeat application. However, total application of Renovate 3 must not exceed an application rate of 2.5 ppm of triclopyr for the treatment area per annual growing season. Apply in spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing. Areas near susceptible crops or other desirable broadleaf plants may be treated by subsurface injection applied by boat to avoid spray drift.

Solubility

Triclopyr is highly mobile (Kd =0.165 to 0.975), and highly water soluble. While triclopyr exceeds the mobility and persistence triggers used to recommend restricted use, triclopyr does not meet detection triggers for recommending restricted use due to limited monitoring data (Hoheisel et al, 1992 in EPA RED, 1998).

In one EPA study (EPA, 1992), three hundred seventy-nine wells were sampled for triclopyr, and only five detections of triclopyr residues in ground water were reported. All detections were far below levels of concern. The maximum concentration reported was 0.58 ppb.

Fate of Product in the Aquatic Environment/Residue tolerances

The environmental persistence of triclopyr products in the field can be quite variable; the dissipation half-life in water varies from less than one day to approximately seven and one-half days. Dissipation of triclopyr is primarily due to photolysis, degradation by microbes, and mixing of triclopyr treated water with water that has not been treated. Dissipation is related to lake size, wind, and the amount of water exchange that occurs. The larger the lake, the more wind blowing across the lake surface, the more water exchange through inlet and outlet streams or rivers, the more likely it is that triclopyr residues will be rapidly dispersed and diluted to below detection limits. The concentrations of triclopyr in lakes that have been spot treated generally fall below 0.5 ppm acid equivalent within one day, but in rare instances can take as long as eight days.

4.1.3 NAVIGATE (2,4-D)

Description of product

AB Navigate (EPA REG. NO. 228-378-8959 EPA EST. NO. 42291-GA-1) active ingredient is Butoxyethyl Ester of 2,4-Dichlorophenoxyacetic Acid, which is an isomer specific by AOAC Method, Equivalent to 2,4-Dichlorophenoxyacetic Acid.

Description of use

Navigate (2,4-D) is formulated on special heat treated attaclay granules that resist rapid decomposition in water, sink quickly to lake or pond bottoms, and release the weed killing chemical into the critical root zone area.

Navigate (2,4-D) is designed to selectively control the weeds listed on the label. While certain other weed may be suppressed, control may be incomplete. Reduced control may occur in lakes where water replacement comes from bottom springs.

Rates of application vary with resistance of weed species to the chemical, density of weed mass at time of treatment, stage of growth, water depth, and rate of water flow through the treated area. Use the higher rate for dense weeds, when water is more than 8 feet deep and where there is a large volume turnover.

Susceptible Weeds include Eurasian watermilfoil (*Myriophylum* spp.) and water stargrass (*Heteranthera dubia*). Lightly to moderate resistant weeds include Bladderwort (*Utricularia* spp.), white water lily (*Nymphaea* spp.), yellow water lily or spatterdock (*Nuphar* spp.), water shield (*Brasenia* spp.), water chestnut (*Trapa natans*), and coontail (*Ceratophyllum* demersum). Repeat treatments may be needed for yellow water lily and coontail.

Mode of Action/efficacy

2,4-D is a synthetic auxin herbicide that mimics the plant hormone indole acetic acid. Susceptible plants exhibit epinastic twisting and bending of stems and petioles, stem swelling and elongation, and leaf cupping and curling. Symptoms are followed by chlorosis then death 2 to 4 weeks after treatment.

Application considerations

For best results, the product should be spread in the spring and early summer, during the time weeds start to grow. If desired, this timing can be checked by sampling the lake bottom in areas heavily infested with weeds the year before.

If treatments are delayed until weeds form a dense mat or reach the surface, two treatments may be necessary. Make the second treatment when weeds show signs of

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Author: User1 Subject: Highlight Date: 3/14/2018 2:41:17 PM
Do not treat in these areas because it will be ineffective and herbicide will drift immediately.
No groundwater model has been completed to show "bottoms springs" contributions.

recovery. Treatments made after September may be less effective depending upon water temperature and weed growth. Occasionally, a second application will be necessary if heavy regrowth occurs or weeds reinfest from untreated areas.

If treatments must be applied later in the season when the weed mass is dense and repeat treatments are needed, spread granules in lanes, leaving buffer strips which can then be treated when vegetation in treated lanes has disintegrated. During the growing season, weeds decompose in a 2 to 3 week period following treatment. Buffer lanes should be 50 to 100 feet wide. Treated lanes should be as wide as the buffer strips.

Best results are generally obtained if the water to be treated has a pH less than 8. A pH of 8 or higher may reduce weed control. If regrowth occurs within a period of 6 to 8 weeks, a second application may be needed.

NY state law NYCRR 6 Part 327.6 dictates that 2,4-D is only to be used on emergent species. However, in a January, 2017 Memo from Anthony LaManno, Chief, Compliance and Lab Services Section, Bureau of Pesticide Management, NYSDEC, the NYSDEC wrote that 2,4-D use on Eurasian watermilfoil may be allowed under language in 6 NYCRR Part 327.7. An NYSDEC aquatic pesticide permit is required to apply Navigate in NY.

Solubility

2,4-D BEE solubility is 86.7 ppb at 20 C though Navigate is a granular formulation.

Fate of Product in aquatic environment/ Residue Tolerances

"The 2,4-D BEE formulations found in Navigate® are effective granular aquatic herbicides that control *Myriophyllum* spp. (watermilfoil), *Heteranthera dubia* (water stargrass), *Uticularia* spp. (Bladderwort), *Nymphaea* spp. (fragrant water lily), *Nuphar* spp. (spatterdock), *Brasenia* spp. (water shield), *Trapa natans* (water chestnut) and *Ceratophyllum demersum* (coontail). 2,4-D butoxyethyl ester is relatively toxic to environmentally relevant species of fish (LC50 = 0.30 to 5.6 mg a.i./L = 0.20 to 3.9 mg a.e./L) (Martens et al 1981 in Ecology, 1989 and Mount & Stephans, 1969 in Ecology, 1989). However, the acid form of 2,4-D is considered to be more representative of these formulations functional toxicity because the ester is essentially insoluble in water. The ester is released gradually from the granules and is rapidly hydrolyzed (within one day) to the acid (Aqua-Kleen MSDS and Zepp et al, 1975 in JMPR, 1997). 2,4-D acid has a much reduced toxicity to environmentally relevant fish (2.5 to 358 mg a.e./L) (Rewoldt et al, 1977 in JMPR, 1997 & FWS, 1986 in Brian database, 1999)." (Washington State EIS)

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Author: User1 Subject: Highlight Date: 3/14/2018 2:41:23 PM
State the pH of Chaut Lake. Will this reduce effectiveness? When? Where? If this is not known then Herbicide treatment should not commence.

EPA drinking water regulations for 2,4-D 70 ppb (50 ppb in NY); irrigation restrictions are 100 ppb or a time delay of 21 days for submersed plant applications.

4.2 HYDROLOGY AND WATER RESOURCES

4.2.1 SURFACE WATER RESOURCES

Macrophyte decay, whether as a result of herbicide treatment or the natural life cycle of plants, may reduce dissolved oxygen concentrations in the water column and release nutrients. Dense untreated macrophyte beds can exhibit very low concentrations of oxygen that can be lethal to fish (Frodge et al. 1995). It is possible that the herbicide treatment could affect oxygen concentrations.

The proposed treatment targets a time period when the biomass of plants will not be high and the water temperature will be relatively low. By treating when the water temperatures are low, it is likely that the water will have higher oxygen levels because colder water holds more oxygen than high temperature water. Therefore, pretreatment oxygen levels are expected to be higher than at other times during the growing season when water temperatures are higher. A portion of the limited decaying plant matter will settle to the bottom, having less impact on the oxygen concentrations in the water column but potentially a greater influence on oxygen concentrations in the sediments. It is worth noting that the seasonal dieback of untreated macrophytes, as well as deposition of cut weed fragments will have a similar if not greater (due to a larger biomass) impact on dissolved oxygen resources in the water column and sediments than the herbicide treatment.

Dying and senescing plants can release substantial amounts of nutrients into the water column (Carpenter and Adams 1978, Madsen 2000). These nutrients may then be available to phytoplankton and result in an increase in growth of those phytoplankton. This can be expected to happen regardless of whether the plants are controlled by herbicides or naturally die back in the fall as available light and water temperatures drop. Data presented in the 1990 SEIS (Appendix D) show more biomass in August than in June or July in both 1988 and 1989. Therefore, targeting plant beds in the early stages of growth will result in less decaying vegetation than would occur after a full growing season of growth and dieback. While the timing of the treatment early in the year will lower the ultimate biomass of dying vegetation, the timing at the beginning of the growing season may provide some additional nutrients for algal growth at the beginning of the summer. Nutrient concentrations are somewhat higher per unit of plant biomass during the early active growing phase of the plants than later in the growing season (Carpenter and Adams 1978).

The nutrients incorporated in treated macrophytes will not all be released at once. The nutrient release after herbicide use can be expected to be spread out over a period of

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Author: User1 Subject: Highlight Date: 3/14/2018 3:22:42 PM
Have you measured this to know? it might be just as "likely" that the proposed treatment areas, that are shallow, warm fast and early. Need to measure first, not just think it's "likely."

days to weeks as plants die and decompose. This is particularly true for those areas to be treated with the relatively slower acting systemic herbicides 2,4,D and triclopyr. The faster acting herbicide Endothall will have a quicker impact on vegetation and as such, nutrients will be released at a more rapid rate.

The flushing rate of the south basin is roughly 2.5 times per year so depending on the timing of rainfall and runoff, nutrients released in the early summer in the south basin would likely not be completely flushed from the system during the growing season and may be available for algal growth. Nutrients released to the south basin in the fall when plants naturally die back would be much more likely to be flushed out of the lake before the growing season the following year. In both instances, a proportion of the nutrients would be reincorporated into the sediments with the plant matter rather than being released into the water column.

The flushing rate of the north basin (0.5 times per year) is much slower than that for the south basin. Nutrient release to the water column associated with herbicide treatment would be available immediately while release from natural dieback would be available for algal growth during the following growing season. However, the flow of water in the lake is from north to south. Most of the treatment areas are in the south basin or the southern end of the north basin. It is likely that any nutrient increases attributable to herbicide treatment would be observed in the south basin and less likely that there would be observable increases in the main portion of the north basin.

4.2.2 HERBICIDE DILUTION / DRIFT

Each of the proposed herbicides are water soluble, and can be expected to travel away from the application site at diluted concentrations. The product label setback distances for potable water use provide some quantification of what amount of drift can be expected. The Aquathol® K label provides a setback distance of 600 feet from an application area for the labeled drinking water threshold of 0.10 ppm. Navigate and Renovate potable water setback distances are 1,200 feet for a 0.070 ppm threshold and 1,300 feet for a 0.40 ppm threshold, respectively. The Renovate setback distance is based on expected application rate and treatment plot size (> 16 acres), but the high label threshold (0.40 ppm) for potable water in relation to the NYS Department of Health threshold of 0.050 suggests that potential movement of Renovate would be significantly greater than the other herbicides. Using the expected application rate range for Renovate, a setback distance of two miles from a public potable water intake is being used for any proposed Renovate application.

In previous applications of Renovate OTF and Renovate 3 at Cazenovia Lake, approximately 200 +/- shoreline acres were treated in the 1,100 acre lake at 2.0-2.5 ppm. Herbicide residue sampling recorded measurable triclopyr (up to 0.028 ppm) in the northern, upstream, untreated end of the lake (more than 1 mile away) within 10

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Author: User1 Subject: Highlight Date: 3/14/2018 3:22:24 PM
Where is this study? is it static?

Author: User1 Subject: Highlight Date: 3/14/2018 3:22:12 PM
you said earlier that "internal loading" is a problem for the "foreseeable future," now it's being flushed out in less than a year?

Author: User1 Subject: Highlight Date: 3/14/2018 2:41:50 PM
Why is this in here? are you now concerned with algae? Where is this in the discussion about herbicides?

Author: User1 Subject: Highlight Date: 3/14/2018 3:22:01 PM
where is this study? show calculations. Has this changed over the decades? Hint: yes it has

Author: User1 Subject: Highlight Date: 3/14/2018 3:21:56 PM
"Before any herbicide is applied to a body of water that has a path from application area to water intake, an analysis, based on lake currents and dispersion data, of transport and dispersion should be performed to determine safe standoff distances."
Full word document available.

days of application (SOLitude Lake Management). In the applications of Aquathol® K and Navigate performed at Bemus Bay in 2017, post-treatment plant monitoring indicated that control was reduced along the windward edge of the application area, and control extended a short distance beyond the leeward edge of the application area. In the weeks and months after herbicide application, water was tested for presence of the herbicides. Eight days after treatment, Navigate levels at all but one sample point, including those near the Chautauqua Institution and Chautauqua Estates water intakes, were far below the Limit of Quantification of 10 ppb. One sample point in Bemus Bay detected Navigate at 10.1 ppb, also far below the drinking water threshold. Two weeks after treatment, endothall levels at all but one sample points including sample points near Chautauqua Institution (CUD) and Chautauqua Lake Estates (CHWD#2) water intakes was below the Limit of Quantification of 0.17 ppb. One sample point in Warner Bay showed 3.15 ppm, also far below the drinking water threshold. (SOLitude Water Test Results) (Appendix K). By late September, herbicide levels were determined to be below NYSDEC's detectable limit and/or below 0.400 ng/ml. (Memorandum to Mike Nierenberg, NYSDEC, 2017) (Appendix K). Drift is expected to primarily move in the direction of the Lake outlet; however, in larger Lakes, wind fetch can play a significant role in movement of herbicide.

Dilution of each herbicide application can be modeled using the NYSDEC dilution model, which accompanies each aquatic pesticide permit application. Prior to submitting a permit application, each area will be modeled individually to demonstrate expected dilution. To provide some guidance in this document, the total area of the ten proposed treatment zones was calculated for total volume, which equaled 4,459.5 acre-feet. (Average depth was based on those sample points measured for water depth during the plant survey.) Using this conservative total volume, the table below shows the theoretical partial or whole Lake concentration of each herbicide at anticipated application rates and areas.

Table 4-1 Herbicide Application Rates and Concentrations

Herbicide	Application Rate	South Basin concentration	Both basins concentration
Renovate 3	2.0-2.5 ppm	0.0499 ppm	0.0146 ppm
Navigate	2.0-4.0 ppm	0.0099 ppm	0.0033 ppm
Aquathol® K	0.75-1.5 ppm	0.0347 ppm	0.0095 ppm

That data illustrates that concentrations in the south basin, where the majority of the application areas are found, are expected to fall below the drinking water threshold. When dilution from the north end of the Lake is included, concentrations are expected to be far below the drinking water thresholds. This expectation is supporting by herbicide level testing that was performed in Bemus Bay following the June 2017

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Author: User1 Subject: Highlight Date: 3/14/2018 3:21:49 PM
How does this effect Chaut Lake? is this going to be quantified before herbicide treatments? how favorable wind directions guaranteed for days following the application?

Author: User1 Date: 3/14/2018 3:21:42 PM
Model not included in draft. Please supply with inputs and assumptions.

application of Aquathol® K and Navigate. (SOLitude Water Test Results, Memorandum to Mike Nierenberg, NYSDEC, 2017) (Appendix K).

Based on the above information, the application of the proposed herbicides at the rates proposed will not adversely affect the water column, and concentrations of herbicide will not exceed safe levels.

To assess post-application herbicide concentrations, including contact exposure time and off-site movement, water samples will be collected and analyzed for each active ingredient in each herbicide. Sampling frequency and location are different for each treatment site, but typically include samples within and outside of treatment areas, and any sites with particular water use concerns such as potable or irrigation water draws by facilities. Typical best management practices include frequent sampling during the week after application, transitioning to weekly sampling starting the second week, and continuing until water use restrictions are removed.

Laboratory analysis is offered by most manufacturers either through their own laboratory, or through agreements with academic institutions. These facilities may provide turnaround times of 3-14 days for herbicide residue testing, which is appropriate for removal of extended irrigation restrictions. For potable water issues, a secondary laboratory is often contracted to provide 24-48 hour sample results.

For the Chautauqua Lake applications, we recommend the following sampling protocol:

1. Week of Application:
   a. Sampling before application: sampling the day before or the day of treatment.
   b. Sampling three days after treatment for each product applied.
2. Week 2: sampling seven and ten days after treatment or until product levels meet or are below water restriction thresholds.
3. Week 3 & after: sampling once every other week (week 5, week 7, etc.) until Renovate levels meet or are below the irrigation restriction threshold.

Sample results should be reported within 48 to 72 hours of collection. Once a particular product's threshold has been met in the associated treatment area, sampling for that product at the site will be discontinued. The number of samples collected per application site is presented in Table 4-2.

Table 4-2: Proposed Sampling Procedure

Treatment Area	Proposed Herbicide(s) and Concentration(s) (mg/l)	Inside treatment area	Outside treatment area
Busti/ Lakewood	Renovate (2.5 ppm)	4 samples	2 samples
Stockholm/ Greenhurst	Navigate (2.0 ppm), Aquathol® K (1.5 ppm)	2 samples	1 sample
Bemus Bay	Navigate (3.0 ppm), Aquathol® K (0.75 ppm)	2 samples	1 sample
Burtis Bay	Navigate (2.0 ppm), Aquathol® K (1.5 ppm)	4 samples	2 samples
Stow	Navigate (4.0 ppm)	3 samples	1 sample
Warner Bay	Navigate (2.0 ppm)	2 samples	1 sample
Bly Bay	Navigate (3.0 ppm), Aquathol® K (0.75 ppm)	1 sample	1 sample
Bemus Point	Navigate (4.0 ppm)	2 samples	2 samples
Sunrise Cove	Navigate (2.0 ppm)	3 samples	1 sample
Sunset Bay	Navigate (1.0 ppm, Aquathol® K (1.0 ppm)	3 samples	2 sample
Chautauqua Institution	Outside treatment area		1 sample
Lake Outlet	Outside treatment area		1 sample

4.2.3 GROUNDWATER

Groundwater impacts primarily relate to the potential impact to private wells and public water supply systems that utilize the groundwater in the region of the Lake.

The proposed herbicide application is not expected to impact water drawn from private wells surrounding the Lake. Outflows to Chautauqua Lake do not recharge groundwater—in other words, water generally flows from the groundwater into the Lake. Groundwater contributes a small portion of inflow to Chautauqua Lake, mainly in the northern basin. (Bergman Associates 2010).

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Author: User1 Date: 2/19/2018 2:27:21 PM -05'00'
why aren't there more samples outside treatment area. it's a given there will be herbicides inside.

4.3 TERRESTRIAL AND AQUATIC ECOLOGY

4.3.1 VEGETATION (AQUATIC)

Each of the three proposed herbicides will control selected aquatic plant species. Both Navigate (2,4-D ester, solid formulation) and Renovate 3 (triclopyr, liquid formulation) are auxin-mimic herbicides, which interrupt cell division in plants and cause affected plants to outgrow their food reserves. Plant response occurs rapidly, initially seen in epinasty of the stem (bending/twisting), and leading to decay over 2-4 weeks. Both herbicides are primarily selective on broadleaf species (dicots) including Eurasian watermilfoil, at labeled application rates. In some cases Navigate has provided control of curlyleaf pondweed as well.

Aquathol® K (salt of endothall, liquid formulation) has historically been characterized as a broad-spectrum contact herbicide because it controls a wider range of aquatic plant species and results in rapid plant mortality. Recent studies at the Colorado State University (M. Ortiz et. al, 2017) have demonstrated that Aquathol® K is absorbed by Eurasian watermilfoil plant roots at a level consistent with other systemic herbicides. Aquathol® K is particularly effective on curlyleaf pondweed, as well as other native pondweed species.

The chart below reflects the documented plant community of the proposed Chautauqua Lake application sites, and the susceptibility of these plants to the three proposed herbicides. This information is based on EPA product labels and information, the 2017 Cazenovia Lake SEIS and 20+ years of application experience of SOLitude Lake Management (formerly Allied Biological).

Table 4-3 Susceptibility of Plants to Herbicides

Aquatic macrophyte species	Renovate	Navigate	Aquathol® K
Eurasian watermilfoil	high	high	high
Curlyleaf Pondweed	Low	low	Very high
Coontail	Low	medium	high
Common Waterweed	Low	low	low
Water Stargrass	medium	high	high
White Waterlily	medium	medium	low
Tapegrass/Wild Celery	Low	low	low
Slender Naiad	Low	low	high
White-Stem Pondweed	Low	low	high
Richardson Pondweed	Low	low	high
Forked Duckweed	Low	low	low
White Water Crowfoot	Low	low	medium
Needle Spikerush	low	low	low
Muskgrass (algae)	Low	low	low

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Author: User1 Date: 3/14/2018 2:57:44 PM
No mention of impacts to native shoreline veg and riparian veg that could be affected if a high water event occurs. Some of these areas maybe state wetlands that have 100 foot buffers that are regulated. Federal wetlands could also be impacted. They should map all federal wetlands in the area.

Author: User1 Date: 2/19/2018 2:32:31 PM -05'00'
this needs more checking and literature citations. once again the sales company is providing the data required for decisions.

A goal of the program is to encourage a native plant assemblage which will have higher habitat value than the nearly monotypic stands of invasive plants currently in place in many areas. Targeting control of the invasive aquatic plants early in the growing season may allow native plant species to recolonize treated areas during the same growing season as the treatment. This was observed in 2017 during the herbicide treatment test application in Bemus Bay. A diverse native plant community should provide higher ecological value than the current community dominated by invasive species.

The proposed treatment plan will kill non-native macrophytes, and allow native macrophytes to return and establish a more balanced aquatic environment.

4.3.2 WILDLIFE

Toxicity of herbicides

The potential for adverse toxicological effects on birds, wildlife, and the aquatic community from the herbicides proposed for Chautauqua Lake are discussed in this section. There are numerous review documents which summarize recent information regarding the ecological risk of application of these three herbicides to the aquatic environment (NYSDEC 1981, CCDPD 1990, UMA 2004), ENSR 2007, TRC 2017). In addition, an SEIS and SEQR findings for the application of triclopyr to Cazenovia Lake, NY were reviewed (EcoLogic 2017, Cazenovia 2017). The commonality of these documents is that each of the proposed herbicides poses reduced ecological risk if used according to the label directions. The summary information provided by TRC (2017) is the most up-to-date available on all three herbicides.

<u>Triclopyr (Renovate 3)</u>
Triclopyr, a systemic herbicide, has been proposed as a part of this project to be applied to portions of Chautauqua Lake at concentrations up to 2.5 mg/l. Triclopyr (Renovate 3) was evaluated under a statewide SEIS (ENSR 2007), a SEIS for Cazenovia Lake (Ecologic 2017) as well as an SEIS update for Washington State (TRC 2017) and a Generic EIS for Massachusetts (UMA 2004).

The toxicity of triclopyr is summarized in Figure 4-2, which was adapted from the SEIS for triclopyr (ENSR 2007). This table suggests that triclopyr toxicity ranges from practically non-toxic to slightly toxic across a variety of fish and animal species. All of the concentrations evaluated were well above target concentrations of 2.5 ppm (mg/l) for the proposed application of triclopyr to Chautauqua Lake. ENSR (2007) goes on to conclude that based on toxicity testing of select species at concentrations well above proposed treatment concentrations, triclopyr is slightly toxic to practically non-toxic for fish, invertebrates, birds, and mammals. As part of this project, there have been requests to address the herbicides' effect on bats. There is no evidence presented in

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Author: User1 Subject: Highlight Date: 3/14/2018 2:42:37 PM
A sample size of one does not imply statistical significance.

Author: User1 Subject: Highlight Date: 3/14/2018 2:42:45 PM
Show this study. This is contrary to other lakes combating milfoil, where milfoil is the first to establish after treatments.

Author: User1 Date: 2/19/2018 2:33:59 PM -05'00'
What about the world health organization that considers the probable carcinogens?

Author: User1 Date: 2/19/2018 2:34:51 PM -05'00'
cite these sources

the review documents that triclopyr toxicity to bats would vary from toxicity to other mammals. At the target concentrations, toxicity is not anticipated.

The SEIS for application of triclopyr to Cazenovia Lake concludes based on a similar groups of aquatic and terrestrial species as are found in Chautauqua Lake and a similar application rate of triclopyr as proposed (2.5 mg/l), that there are no projected adverse effects on fish, wildlife, birds or mollusks.

Durkin (2011) as cited in TRC (2017) found that found that aquatic applications of triclopyr across the range of labeled application rates did not pose substantial risks to aquatic animals. The University of Massachusetts (2004) lists low toxicity to aquatic organisms as one of the advantages to use of triclopyr in an aquatic setting.

Table 4-4: Summary of Selected Triclopyr Toxicity (adapted from Table 5-2 ENSR 2007)

Study		Organism	Results	Comments
Mammalian Studies [1,2]				
Acute	Oral LD50	Male rat	2,574 mg/kg	Practically non-toxic
	Eye irritation	Rabbit	Corrosive	Severe eye irritant
	Dermal LD50	Rabbit	>2,000 mg/kg	Practically non-toxic
Subchronic	Oral (90 days) NOEL	Mouse	20 mg/kg/day	No effects at this level
	Oral (90 days) NOEL	Rat	30 mg/kg/day	No effects at this level
	Oral (6 months) NOEL	Dog	2.5 mg/kg/day	No effects at this level
Chronic	Oral (22 month) NOEL	Mouse	5.3 mg/kg/day	Not oncogenic
	Oral (2 year) NOEL	Rat	3 mg/kg/day	Not oncogenic
Freshwater Organism Studies [1]				
Fish 96 hour LC50		Bluegill	891 mg/L	Practically non-toxic
Fish 96 hour LC50		Rainbow trout	552 mg/L	Practically non-toxic
Fish 96 hour LC50		Fathead minnow	44 mg/L	Slightly toxic
Non-target Insect		*Daphnia magna*	248 mg/L	No effect on number and size
Avian Studies [1]				
Avian 8 day LC50		Mallard Duck	>10,000 ppm	Practically non-toxic
Avian 8 day LC50		Bobwhite Quail	2,935 ppm	Practically non-toxic

[1] – Studies conducted with triclopyr TEA unless otherwise noted. [2] – Subchronic and chronic mammalian studies conducted with triclopyr acid. Data obtained from SePRO's Technical Bulletin for Renovate® (SePRO, 2004)

<u>2,4 D (Navigate)</u>

The granular butoxyethyl ester (BEE) form of 2,4 D, a systemic herbicide, has been proposed as a part of this plan to be applied to specific areas of Chautauqua Lake at a concentration of up to 4 mg/l. 2,4 D was evaluated for use in Chautauqua Lake in by the NYSDEC (1981). Further, more recent, summary information on 2,4 D in the aquatic

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environment can be found in an updated SEIS for Washington State (TRC 2017) and in the Generic EIS for Algae and Aquatic Vegetation Control in Massachusetts (UMA 2004).

The 1981 PEIS reviews the use of 2,4 D in the aquatic environment. Several statements relative to ecological effects of the application of 2,4 D to Chautauqua Lake are notable. 2,4 D is not considered harmful to wild animals under existing use dosages (in 1981). (NYSDEC, 1981). The review documents present no evidence that 2,4-D would affect bats differently than other mammals. 2,4-D is also characterized as having generally low toxicity to birds. NYSDEC (1981) states that certain esters of 2,4 D are toxic to certain fish species but the NYSDEC allows use of granular formulations for Eurasian watermilfoil and other species as long as the lakes are large and that whole bays are not treated to avoid fish toxicity. The document recognizes that the slow release nature of the granular 2,4 D and suggests that small fish fry may be more susceptible to the chemical than adults. According to the document 2,4 D does not accumulate in fish.

UMA (2004) states that 2,4 D levels could approach or exceed lethal concentrations for sensitive aquatic organisms, such as bluegill, fathead minnow, and several species of salmonids if applied at maximum rates. These species were reported as present in Chautauqua Lake by CCDPD (1990). Table 4-5 (UMA 2004) presents toxicity information for 2,4 D ester on aquatic organisms. Many of the concentrations to be applied are below the maximum 2,4 D ester concentration although UMA (2004) states that the ester form of 2,4 D is quickly transformed to the acid form (resulting in somewhat higher concentrations of the acid vs the ester) after application. The acid form has a much higher toxicity threshold for aquatic life (generally an order of magnitude or two higher than the proposed ester concentration), and is therefore less toxic. UMA (2004) concludes that there is the potential for some acute and lethal toxicity to aquatic species in the days immediately following application due to the action of the BEE form of 2,4 D. They go on to say that lethal toxicity is unlikely after that as the ester is converted to the acid form which will exhibit concentrations 10-100 times less than the LC50 for aquatic species.

According to UMA (2004), studies indicate that 2,4 D is weakly teratogenic or non-teratogenic, is non-mutagenic and is not carcinogenic. Toxic effects on mammals and birds is very low. 2,4 D does bioconcentrate in fish and zooplankton but is rapidly cleared.

TRC (2017) provided an update to the Washington State SEIS on the use of aquatic herbicides the effects on aquatic organisms are summarized in the following paragraph:

> although 2,4-D BEE has the potential to harm fish and aquatic invertebrates based on risk assessments conducted using laboratory data, field studies have indicated that the use of 2,4-D BEE granular pellets has no direct impact on fish populations (Shearer and Halter, 1980),

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Author: User1 Date: 2/19/2018 2:41:38 PM -05'00'
what about oxygen depleted environments created by 2,4-d killing vegetation trapping fish or driving them towards areas they can not survive in?

Author: User1 Subject: Highlight Date: 3/14/2018 2:42:57 PM
"unlikely" but could still be then. What will be the effects?

Author: User1 Date: 2/19/2018 2:45:21 PM -05'00'
it is an endocrine disruptor and is a benzene ring. why would you knowingly put this in a class A drinking water supply when the issue of getting your boat stick in weeds can be solved by making a longer dock or mechanical removal?

presumably due to the insolubility of these granular materials. Limited field data with benthic invertebrates indicates a similar lack of direct effects, but indirect effects such as decreased dissolved oxygen content can result in a shift in dominant organisms to those more tolerant of low dissolved oxygen content (Marshall and Rutschky, 1974). Low solubility of 2,4-D BEE and a rapid hydrolysis of 2,4 D BEE to 2,4-D acid also improves the safety of Aqua-Kleen® and Navigate® by decreasing contact time of 2,4-D BEE and increasing contact time to 2,4-D acid, which appears to cause little toxicity to aquatic biota. Thus, as long as label specifications are followed, field data have indicated that use of 2,4-D aquatic use products should be safe to aquatic biota at label-specified use rates.

2, 4 D is not considered hazardous to beneficial insects (TRC 2017). They report further that a mesocosm study (Relyea 2005 as cited in TRC 2017) found that an application of an unspecified form of 2,4 D at a typical labeled rate showed no negative effects on species richness, biomass or survival of 25 species of aquatic animals including frog larvae, salamanders, snails, and other invertebrates. However, they do report that due to the persistence and mobility of 2,4 D, freshwater mussels are vulnerable to acute toxicity and 2,4 D may cause demineralization of freshwater mussel shells.

Table 4-5: 96 Hour LC50 Aquatic Toxicity Tests Using 2,4 D (adapted from University of Massachusetts 2004, Table III 3-5).

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Author: User1 Date: 3/14/2018 2:57:53 PM
What was the life stage of the species tested? Treatment during late spring and early summer could affect fry and young of year species such as musky, northern pike, walleye and the prey (carp, suckers, perch) they depend on during these early stages of life.

Form	Species	Conc (ppm)	Reference
Acid	rainbow trout	358	Dow Elanco, 1995
	fathead minnow	320	Dow Elanco
	american eel	300.6	HSDB, 1995
	bluegill	263	Dow Elanco, 1995
	carp	96.5	HSDB, 1995
	pumpkinseed fish	94.6	HSDB, 1995
	guppy	70.7	HSDB, 1995
	striped bass	70.1	HSDB, 1995
	cutthroat trout	64	USDA, 1993
	white perch	40	HSDB, 1995
	Banded killifish	26.7	HSDB, 1995
	Daphnia	25-36.4	Dow Chemical Co., 1983a
BEE	Rainbow trout	2.8	Dow Chemical Co., 1983b
	Bluegill	0.6	Dow Chemical Co., 1983b
	Daphnia	7.2	Dow Chemical Co., 1983b
	Fathead minnow	2.5	Dow Chemical Co., 1983b
	Coho salmon Chinook salmon Chum salmon Pink salmon Sockeye salmon Rainbow trout	0.4-6.1	Wan et al., 1990

Aquathol® K (endothall)
Endothall, a contact herbicide, has been proposed to be applied to Chautauqua Lake at a concentration of up to 1.5 mg/l. Summary information on endothall can be found in the 1990 SEIS (CCDPD 1990) (Appendix D), the Generic EIS for Algae and Aquatic Vegetation Control in Massachusetts (University of Massachusetts 2004) and an SEIS update for Washington State (TRC 2017).

The 1990 SEIS (CCDPD 1990) (Appendix D) describes endothall as relatively short lived in the environment and biodegradable. According to the report, it does not bioaccumulate and has low toxicity to fish and other aquatic organisms.

UMA 2004 concludes that endothall is generally not toxic to aquatic organisms at the recommended application rates of 0.5-5 mg/l. Endothall does bioconcentrate in the zooplankton, algae, and snails but concentrations are transient and not passed up the food chain.

This page contains no comments

UMA (2004) presents information on the toxicity of endothall to birds and mammals. An oral LD_{50} (lethal dose) value for mallards is two orders of magnitude greater than concentrations proposed while a no observable effects level (NOEL) for mallard ducks is over 30 times higher than the concentrations proposed. The report states that in concentrated form endothall is highly toxic to mammals however the LD_{50} (lethal dose) for rats is well above the maximum concentrations specified for this project. The report also asserts that there is no evidence of conclusive teratogenic, fetotoxic, mutagenic or carcinogenic effects of endothall on mammals. There is no reason to conclude that endothall's effects on bats would be different than its effects on other mammals.

TRC (2017) presents the toxicity of endothall on fish. The most sensitive fish and life stage tested was young walleye. The 96 hour LC_{50} (lethal concentrations) value of 16 mg/l is an order of magnitude higher than the prescribed dose for this project (1.5 ppm). The 96 hour LC_{50} (lethal concentrations) for juvenile mussels was roughly twice as high as for juvenile walleye. TRC (2017) goes on to say that "the most common forms of endothall, including the dipotassium and mono salts, will not cause acute or chronic harm to non-target aquatic animals when label specifications are followed."

Fish, Fish Spawning and Habitat

In general, the previous information illustrates that there will be minimal toxicity impact to fish from the application of these three herbicides under the proposed treatment plan (types, concentrations).

The proposed treatment time frame coincides with the spawning season for a number of fish species in Chautauqua Lake (Table 3-4). In particular, those species partially or fully dependent on macrophyte beds for spawning in multiple months including May might be impacted by the proposed treatment plan. These species include black crappie, gizzard shad, muskellunge, yellow perch, and pumpkinseed. Of these species, gizzard shad is considered of lesser importance as it is a non-native, invasive species. Black crappie is also a non-native but has become an important part of the recreational fishery.

Muskellunge is a critical species for the Lake. The overwhelming majority of the current reproduction of muskellunge in Chautauqua Lake occurs through the hatchery program.

The herbicide treatment is proposed to occur in May for four reasons. First and foremost, this time period is the beginning of the active growing period for the target species and is a time when biomass is relatively low but the effectiveness of herbicides on target species is high. Second, this period is prior to major contact recreation use of the Lake. Third, Lake water temperatures are cooler lessening any potential impacts on dissolved oxygen as treated plants decay. Fourth, because the biomass of target

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Author: User1 Date: 3/14/2018 3:40:52 PM
Currently, herbicide application is restricted to after June 20 to protect fish spawning. This must not be changed.

plants is low, early treatment may reduce the total mass of nutrients that will be released upon decay of target plants. The MMS (EcoLogic 2017) states that there are approximately eight miles of shoreline of Chautauqua Lake considered critical for fish spawning and nursery areas. This represents approximately 17% of the shoreline area of the lake. Potential treatment areas (Figures 4-1 through 4-10) have been chosen to target areas of dense growth of invasive species.

There are ten proposed treatment areas. Comparison between the fish spawning and rearing areas and the presence of rare, threatened, and endangered (RTE) species presented in EcoLogic 2017 and treatment areas are summarized in Table 4-6. Of the ten treatment areas, three do not have overlap with mapped fish spawning, fish rearing, or RTE species. Six areas have overlap with fish spawning and rearing sites and two areas (Burtis Bay and Busti/Lakewood) have overlap with fish rearing areas. These areas represent approximately 25% of the identified fish spawning and/or rearing areas. Or, in other words, the proposed treatment areas do not overlap with approximately 75% of identified fish spawning/rearing areas. Three proposed treatment areas have RTE species conflicts. Bemus Bay has overlap with kidneyshell mussel. Sunset Bay has overlap with Spiny Softshell Turtle. Burtis Bay has overlap with mapped populations of *Potomageton hillii (Hill's pondweed) and* is also upstream of habitat for spiny softshell turtle and additional fish spawning and rearing habitat.

Herbicide product labels do not specifically address fish spawning, and the NYSDEC regularly approves permits for herbicide applications during typical spawning periods. This reflects recommended application timing language, such as Renovate's "Apply in Spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing." The herbicide Navigate has a similar statement on use recommendations and application timing. Endothall (Aquathol® K's active ingredient) impact has been studied by Maciena, et. al. in 2008 at Auburn University. A three-year study of largemouth bass spawning in a pond found no differences in nest guarding, nest fidelity or relative abundance and size of young largemouth bass. (Maceina 2008).

Table 4-6. Overlap between proposed treatment zones and fish spawning, fish rearing and endangered species zones from the MMS (EcoLogic 2017).

			Overlap of Proposed Treatment Zones with Fisheries and Endangered Species Environmentally Sensitive Zones from MMS					
Proposed Treatment Area	Figure	Proposed Herbicide(s) and Concentration(s) (mg/l)	Fish Rearing/ Spawning (FS1)	Fish Spawning (FS2)	Fish Rearing (FS3)	RTE Species (ES1 Kidneyshell Mussel)	RTE Species (ES2 Spiny Softshell Turtle)	RTE Species (ES3 *Potomageton hillii*)
Busti/ Lakewood	4-1	Renovate (2.5 ppm)	yes		yes			

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Author: User1 Date: 3/14/2018 3:41:29 PM
Explains what chemicals will be used in designated environmentally sensitive zones. These zones have been clearly identified for exclusion of herbicides yet the DSEIS recommends "Overlap between proposed treatment zones and..." Table 4-6 and all language supporting this overlap must be removed. why are there any "yes" that would be ok?

Stockholm/ Greenhurst	4-2	Navigate (2.0 ppm), Aquathol® K (1.5 ppm)	yes					
Bemus Bay	4-3	Navigate (3.0 ppm), Aquathol® K (0.75 ppm)	yes			yes		
Burtis Bay	4-4	Navigate (2.0 ppm), Aquathol® K (1.5 ppm)			yes			yes[1]
Stow	4-5	Navigate (4.0 ppm)	yes					
Warner Bay	4-6	Navigate (2.0 ppm)						
Bly Bay	4-7	Navigate (3.0 ppm), Aquathol® K (0.75 ppm)						
Bemus Point	4-8	Navigate (4.0 ppm)	yes					
Sunrise Cove	4-9	Navigate (2.0 ppm)	yes					
Sunset Bay	4-10	Navigate (1.0 ppm, Aquathol® K (1.0 ppm)					yes	

[1]Based on 2007 data. Presence also noted in Spring 2017 Racine-Johnson survey.

It should be noted that the NYSDEC Fish Hatchery is located more than 1 mile from the nearest herbicide treatment area and therefore should not be impacted by these treatments.

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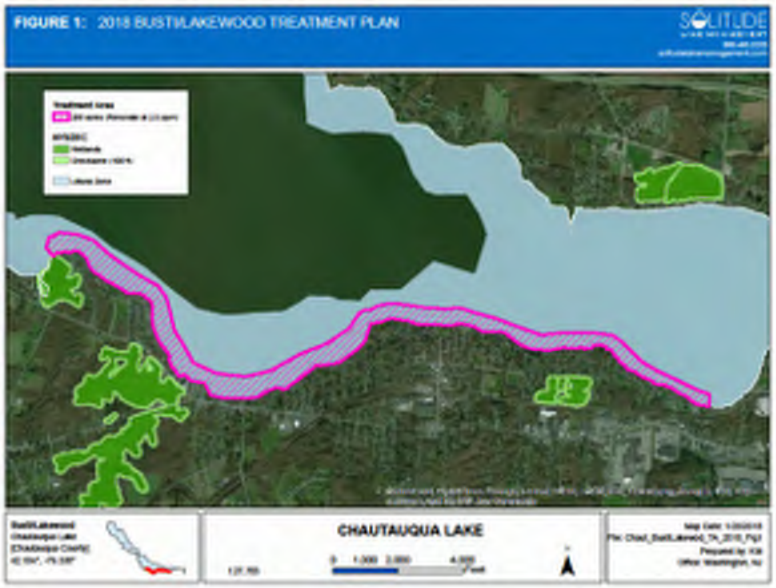
Author: User1 Date: 2/19/2018 2:50:37 PM -05'00'
so it would impact fisheries? and if it were closer it would impact the hatchery. it was stated that fish were not effected.

Figure 4-1 Treatment Area Map – Busti/Lakewood



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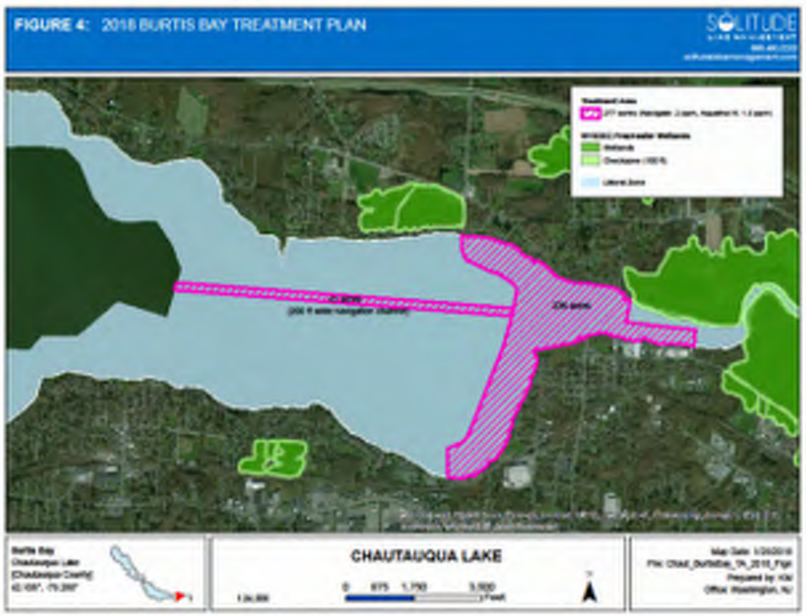
Author: User1 Date: 3/14/2018 3:41:34 PM
Currently, to protect habitat, herbicide application is restricted to 200 feet off shore or 6 feet of water, whichever comes first. These maps show zones many times that width. Proposed areas of herbicide application must be recalculated to maintain the above restrictions.

Figure 4-4 Treatment Area Map – Burtis Bay



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Author: User1 Date: 3/14/2018 3:41:52 PM

Currently, to protect habitat, herbicide application is restricted to 200 feet off shore or 6 feet of water, whichever comes first. These maps show zones many times that width. Proposed areas of herbicide application must be recalculated to maintain the above restrictions.
Can not mix endothall and 2,4-d. Their synergistic relationship is not known. will this be done at different times?

4.3.3 WETLANDS

Several DEC-designated wetlands in the vicinity of Chautauqua Lake are displayed in the NYSDEC Environmental Resource Mapper as immediately adjacent to the Lake, or are located within 500 feet of the Lake. These are identified below (Classification in parentheses).

Wetlands Adjacent to the Lake

i. LW-10 (1) – at Jones and Gifford Ave., Celoron
ii. LW-11 (1) – at Rt. 430/Fluvanna Ave, Celoron
iii. LW -1 (1) – At Loomis Bay Road, Ashville
iv. CH-1 (1) – At Lakeland Road, Stow

Those wetlands adjacent to the Lake, and located in proximity to planned application areas will be protected by not applying the herbicide within the wetland or the 100' designated adjacent area. The vegetation in these wetlands is predominantly woody plant material. The WNY Environmental Alliance describes the wetland associated with LW-11 as a "predominantly red maple swamp and shrub swamp." Any drift of herbicides into a wetland area will not impact any emergent or woody species from in-water contact. Woody species have the majority of their biomass out of the water, and root/stem uptake of the proposed herbicides is insufficient to cause injury to these species. Control of woody species with triclopyr or 2,4-D require direct application of the concentrated material to the inner stem of the plant, which will not occur as part of the proposed treatments.

Wetlands Adjacent to of within 500' of the Lake That Are Not Expected to Be Impacted

i. LW-6 (2) –across Pleasant Avenue from Lake, Town of Ellery Park
ii. LW-2 (2) –across Rt. 395, Maple Point
iii. CH-2 (2) – at Prendergast Creek inlet, Prendergast Point
iv. HF-4 (2) – across Sea Lion Drive, Sandlewood Land and Galloway Road, Hartfield

Wetlands LW-6, LW-2 and HF-4 are all located across roadways from the Lake and will not be impacted.

Wetland CH-2, as well as wetland HF-4 are located more than 3 miles from the nearest application area. At that distance, dilution of the herbicide in the Lake is expected to result in extremely low herbicide concentrations Lakewide, and especially upstream of the application area. Therefore, any residual herbicide concentrations reaching these wetlands will be at levels insufficient to provide any plant control, as concentrations will be below any labeled application rate.

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Author: User1 Date: 3/14/2018 2:58:03 PM
Federal wetlands are not included.

Author: User1 Date: 2/19/2018 2:54:30 PM -05'00'
needs literature support. 2,4-d can kill shoreline trees whose roots go into the treated water.

4.4 AGRICULTURAL RESOURCES

Agriculture plays a vital role in the Chautauqua County economy. Nutrient contamination from agricultural lands located within the Lake's watershed is one of the primary drivers of the growth of submerged aquatic vegetation in the Lake. It will take decades of cooperation, education, and coordination with area farmers to fully implement the recommendations made in the 2010 *CLWMP and TMDL*.

The proposed project will have no direct significant negative impacts on agriculture. Agricultural lands are not located directly adjacent to the lake, although some are located less than a mile from the lake and downstream of the Lake.

Potential indirect impacts could arise from use of Lake water for irrigation of agricultural crops. NYS DEC requires an agricultural water withdrawal permit from farmers who use surface water or ground water at volumes in excess of 100,000 gallons per day. There are no known agricultural water users with a NYS DEC permit on Chautauqua Lake. Farmers and other property owners may be drawing lesser amounts of water for irrigation purposes, especially downstream of the Lake. If these users exist, they may be far enough downstream that the concentrations of herbicides would fall below the minimum levels required for irrigation.

The following irrigation restrictions are on the labels of the products:

- Renovate – The primary product label and the NY product label (SLN 24(c) - NY-060001*)* indicate a 120 day or 1 ppb threshold on irrigation. Given the size of the Lake and the treatment areas, this restriction could last an estimated 30-60 days.
- Navigate - The NY label (SLN No. NY-080004) and 6 NYCRR 327.6 restrict all Lakes uses, including irrigating terrestrial plants with Lake water, for 24 hours. The Navigate label also restricts irrigation for 21 days, or until water concentration is less than 100 ppb if application occurs within 600' of an intake. This does not apply for pasture, turf, or cereal grain irrigation.
- Aquathol® K – There are no irrigation restrictions with this product.

4.5 OPEN SPACE AND RECREATION FACILITIES

Chautauqua Lake is a prime recreational destination for both Chautauqua County residents and tourists. Boating, kayaking canoeing, water-skiing, jet skiing, swimming, and fishing are all popular pursuits throughout the summer months. The Towns of Ellery, Busti, North Harmony, and Ellicott and Villages of Celoron, Lakewood and Bemus Point all border the Lake and provide recreational opportunities for their residents and tourists.

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Author: User1 Date: 2/19/2018 2:55:34 PM -05'00'
why isn't CLP helping with this then?

Author: User1 Subject: Highlight Date: 3/14/2018 2:43:11 PM
How far is "may be far enough downstream?" Quantify this and defend.

However, the densities of macrophytes on the Lake are hindering motor boats and jet skiers' ability to leave their docks and individuals from swimming near shore. They also diminish the viewshed of the Lake, and uncollected harvested portions of the weeds wash up onshore and release odors as they decay. For the past twenty-five years, mechanical harvesting has been the main method for managing macrophytes' interference with recreational activities. Harvesting, however, has not been sufficient to address the increasing problems of invasive weeds.

In the 2017 MMS, the majority of residents (83%) listed the condition of the Lake as declining, in large part due to the presence of the invasive macrophytes. (EcoLogic 2017). Many suggested that herbicides should be used to combat the invasive weed problem. *Id*. While not a permanent solution, the use of herbicides is one tool in the weed management toolkit that will help maintain Chautauqua Lake as a destination for those seeking Lakefront property and tourists alike.

In discussing the potential impacts of the proposed project on open space and recreational resources, we first must understand the socioeconomic implications of recreation, open space and tourism related to the Lake. The overall impact of the herbicide application on the socioeconomics of the region is projected to be positive as it may lead to increased property values and will increase the ability to use the Lake for recreational pursuits.

In 2015, the University of Vermont (Voigt 2015) published "An Assessment of the Economic Value of Clean Water in Lake Champlain." (Id.). Multiple studies have looked at the effect of the presence of Eurasian watermilfoil on property values and have found that its presence alone causes property values to decline. A 2010 study on Lakes in Vermont concluded that "Eurasian watermilfoil significantly and substantially affects Lakefront property values." (Zhang, 2010). The higher the percentage invasion of milfoil, the higher the decrease in value of nearly properties. (Id.). Another 2009 study concluded that Eurasian watermilfoil infestations in Wisconsin reduced average property values by approximately 8%. (Id.).

In addition, Eurasian watermilfoil hinders recreational pursuits. It clogs boat propellers and causes the motors to overheat, makes it difficult to swim along shores, and forces individuals to tow their jet ski equipment to the middle of the Lake before it can be used. A2017 study in Washington State estimated that the presence of Eurasian watermilfoil in 12% of the states' Lakes and rivers resulted in a $5.14 million direct negative economic impact to boating in the state. (Mefford, 2017).

Given this data and other states' experience, the application of herbicides will assist the socio-economics of the region and enhance people's ability to use the area's community facilities.

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Author: User1 Date: 2/19/2018 2:57:18 PM -05'00'
this is more likely from motor boats than harvesters.

Author: User1 Subject: Highlight Date: 3/14/2018 2:43:22 PM
Substantiate this statement. It was the same argument used by Grand Lake St. Mary's that now has signs posted not to touch the toxic water.

As to the potential negative impacts, recreational use of the Lake will be restricted during the application itself to allow the application to take place safely and efficiently. Additional water use restrictions will be in the place depending on the product used. These restrictions are temporary and will be lifted once it is determined that it is safe.

Swimming Restrictions – Swimming is restricted in the application area during any application. This is both a safety consideration for boat operation, as well as an opportunity for the herbicide to disperse through the water column. In the event that swimmers are noted adjacent to an application area, the applicator shall halt application and advise Lake users to leave the area before resuming application. In addition to the restriction during application

- Renovate – The NY product label (SLN 24(c) - NY-060001) requires a 3 hour restriction on swimming following application.
- Navigate – NYS law (6 NYCRR 327.6) restricts swimming for 24 hours following 2,4-D application.
- Aquathol® K – The NY label (SLN No. NY-080004) restricts swimming until the day after application.

Recreational Fishing Restrictions – There would be a 24-hour fishing restriction for areas in which Navigate is applied. Given the size of the Lake and the relatively small treatment areas, boat fisherman can simply fish other areas of the Lake for the brief duration of any restriction; therefore, this restriction mainly impacts fishing from the shoreline in application areas.

Concerns have been raised that use of the herbicides will lead to declining tourism, especially in the fishing industry, due to the possible harmful effects of the herbicides' on fish and fish spawning. According to available literature, toxic effects to fish are not expected when application is performed according to the label.

4.6 HISTORIC AND CULTURAL RESOURCES

Archeological and historic sites in the area will not be impacted by the application of herbicides to the lake therefore there will be no significant impacts to historic or cultural resources.

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Author: User1 Date: 2/19/2018 2:59:50 PM -05'00'
references?

4.7 WATER SUPPLY AND INFRASTRUCTURE.

4.7.1 PUBLIC WATER SUPPLY

There are four major utilities located on or near Chautauqua Lake. Both the City of Jamestown and the Village of Mayville use groundwater drawn from underground aquifers to supply water to their customers. Jamestown also provides water to several surrounding communities. The aquifer used by the City of Jamestown is the Conewango aquifer, which is not connected to the lake, and will be unaffected by the proposed action. The aquifers being used by Mayville are confined and not vulnerable to surface water contamination.

The only major public utility located along Chautauqua Lake that uses surface water is the Chautauqua Utility District, which provides drinking water to the residents and visitors to the Chautauqua Institution and others. A major private water district is the Chautauqua Heights Water District. The labels for the proposed herbicides state that they should not be placed within 600 feet to 1300 feet (depending on type and concentration) from a water supply intake and have limitations on the concentrations that can enter these systems (see previous product descriptions). The Chautauqua Utility District intake is located over 2 miles from the nearest treatment area and is north and upiake of the treatment area. Concentrations of the herbicides to be applied and the dilution modelling show that the concentrations at this intake we be several orders of magnitude less than the drinking water standards. The Plan also includes not using Renovate in the areas closest to this water intake. Renovate will be used only in the southern end of the south basin of the Lake.

4.7.2 PRIVATE WATER USERS

The vast majority of residents surrounding the lake depend upon groundwater, either from public well systems or private wells, discussed in the groundwater sub-section.. There are also other private users who use the lake as a source of drinking water. The Chautauqua Heights Water District located in the Dewittville, as well as individual homeowners, use surface water from the Lake. These users could potentially be affected if the herbicide exceeds levels that are safe for human consumption.

In the case of the Chautauqua Heights Water District, it is located miles north of the closest treatment area and concentrations of the herbicides to be applied and the dilution modelling show that the concentrations at this intake we be several orders of magnitude less than the drinking water standards.

Because the number of private properties that draw surface water from the Lake is unknown, every shoreline resident in the notification zone will be notified when herbicide treatments are taking place. Residents who rely on surface water intakes in

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Author: User1 Date: 2/19/2018 3:02:44 PM -05'00'
now that herbicides have been used, other lake-shore land owners may self-treat their dock areas, which could be next to CUD's intake. The precedent has been established that herbicides are "ok" to use and this will be an issue.

Author: User1 Date: 2/19/2018 3:05:00 PM -05'00'
Include this model for review. The only model is a dilution model, there is not a transport or dispersion model to substantiate this statement.

Author: User1 Date: 2/19/2018 3:07:15 PM -05'00'
all statements above say there is no risk to humans. now this statement says may exceed levels that are safe.

Author: User1 Date: 2/19/2018 3:08:03 PM -05'00'
include this model for review

the Lake for potable use and whose water intakes are within the notification areas will be provided with bottled water, if requested, for the duration of the restriction period.

In addition, ac notice will be sent to shoreline residents with product specific information that delineates restriction periods for swimming/bathing, fishing, animal consumption, drinking, culinary, or food processing purposes and irrigation. Residents using Lake water for potable and domestic use will need to refrain from that use until the required herbicide concentration threshold of 0.050 mg/L is met.

4.8 UNAVOIDABLE ADVERSE ENVIRONMENTAL IMPACTS

Impacts associated with the application of herbicides for this project will be short term. No long term environmental impacts are expected.

4.8.1 IMPACTS TO WATER COLUMN

The decay of plants controlled by the herbicide will consume dissolved oxygen, and potentially release nutrients to the water column. The relatively small size of the application areas compared to the entire Lake area and the proposed spring application will minimize these impacts.

Decomposition of the affected macrophytes will occur in the water column. Because this is an aerobic process, dissolved oxygen will be consumed and a portion of the nutrient material held in the biomass will be released to the water column. The dissolved oxygen could impact aquatic organisms while the nutrients may contribute to existing algal blooms. These impacts will be minimized by the method, scope, and timing of the proposed application. The early treatment is planned to kill the affected macrophytes before biomass reaches the high levels typical of mid-summer. However, the benefit of low biomass at the time of treatment is somewhat offset by the release of some nutrients prior to the growing season for planktonic algae.

4.8.2 IMPACTS TO PLANT BIOMASS

The application of herbicides is anticipated to affect the overall density and abundance of aquatic plants. In addition, application of an aquatic herbicide will impact some species of aquatic plants in the treatment area, and result in reduced plant biomass and coverage, at least temporarily.

The herbicide treatment program will eliminate susceptible species of macrophytes in Chautauqua Lake. The program is designed to target the invasive plant species Eurasian milfoil and curlyleaf pondweed. However, there will be some native plants affected by the herbicide treatments. These plants may include water star grass,

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Author: User1 Date: 2/19/2018 3:09:39 PM -05'00'
this does not sound like safe herbicides

Author: User1 Date: 3/14/2018 3:44:13 PM
where is the science to show this?
what about the increase of HABs due to available nutrients?

Author: User1 Date: 3/14/2018 3:43:00 PM
vague syntax; "could" impact organisms? so it can impact?

Author: User1 Date: 2/19/2018 3:12:06 PM -05'00'
when? during spawning season?

Author: User1 Date: 3/14/2018 3:43:11 PM
show the science behind this statement? references? define "temporarily"

spatterdock and coontail, notably in areas where Navigate or Renovate are applied at 2.0 ppm or higher.

4.8.3 IMPACTS TO FISH AND FISH SPAWNING

During the treatments, there may be some effect on fish-spawning and rearing because the treatment timing overlaps with fish spawning periods and identified spawning habitat in the Lake for a number of species. Fish rearing may also be impacted as plants die back during a time when young fish using plant beds as refuge are vulnerable to predation, especially in locations where target weeds are most prevalent. These effects may occur in approximately 25% of the zones identified as fish spawning and/or rearing zones in the MMS. No data has been found that either substantiates or negates these potential impacts. In the short to longer term, the re-emergence of a native plant assemblage after treatment should improve conditions for native fish species. The plant beds should be more diverse and contain fewer non-native plants. With regards to muskellunge spawning, the proposed treatment areas do not overlap with three identified muskellunge spawning areas. In addition, treatment will be planned in conjunction with the NYSDEC to minimize any effects on the NYSDEC's annual collection of muskellunge eggs from the Lake the first week in May.

4.8.4 IMPACTS TO INVERTEBRATES

There is the possibility that mussels may be adversely affected by some of the treatments. It should be noted that mussels are found in less than 20% of the proposed treatment areas. A goal of the program is to change the invasive dominated plant community to one closer to the native plant community for Chautauqua Lake. This native plant community should be functionally better suited and more stable for all of the aquatic and land-based organisms which utilize it, ultimately resulting in a more robust aquatic community.

4.8.5 IMPACTS TO HUMAN USE OF LAKE

As indicated above, swimming is restricted for 3-24 hours, depending on the product used in addition to the time that the application is being conducted. The exposure and risk assessment for Aquathol® K contained in the 2000 Draft SEIS on Aquatic Herbicides (Washington State) indicates that, based on an application of 5 ppm endothall, and assuming no degradation and 100% absorption, a person can swim daily in the treated water and never reach the lowest NOEL endothall dose of 2.6 mg/kg/dy. The same document states in reference to 2,4-D (Navigate) that dermal contact with vegetation may present limited risk one hour after application. After 24 hours, post-application non-carcinogenic risk is essentially nonexistent, as 2,4-D is unavailable for dermal uptake.

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Author: User1 Date: 3/14/2018 2:58:12 PM
Herbicide impacts to survival of newly hatched fry of prey species that musky and walleye young of year depend on for food. .

Author: User1 Subject: Highlight Date: 3/14/2018 2:43:30 PM
Quantify this. Where are the studies? "may be some effect"

Author: User1 Date: 2/19/2018 3:15:13 PM -05'00'
then why proceed before establishing these data?

Author: User1 Date: 2/19/2018 3:16:51 PM -05'00'
invasive species "invade" first. this goal is not grounded in science.

There will be the following restrictions on the use of lake waters for drinking and other purposes following the application of the product in accordance with their product labels.

Aquathol® K (endothall)

1. Swimming restricted until the day after application.
2. Fishing or fish consumption not restricted.
3. Drinking of treated water restricted until concentrations are <50 ppb.
4. Irrigation use of treated water not restricted.

Navigate (2,4-D)

1. Swimming restricted for 24 hours.
2. Fishing restricted for 24 hours.
3. Drinking restricted for 24 hours and until concentration are <50ppb.
4. Irrigating restricted for 24 hours (mandatory per NYS law), and either 21 days or until measured concentration <100 ppb, or label-specified setbacks are followed.

Renovate 3 (triclopyr)

1. Swimming restricted during application and for 3 hours after.
2. Fishing or fish consumption not restricted.
3. Drinking restricted until concentrations are <50 ppb.
4. Irrigation restricted for 120 days or until concentrations are <1 ppb.

4.9 CUMULATIVE IMPACTS

None. Once applied, the products will dissipate. No negative effects from any synergistic interactions between herbicides are expected. These products have been used together in treatments at other lakes, and there have been no cumulative effects. No negative effects were observed as a result of the use of both Aquathol K and Navigate in Bemus Bay in 2017.

4.10 GROWTH INDUCING IMPACTS

None. No growth inducing impacts of the proposed action are anticipated.

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Author: User1 Date: 2/19/2018 3:18:11 PM -05'00'
what about near shore wells?

Author: User1 Date: 2/19/2018 3:18:21 PM -05'00'
what about near shore wells?

Author: User1 Date: 2/19/2018 3:18:27 PM -05'00'
what about near shore wells?

Author: User1 Date: 2/19/2018 3:19:26 PM -05'00'
it is on the label not to mix because the synergistic relationships are NOT known.

Author: User1 Date: 2/19/2018 3:20:10 PM -05'00'
this was the most effectively treated area, possibly because of a synergistic interaction?

Author: User1 Date: 3/14/2018 3:33:51 PM
what is the course of action if there is?

5.0 MITIGATION MEASURES

The mitigation measures discussed in Section 4 and any additional measures are consolidated in this section for easy reference and review. One of the key requirements imposed by SEQR is that agencies insure that significant adverse environmental impacts are minimized or avoided to the maximum extent practicable. Draft EIS's (and DSEIS's) should propose mitigation measures. The lead agency is then responsible for the decision, subject to the rule of reason, of which mitigation measures should be incorporated in the FSEIS.

For this proposed project, the herbicide treatment plan has been designed to minimize impacts and the plan itself is one of the primary mitigations.

The proposed plan is to apply herbicide treatment early in the year. Aquatic herbicide applications in general, and systemic herbicides in particular (like the three herbicides proposed for this project) target the growth stage of plants for greatest efficacy, since new growth is less hardy and translocation of the herbicide throughout the actively growing plant is more effective. Treatment in spring also reduces concerns for oxygen depletion, since colder water holds greater oxygen capacity, and younger, smaller plants have less biomass to decay. Eurasian watermilfoil tends to grow in the early spring, well before most native plants, therefore treatment of Eurasian watermilfoil is recommended prior to Memorial Day weekend assuming permit approvals are received.

Prior to Memorial Day, air temperatures average less than 70 degrees (several weather sites reported 65 -69 degree averages), which limit the popularity of swimming among many people. Based on historical observation, swimming and recreational boating seasons usually begin on Memorial Day weekend, and are most popular thereafter on weekends until late June when schools are out for the summer. Herbicide application on Chautauqua Lake is not expected to overlap with the school vacation period. Moreover, herbicide application typically occurs during the week, most often between Tuesday and Thursday. Applications are also typically not scheduled on Fridays to mitigate impacts on weekend Lake use.

Applications typically start in the morning, and can last the entire day or multiple days depending on the scope of the application. Applicators are reluctant to end a treatment operation before dusk if it can minimize the total number of days spent at a site. Applicators are conscious of increased activity on the Lake after normal school and work hours.

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Author: User1 Date: 3/14/2018 2:58:21 PM
They are using this to justify minimal impacts so should there be a temperature range for treatment?

Author: User1 Date: 2/19/2018 3:22:31 PM -05'00'
by who, where? references?

5.1 HYDROLOGY AND WATER RESOURCES

5.1.1 SURFACE WATER RESOURCES

Macrophyte decay following herbicide treatment has the potential to temporarily reduce dissolved oxygen levels and release nutrients into the water column. Based on the following proposed plan, these impacts will be minimized:

1. Treatment occurring early in the year when dissolved oxygen levels in the water column are higher and overall plant mass is smaller than later in the season.
2. The herbicides to be utilized are systemic herbicides that are selective and can be used at lower concentrations.
3. The treatment areas are balanced with non-treatment areas (spread out) to minimize oxygen depletion and allowing for other non-treatment areas to absorb released nutrients.

5.1.2 GROUNDWATER

Groundwater impacts primarily relate to the potential impact to private wells and public water supply systems that utilize the aquifers in the region of the Lake. Due to the nature of the Lake, the depth and location of the aquifers, the concentrations of the herbicide treatments and fate of the product in the aquatic environment, there should be no impacts to the aquifers in the area and therefore no impacts to public or private wells. No mitigations are needed.

5.2 TERRESTRIAL AND AQUATIC ECOLOGY

5.2.1 TERRESTRIAL AND AQUATIC ECOLOGY (PLANTS AND ANIMALS)

The products being proposed, at the concentrations recommended, and in accordance with the directions on their labels are expected to have a minimal impact on non-targeted plants, or on birds, mammals (including bats), amphibians or fish.

Vegetation

Overall invasive aquatic macrophytes will be reduced in the Lake. This is the goal of the project. The 2017 post treatment survey showed a native species “rebound” occurred in some of the treatment areas. (SOLitude, Dec. 2017) (Appendix E). It should also be noted that removal of the invasive macrophytes will increase habitat availability for native macrophyte species.

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Author: User1 Date: 2/19/2018 3:23:25 PM -05'00'
why doesn't CLP collect decaying masses, it can only help?

Author: User1 Date: 2/19/2018 3:25:33 PM -05'00'
and if there is? is the money in escrow to mitigate?
No groundwater flow model has been created to quantify zones of capture. this statement can not be absolute.

Author: User1 Date: 2/19/2018 3:28:28 PM -05'00'
this is a short sided goal. the impacts of next year's invasive plants establishing is not considered and the increase nutrients for HAB's also not considered. all of which are worse than nuisance weeds in your prop.

The impacts are small, due to the treatment plan, which includes the following:

1. Products and use rates have been selected to minimize or avoid impacts to ~~native macrophyte species.~~
2. Timing of applications (spring) is chosen to minimize or avoid impacts to native macrophyte species, particularly pondweeds that begin growth later in the season.

Birds

The proposed herbicides have do not have negative effects on birds. Therefore, no mitigations are being proposed.

Paper Pondshell Mussel

The only known occurrence of the Paper pondshell is at the north end of the north basin well away from any treatment area (Racine-Johnson 2017). Therefore, no mitigations are being proposed.

5.2.2 RARE, THREATENED, AND ENDANGERED SPECIES

Kidney Shell Mussel

It is unknown if this species is currently present in Chautauqua Lake. It was found in 2008 near Bemus Point, just within the southern boundary of the proposed Bemus Bay treatment zone (EcoLogic 2017) but was not found in the mussel survey in 2016 (Racine-Johnson 2017). No mitigations are proposed.

Pied Bill Grebe

This protected bird has been reported to make Fall/Winter stops in Chautauqua Lake. No other mitigations are being proposed as treatment of the lake will occur in the spring season.

Bald Eagle

Bald Eagles are a threatened species. Two Bald Eagle nests have been documented within a ½ mile of Chautauqua Lake. Individual eagles may travel up to a mile from documented locations. The proposed herbicides have not been found to have negative effects on birds. Therefore, no mitigations are being proposed.

Spiny Soft-Shell Turtle

The spiny soft-shell turtle was reportedly found in Sunset Bay within the treatment zone. However, it is not been reported in any of the treatment zones in recent years. Therefore, no mitigations are being proposed.

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Author: User1 Date: 2/19/2018 3:29:46 PM -05'00'
certainly hope so, but not data has been shown to prove this.

Author: User1 Date: 2/19/2018 3:29:08 PM -05'00'
time line not shown. is this all in one day?

Author: User1 Date: 3/14/2018 2:58:30 PM
What about waterfowl feeding on veg?

Author: User1 Date: 3/14/2018 2:58:37 PM
Not a good excuse to ignore a SGCN because it has not been reported in recent years.

Potamegeton hillii

The proposed project may have a small impact to this plant that could be found in the treatment areas. Hill's Pondweed (*Potamogeton hillii*) is thin-leaved pondweed typically associated with alkaline waters. The plant is found from late Spring (mid-June) through early Fall, and is best identified when fruiting, since it is readily confused with similar species such as Leafy Pondweed. Hill's Pondweed populations can fluctuate widely, and at times have been known to disappear entirely. (NY Natural Heritage Program).

Hill's Pondweed was found in Chautauqua Lake by Robert Johnson (now Racine Johnson Ecologists) in 2004 and in 2007. In the 2007 survey, the plant was found in 12 locations, a 1.7% occurrence. Surveys by Racine Johnson in 2010 and 2011 did not find Hill's Pondweed in the lake. A single location was found in the Greenhurst section of the lake in 2012. In Spring 2017, Racine Johnson documented 121 occurrences of Hill's Pondweed, primarily along the lake's east shoreline from the Greenhurst section to the north end of the lake. Two occurrences were also documented in the vicinity of the Chautauqua Institution. In the follow-up survey in the Fall of 2017, Hill's Pondweed was not found. (Racine-Johnson, 2017).

Hill's pondweed is a monocot, therefore it is unlikely to be harmed by the application of Renovate or Navigate, since both products are selective to dicots. Hill's Pondweed is not listed on the Aquathol K label as a susceptible species, but most pondweeds are susceptible to Aquathol K. Aquathol K is not known to impact pondweed seeds. There are three treatment areas where Aquathol k is proposed and Hill's Pondweed was found in 2017; Bemus Bay, Sunset Bay and Stockholm/Greenhurst (Appendices D and E). Treatment of the lake is planned for May, before the vegetative portions of the plant are present in the water column, so impact to Hill's Pondweed is not expected. No further mitigations are proposed.

5.2.3 FISH AND AQUATIC ANIMALS

Adult Fish Population

As discussed in previous sections, impacts to the general adult fish population will be small, based on the treatment plan which includes staged treatment and staggered locations of treatment. To mitigate any impact, treatments start along the Lake shoreline, and work out into deeper water, so that fish are free to move into other areas of the Lake temporarily while the application occurs. The staggered treatment areas will also provide refuge areas for fish.

In addition, treatment will occur early in the season, which provides a wider safety margin for dissolved oxygen levels, since water temperatures of 60-68 F have an oxygen saturation level of 9-10 ppm, while water temperatures in the 75-80F range in mid-summer have a saturation rate of 8-8.5 ppm.

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Author: User1 Subject: Highlight Date: 3/14/2018 3:34:14 PM
"unlikely" but could be. And with mixing herbicides their unstudied synergistic interactions could harm.

Author: User1 Date: 3/14/2018 2:58:45 PM
Need to address impacts to newly hatched fry and young of year fish.

Fish Spawning / Rearing Areas

Some treatment areas include areas classified as fish spawning and/or rearing areas by the NYSDEC (which are shown in the MMS). The proposed treatment areas cover about 25% or less of fish spawning and/or rearing areas noted in the MMS report. In addition, the proposed treatment is not projected to have a significant impact on muskellunge spawning given that the proposed treatment areas do not overlap with the three identified muskellunge spawning areas. Treatment will be planned in conjunction with the NYSDEC to minimize any effects on the NYSDEC's annual collection of muskellunge eggs from the Lake the first week in May.

5.2.4 WETLANDS

The proposed treatment areas are not located in any wetland area or 100 foot regulated adjacent area. Therefore, there are no significant impacts to wetlands that need to be mitigated. Potential impacts to plants and animals that may reside in these areas and potential mitigations are discussed below.

5.3 AGRICULTURAL RESOURCES

There are no direct impacts to agriculture but one potential indirect impact is the use of herbicide treated water for irrigation. No farmers are withdrawing water in amounts that require a DEC permit, although there may be farmers that withdraw smaller volumes. Due to the proposed timing of the treatment (in early spring), there would be little or no expected use of waters for irrigation. The treatment strategy, focusing on selective application areas rather than a larger application block, also helps to mitigate irrigation restrictions, since smaller plots dilute herbicide concentrations more quickly. Herbicide concentration testing will be performed to facilitate removal of irrigation restrictions.. Since there are no farms on the lake, any farmers will be located downstream of the outlet. Herbicide levels in these locations will be low.. If farms are found in these downstream areas, they will be notified of the treatments.

5.4 OPEN SPACE AND RECREATION FACILITIES

Impact to the use of community facilities will be mitigated through communication of the water use restrictions throughout the community. This communication begins with the NYSDEC public notification process, and extends to various community outlets.

1. The NYSDEC Pesticide Program Policy requires written notice be sent to riparian owners and users of the waterbody to be treated, and the specific treatment information to be included in that notification. The riparian owner/user notification letter is mailed to affected parties prior to or at the submission of the permit application materials to NYSDEC, and the date of mailing is referenced on the permit application form. Riparian owners/users

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Author: User1 Date: 2/19/2018 3:31:25 PM -05'00'
dilution model not supplied to assure this.

Author: User1 Date: 2/19/2018 11:20:16 AM -05'00'
quantify and show model input and results

Author: User1 Date: 3/14/2018 3:34:22 PM
Numbers 1-3 indicate that some lake users will be notified of any treatment. ALL lake users, both from public access points and any PRIVATE access point must be notified.

have 14-21 days to respond to that letter with their concerns before a permit can be acted upon.

2. Per the New York Environmental Conservation Law, public notification of the application must be made by posting the shoreline of the waterbody with the applicable water use restrictions in specified areas of the Lake. Y roved Aquatic Pesticide Permits will indicate the site specific posting requirements, such as poster sizes or posting distance intervals, if any. Article 33 of the Environmental Conservation Law mandates 33, posting for the use of Navigate must not exceed an interval of 250 feet between posters.
3. On-line notification of herbicide application and water use restrictions should be posted on the websites of all towns and villages within the treatment zones and CLP.

Lake Recreation – Mitigation of Water Use Restrictions

Each product has a specific set of water use restrictions dictated by the primary EPA product label, or by Supplemental or Special Local Needs label specific to the state of New York. These water use restrictions are specified below:

Aquathol® K (endothall)

1. Swimming restricted until the day after application.
2. Fishing or fish consumption not restricted.
3. Drinking of treated water restricted until concentrations are <50 ppb.
4. Irrigation use of treated water not restricted.

Navigate (2,4-D)

1. Swimming restricted for 24 hours.
2. Fishing restricted for 24 hours.
3. Drinking restricted for 24 hours and until concentration are <50ppb.
4. Irrigating restricted for 24 hours (mandatory per NYS law), and either 21 days or until measured concentration <100 ppb, or label-specified setbacks are followed. (Proposed treatment areas will either adhere to setbacks, or monitor concentrations to remove this restriction).

Renovate 3 (triclopyr)

1. Swimming restricted during application and for 3 hours after.
2. Fishing or fish consumption not restricted.
3. Drinking restricted until concentrations are <50 ppb.
4. Irrigation restricted for 120 days or until concentrations are <1 ppb.

As indicated above, swimming is restricted for 3-24 hours, depending on the product used. For Aquathol® K, the 2000 Draft SEIS on Aquatic Herbicides (Washington State) noted that based on an application of 5 ppm endothall, assuming no degradation and 100% absorption, the exposure and risk assessment indicate that a person could swim

This page contains no comments

daily in the treated water and never reach the lowest NOEL endothall dose of 2.6 mg/kg/dy. The same document states in reference to 2,4-D (Navigate) that dermal contact with vegetation may present limited risk one hour after application. By 24 hours, post-application non-carcinogenic risk is essentially nonexistent, as 2,4-D is unavailable for dermal uptake.

In addition to the considerable margin of safety built in to the product label guidance, mitigation of impacts from swimming will be reduced by recommending that public beaches at Long Point State Park and Lakewood be closed for the duration of the application, and for a period of 24 hours after completion of the application.

Negative effects of the application of herbicides on community parks and beaches and the effects of the temporary closing of these facilities will be minimized by applying herbicides in the spring to avoid the summer tourist season.

Notifications that herbicides will be applied and the date of application will be provided to the New York State Parks, Recreation, and Historical Preservation, NYSDEC, any towns, villages, or local organizations that own land that provides public access to the Lake, and all other riparian owners in the treatment area or the restricted water use area. The notification will also be placed in the *Jamestown Post Journal* and on the website of the locality that is undertaking the application of herbicides.

In addition, notices stating that an herbicide has been applied, the date of application, and the associated water use restrictions will be placed along the shoreline of the treated area, water use restriction area, and all public access points to the Lake until water use restrictions are lifted.

5.5 WATER SUPPLY AND PUBLIC INFRASTRUCTURE

5.5.1 PUBLIC WATER SUPPLY (SURFACE WATERS)

There are two public water supplies in Chautauqua Lake and one for Jamestown. The Jamestown system acquires its waters from an aquifer that is not tied into the lake and therefore will not be impacted by the herbicide treatments. No mitigations are necessary. The other two systems take water from the lake and the treatment plan is designed to minimize or eliminate any potential impacts.

This treatment plan includes:

1. Location of the treatment areas will be greater than the required setback distance from public water intakes as specified by the products applied in each treatment area.
2. Dilution modeling showing that the concentrations are below standards at the intake.
3. Notification of public systems concerning treatment.

5.5.2 PRIVATE WATER SYSTEMS (SURFACE WATERS)

It has been reported in previous studies that some waterfront property owners utilize Lake water for drinking and other purposes such as irrigation of lawns and gardens. There is no accurate data available to illustrate where these users are and no methodology to accurately collect this data. To mitigate the potential impact to these property owners (public health issue), the following mitigations are proposed.

Mitigations:

1. Notification of property owners based on the development of a notification plan that ensures that residents in the area are aware of the treatment (mailings, signage, advertisement in newspapers, etc.).
2. Provision of drinking water upon request to those who rely on water from the Lake within the treatment zone and do not have other sources of potable water.

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Author: User1 Date: 2/19/2018 3:32:27 PM -05'00'
include model for review

Author: User1 Date: 2/19/2018 3:33:04 PM -05'00'
what about mitigation if public supplies are contaminated? money in escrow?

6.0 ALTERNATIVES ANALYSIS

6.1 INTRODUCTION

An EIS requires the discussion and analysis of reasonable, feasible alternatives which would allow some or all of the adverse impacts to be avoided or reduced, while satisfying the goals of the project and its sponsor. The SEQR law requires the analysis of a "No Action" alternative. Other alternatives that are evaluated could include sites, technologies, scale, magnitude, design, timing, uses and types of actions.

6.2 NO ACTION ALTERNATIVES

For this Supplemental EIS, the No Action alternative includes two options, as requested by NYSDEC: an "As Is" alternative (no herbicides, with continued mechanical harvesting), and an alternative with no herbicides and no mechanical harvesting. Other alternatives evaluated are the types of herbicides and application methodology (concentrations, locations, and timing).

Both no action alternatives contemplate continued nutrient reductions at the current level. Continued nutrient reductions alone will not likely address the proliferation of Eurasian watermilfoil and curly leaf pondweed.

According to the 2012 TMDL, the greatest sources of phosphorous loads into the Lake are from agriculture and internal loading (i.e., nutrients being released from decomposing sediment on the Lake bottom) (Cadmus 2012). To date, there are no requirements—only recommendations—that farms within the Lake's watershed decrease their use of phosphorous and there are no Lake-wide efforts to remove the sediment from the Lake bottom. While there are multiple ongoing campaigns around Chautauqua Lake, including the Chautauqua Watershed Conservancy's "Don't Feed the Weeds" program, which aim-to inform residents how they can prevent the total nutrient loads in the Lake from increasing, these programs are voluntary and only affect the eutrophication potential of the Lake. (Cadmus 2012). They do not address current issues, such as invasive weeds, that have arisen due to the current level of eutrophication of the Lake. (Id.).

As the NYSDEC has recognized, "TMDL designated load reductions alone may not be sufficient to address all concerns of eutrophic lakes, such as invasive weeds." (Cadmus 2012). The macrophyte beds are currently nutrient rich as the result of years of nutrient and sediment loading to the Lake. Macrophytes derive much of their nutrients from the sediments although they may take some nutrients from the water column (Wagner 2004). As a result, a reduction in water column nutrient concentrations may not, by itself, be sufficient to reduce macrophyte biomass.

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Author: User1 Date: 3/14/2018 3:36:27 PM
1) increase mechanical harvesting
2) reduce nutrients into lake
3) extend docks beyond plant growth
4) conduct more science

Author: User1 Subject: Highlight Date: 3/14/2018 3:34:36 PM
"not likely" then this should be studied. How does an X% reduction of nutrient effect growth?

Author: User1 Date: 2/19/2018 3:37:38 PM -05'00'
neither has the use of 2,4-d in other lakes, see New Hampshire

Author: User1 Date: 2/19/2018 3:39:55 PM -05'00'
MAY NOT, so do the science and see if it will, seems like a safer, longer-term plan

The long-term accumulated mass of nutrients in the sediments may fuel macrophyte growth into the foreseeable future even with substantial reductions in nutrient loading to the Lake. Annual growth of macrophytes will return a large portion of their accumulated nutrients to the sediments as they die at the end of the growing season.

6.2.1 CONTINUED NUTRIENT REDUCTIONS AT CURRENT LEVEL AND CONTINUED MECHANICAL HARVESTING WITHOUT HERBICIDE TREATMENT

The most often recommended alternative by those who oppose the application of herbicides is to continue with the status quo—that is, to continue the voluntary efforts to reduce nutrient loads in the Lake in accordance the 2012 TMDL and to continue mechanical harvesting throughout the summer. This alternative has not reduced the proliferation of Eurasian watermilfoil and curlyleaf pondweed. As the NYSDEC has recognized, "TMDL designated load reductions alone may not be sufficient to address all concerns of eutrophic lakes, such as invasive weeds." (Cadmus 2012). Mechanical harvesting of aquatic macrophytes is akin to mowing one's lawn or pruning your bushes. That is, it cuts off the tops of the macrophytes but does not affect their root systems. An advantage of mechanical harvesting is that there are no water use restriction.

Disadvantages of mechanical harvesting include that it is time and labor intensive, must be performed multiple times throughout the season, and can negatively affect fish by catching them in the harvesters. In addition, l cut weed fragments cause Eurasian watermilfoil to propagate and thus increase the macrophytes' densities in the Lake.

Data collected between 2007 and 2017 reveals that the densities of invasive weeds in areas of Chautauqua Lake, such as Bemus Bay, have increased over the last ten years. The MMS notes that there were only scattered amounts of Eurasian watermilfoil and trace amounts of curlyleaf pondweed in the Bay. (*See* MMS Map 11-2A, EcoLogic 2017). By May 2017, these macrophytes were present along almost the entire Bay coastline and at dense or medium density for approximately half of the data points tested. (SOLitude June 2017) (Appendix F).

The increase in densities of Eurasian watermilfoil was seen Lakewide. In the 2007 survey, Racine-Johnson found Eurasian watermilfoil present at 72% of the 716 sampled Lake locations. (Johnson, 2007). By 2016, Eurasian watermilfoil was found at 84% of the sample points. (Johnson, 2016). The following year, Eurasian watermilfoil was found at approximately 89% of the locations surveyed. (Johnson 2017). In 2017, the levels of Eurasian watermilfoil were medium to dense in 23% of the rake toss samples, a 3% increase from the previous year. (Johnson, 2016; Johnson 2017).

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Author: User1 Date: 3/14/2018 3:34:55 PM
quantify in a study then. "foreseeable" is not scientific.

Author: User1 Date: 2/19/2018 3:42:35 PM -05'00'
but does not leave the bottom bare, and not susceptible to invasive expansion. like herbicides will.

Author: User1 Date: 2/19/2018 3:43:51 PM -05'00'
again, define sparse and trace. this is misleading.

Studies on the effects of mechanical harvesting on Eurasian watermilfoil suggest that 25 years of unregulated mechanical harvesting may have contributed to the increased propagation of milfoil. The New York State Federation of Lake Associations, Inc.'s *Diet for a Small Lake, the Expanded Guide to New York State Lake and Watershed Management* and NYSDEC Division of Water's *Primer on Aquatic Plant Management in New York State*, state the fact that harvesting affects plant communities:

> Plant communities may be altered by harvesting. If both native and fast-growing exotic plants are cut equally, the exotic plants may grow back faster and dominate the plant community. This is especially true for plants that propagate by fragmentation, and these are usually the plants originally targeted for removal. Stressed plant communities often favor the selective growth of exotic plants. As with the backyard lawn, cut plants often rebound with more luxuriant growth.

(NYSFOLA, 2009; NYSDEC Div. of Water 2008).

There is not currently a plan for mechanical harvesting in Chautauqua Lake to ensure that Eurasian watermilfoil is not harvested along with other weeds. Such plan would likely be impossible in large portions of the Lake because mechanical harvesting " techniques are generally non-selective since the mechanical harvesters cut most all plants contacting the cutting bar. The machines cannot be easily maneuvered to selectively remove target plant species within diverse beds, particularly near the Lake shoreline." (NYSFOLA, 2009; NYSDEC Div. of Water 2008).

In addition, the failure to collect all weed fragments is also likely causing the densities of milfoil to rise. It is estimated that up to 10% of cut weeds remain unrecovered despite the fact that all fragments from harvesting are supposed to be removed. (EcoLogic 2017; NYSFOLA 2009). These fragments fall to the lake bottom and cause uncut plants to propagate further, it also can cause " oxygen levels [to] temporarily fall and nutrient levels, such as phosphorus, [to] rise." (NYSDEC Div. of Water 2008).

Therefore, it is not likely that relying on current nutrient reductions and mechanical harvesting is an adequate alternative to address invasive macrophytes.

6.2.2 CONTINUED NUTRIENT REDUCTIONS WITHOUT WEED CUTTING OR HERBICIDE TREATMENT

As the NYSDEC has recognized, "TMDL designated load reductions alone may not be sufficient to address all concerns of eutrophic lakes, such as invasive weeds." (Cadmus 2012). Currently, invasive macrophytes are controlled only through mechanical harvesting. The advantages of discontinuing mechanical harvesting are that it would save the expense related to the endeavor, reduce the rapid re-propagation of

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Author: User1 Subject: Highlight Date: 3/14/2018 3:35:07 PM
Show this study. How large of a fragment is need to re-plant? How much of that is due to motorboat propellers?

Author: User1 Subject: Highlight Date: 3/14/2018 3:35:11 PM
in other lakes (see NH), herbicides also have not corrected the milfoil problem, even after 10 years of treatments.

Author: User1 Date: 2/19/2018 3:45:35 PM -05'00'
this is the only method actually reducing the amount of nutrients in the lake. and reducing internal loading.

Eurasian watermilfoil caused by mechanical harvesting, eliminate its carbon footprint and reduce or eliminate other negative impacts, as discussed in the previous section.

The disadvantages of stopping mechanical harvesting include that human enjoyment of the Lake would be curtailed as use of the Lake for recreational activities would become more difficult as a result of the unimpeded invasive macrophyte growth throughout the growing season .

Neither of these "no action" alternatives, achieves the goals of this project, has significant benefits to the environment and meets the needs of the residents and users of the Lake, and therefore are not acceptable actions.

6.3 ALTERNATIVE: DIFFERENT HERBICIDES

Reward (diquat dibromide). Reward is a broad-spectrum, fast-acting, contact herbicide that is widely used for submersed aquatic plant control throughout the US. Its use is not recommended in Chautauqua Lake because the management plan focuses on selective control of invasive species, and the use of systemic herbicides which can provide some measure of extended control of the target plants.

Sonar (fluridone): Sonar is perhaps the most preferred aquatic herbicide for the control of Eurasian watermilfoil in sites where extended contact time is achievable. Sonar is highly water-soluble. Slow-release granular formulations are produced to increase exposure time with reasonable success, but effective treatment of partial Lake areas generally results in impacts extending beyond the application area. Depending on application rate, Sonar can be either broad-spectrum or somewhat selective. Based on the goals of the management program and the shoreline character of the proposed treatment areas, Sonar is not considered a cost-effective fit for Chautauqua Lake.

Clipper (flumioxazin): Clipper is a fast-acting, broad-spectrum, contact herbicide. Native plants are generally more susceptible to Clipper than Eurasian watermilfoil, making it not a good fit for Chautauqua Lake. In addition, Clipper's label language requires a 5 day irrigation restriction which, under NYSDEC current Downstream modeling program, could extend that irrigation restriction to the entire Lake and a considerable distance downstream.

Rodeo (and like products) (glyphosate): Rodeo is a contact herbicide used for emergent vegetation. It becomes ineffective in water, and does not impact submersed plants such as Eurasian watermilfoil.

This page contains no comments

6.4 APPLICATION ALTERNATIVES

6.4.1 DIFFERENT CONCENTRATIONS OF HERBICIDES

The expected application rate of Aquathol® K is 0.75-1.5 ppm. This assumes that Aquathol® K is targeting curlyleaf pondweed and contributing to the control of Eurasian watermilfoil, which are more susceptible than the many native pondweeds. Increasing the application rate of Aquathol® K would extend control to more native plants, including the native pondweeds, as well as coontail and naiads, which would not be desirable. Decreasing the application rate risks effective control of the target plants, inasmuch as dilution in each treatment area from the larger Lake may reduce herbicide contact time below the efficacy threshold.

The expected application rates of Navigate and Renovate are 1.0-4.0 ppm. In this rate range, both products are expected to control targeted Eurasian watermilfoil in the treatment area for the season, with potential positive impact the following year. Several of the proposed treatment sites are planned for less-than-maximum rate applications. Increasing the application rate in these areas would likely extend the duration of Eurasian watermilfoil control Product labels allow for a higher application rate, which may provide more prolonged control of Eurasian watermilfoil. The trade-off for this extended control would be a greater cost, and more likely impact to non-target species such as white water lily and coontail, which would be undesirable. Lower application rates than proposed would reduce or impair partial or shorter-term control of Eurasian watermilfoil.

6.4.2 DIFFERENT APPLICATION LOCATIONS

The location of the treatment areas have been determined by the community and supported by their municipality representatives to address nuisance weed growth, allowing residents greater use of their properties and greater access to the open Lake. Each treatment area has been mapped for plants, confirming the presence of the target species and providing justification and direction for the treatment. Extending the treatment zone further into the Lake would be beneficial, particularly in the Burtis Bay, Lakewood and Greenhurst sections where the littoral zone and the target plants occupy the Lake from one shoreline to the other. In fact, the entire littoral zone of the south basin has been identified by Solitude Lake Management as a potential management area for invasive plant control. Increasing the application locations could create problems with setbacks to water intakes, and would in general increase the concentration of the product in the lake. Eliminating locations would not achieve the goals of the project and the expectations of the residents of the area.

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Author: User1 Subject: Highlight Date: 3/14/2018 3:35:20 PM
in other lakes (see NH), herbicides also have not corrected the milfoil problem, even after 10 years of treatments.

Author: User1 Subject: Highlight Date: 3/14/2018 3:35:24 PM
So are you going to increase the rate or not? these statements lead me to think that over application is the solution to the problems stated.

6.4.3 APPLICATION FREQUENCY

Only a single application, or single application per product is planned for the proposed treatment areas in 2018. The size of the individual application areas (15-289 acres) and the planned application rates are sufficient to provide effective control of the target species with no significant impact to native plants and community facilities. A lower-dose “split-treatment” scenario may be used when retention of the herbicide is a concern, but that is not deemed necessary for the proposed treatment areas. (For example, a planned dose of 2 ppm may be split into two applications of 1 ppm and applied a day apart.) A follow-up application later in the summer would provide an opportunity to control target plants that re-infest application areas from other areas of the Lake. However, this follow-up late-season application(s) would have a greater impact on community facilities and Lake use, as well as on Lake ecology, and is not suggested at this time.

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Author: User1 Date: 2/19/2018 3:47:56 PM -05'00'
where, which parts? this needs to be spelled out.

7.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The application of herbicide will not result in any irreversible and irretrievable commitment of any resources. After application, the Lake and its natural resources will still be intact, except for reductions in non-native macrophytes. Levels of herbicides will quickly dissipate after treatment, and no long-term adverse impacts are anticipated.

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Author: User1 Subject: Highlight Date: 3/14/2018 3:35:34 PM
This has not been showed. There are areas where impacts may occur beyond just reducing weeds. Quantify "quickly dissipate" and "long-term." How long is quick? Are there short-term adverse impacts?

8.0 EFFECTS ON USE AND CONSERVATION OF ENERGY RESOURCES

The application of herbicide in Chautauqua Lake will have no negative and likely a positive impact on the use and/or conservation of energy resources. No new uses or structures are proposed that would result in an increase in energy usage. A modest amount of energy would be used during the process of applying the product but much less than the amount of energy used for mechanical harvesting in the same areas.

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Author: User1 Subject: Highlight Date: 3/14/2018 3:35:40 PM
I'm not sure how you arrived at this conclusion after the complete lack of science supporting a majority of the statements. It is still "likely positive" so there's an option for it to be negative.
There will be "no negative" impacts, I don't know how you can say that with the absence of supporting science, perhaps now is a good time to use "likely".

9.0 CONCLUSION

Based upon the discussions herein, the proposed application of the herbicides Aquathol K, Navigate (2,4-D), and Renovate is recommended to be performed in the proposed treatment areas in accordance with the NYS product labels and the above treatment plan and mitigations. Although some environmental impacts may result from the proposed application of herbicides (see Section 4.0), these impacts will be effectively mitigated (see Section 5.0). Overall, the removal of invasive macrophytes and the encouragement of a native plant community through the program outlined in this SEIS will result in improvement of the condition of Chautauqua Lake.

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Author: User1 Date: 3/14/2018 3:35:46 PM
so you can not mix 2,4-d with endothall as stated on the label.

Author: User1 Subject: Highlight Date: 3/14/2018 3:35:53 PM
This will be a slight reduction, momentarily at best, not a "removal"

Author: User1 Subject: Highlight Date: 3/14/2018 2:46:58 PM
Are you planting native plants in the herbicide treated areas? if not invasives will be the first to move in.

Author: User1 Subject: Highlight Date: 3/14/2018 3:36:02 PM
Now might be a good time to use your favorite word "likely"

Author: User1 Subject: Highlight Date: 3/14/2018 3:35:57 PM
A study showing the lake was impaired due to ALGAE not weeds. inhibiting weed growth will increase algae growth.

Articles Sent by General Public

Hydrobiologia (2005) 543: 71–78
DOI 10.1007/s10750-004-6822-7

Primary Research Paper

Anti-cyanobacterial fatty acids released from *Myriophyllum spicatum*

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Key words: allelochemical, fatty acid, *Microcystis aeruginosa, Myriophyllum spicatum*

Abstract

This study was carried out to identify unknown allelochemicals released from *Myriophyllum spicatum* and to investigate their anti-cyanobacterial effects. A series of analyses of culture solutions and methanol extracts of *M. spicatum* using gas chromatograph equipped with a mass selective detector revealed that *M. spicatum* released fatty acids, specifically, nonanoic, tetradecanoic, hexadecanoic, octadecanoic, and octadecenoic acids. Nonanoic, *cis*-6-octadecenoic, and *cis*-9-octadecenoic acids significantly inhibited growth of *Microcystis aeruginosa*, whereas tetradecanoic, hexadecanoic, and octadecanoic acids did not show any effect. When the inhibitory effect of nonanoic acid was compared with those of 4 polyphenols and eugeniin, which are anti-cyanobacterial compounds previously reported to be released by *M. spicatum*, nonanoic acid was found to be the most inhibitory to *M. aeruginosa*. These results indicate that not only polyphenols and eugeniin but also fatty acids such as nonanoic acid must be studied to reveal how *M. spicatum* exerts its allelopathic effect on *M. aeruginosa*.

Introduction

Certain macrophytes have been reported to contain anti-algal and anti-cyanobacterial compounds, which has led researchers to investigate the feasibility of controlling nuisance algal and cyanobacterial growth by using these fascinating macrophytes (Barrett et al., 1996; Ridge & Pillinger, 1996). Either living or withered macrophytes releasing anti-algal compounds such as allelochemicals can be used for algal growth control. For example, Ridge & Pillinger (1996) showed that rotting barley (*Hordeum vulgare*) straw inhibited algal growth and found that autoclaving the straw prior to use enhanced its anti-algal activity. We demonstrated growth inhibition of a cyanobacterium *Microcystis aeruginosa* by allelochemicals released from *Myriophyllum spicatum*. These results clearly indicate that some macrophytes can be used to control algal and cyanobacterial growth.

Myriophyllum spicatum, or Eurasian water milfoil, is a submerged macrophyte that inhibits the growth of cyanobacteria allelopathically (Gross et al., 1996; Nakai et al., 2000). Gross et al. (1996) showed that *M. spicatum* released the allelopathic compound hydrolyzable tannin (eugeniin), and its derivatives, ellagic and gallic acids. We found pyrogallic acid and (+)-catechin, in addition to ellagic and gallic acids, in the culture solution of *M. spicatum* (Nakai et al., 2000) and confirmed that these 4 polyphenols contributed to the allelopathic effect of *M. spicatum* on *M. aeruginosa* by comparing the growth-inhibiting effect of *M. spicatum* culture solution with that of a simulated culture solution prepared by estimating the release rates of these polyphenols from *M. spicatum*. The result showed that together these 4 polyphenols accounted for between 10 and 100% of the allelopathic effect of *M. spicatum*. Eugeniin may also contribute to the effect (Gross et al., 1996), and we expect that other unknown allelochemicals are also released from *M. spicatum*.

In order to understand the mechanism on the growth inhibition of cyanobacteria by the allelopathic effect of *M. spicatum*, allelochemicals must be identified. Therefore, we aimed to identify unknown allelochemicals released by *M. spicatum* and to investigate their inhibitory effects on the cyanobacterium *M. aeruginosa*.

Materials and methods

Cyanobacterium and Myriophyllum spicatum

Microcystis aeruginosa (NIES-87) obtained from the microbial collection of the National Institute for Environmental Studies (NIES), Japan, was used for cyanobacterial assays. *Myriophyllum spicatum* was collected from the Asakawa River, Tokyo, Japan, and then cultivated in a 20-fold dilution of Gorham's medium (Zehnder & Gorham, 1960) under a light intensity of 3000 lux at 25 °C. *M. aeruginosa* was cultivated in triplicate under a light intensity of 5000 lux in a modified C (CB) medium (Watanabe & Satake, 1991) at 25 °C for about 10–15 d, during which time its growth was monitored by measuring turbidity (T-2600 DA turbidity meter, Tokyo-Denshoku, Japan, Tokyo) to determine its maximum growth.

Fractionation

To collect unknown allelochemicals released from *M. spicatum*, its culture solution was subjected to a solid-phase extraction procedure combined with high-performance liquid chromatography (HPLC) fractionation. The *M. spicatum* culture solution was prepared by culturing the macrophyte in a 20-fold dilution of Gorham's medium at 100 g-wet wt l^{-1} for 3 d with rotation at 70 rpm, after which the culture solution was filtered through a membrane filter (0.22 1m). Five hundred milliliters of the filtrate was adjusted to pH 3 with 0.1 N HCl and then passed through a solid extraction cartridge (C18HD, 3 M Japan). Following methanol elution, the eluate was fractionated on an ODS column (TSK-gel ODS 80TS, 300 × 21.5 mm, Tosoh, Japan) at 25 °C using 2 eluents, eluent A (0.025% H_3PO_4 in water) and eluent B (0.025% H_3PO_4 in methanol), as follows: 0–55 min, 0–50% B; 55–92 min, 50–90%; and 92–100 min, 90–100% in the mixture, at a constant flow rate of 9 ml min^{-1}. Finally, the solid-phase extract was separated into 3 fractions according to the elution time: Fr. A, 34–64 min; Fr. B, 64–92 min; and Fr. C, 92–120 min. Although the HPLC was equipped with an ultraviolet detector (UV-8000, Tosoh, Japan), this detector was not used in the HPLC fractionation, to prevent allelochemicals from being destroyed. In the preliminary experiments, we confirmed that the previously reported allelochemicals gallic and pyrogallic acids and (+)-catechin (Gross et al., 1996; Nakai et al., 2000) were eluted in Fr. A (34–64 min) during HPLC, whereas the retention time of ellagic acid (Gross et al., 1996; Nakai et al., 2000) was 73 min (Fr. B) (data not shown). Unfortunately, eugeniin (Gross et al., 1996) was not analyzed, because we could not obtain an authentic sample. Each fraction was re-passed through the solid extraction cartridge followed by methanol elution, and then the resultant methanol eluate was dehydrated with sodium sulfate anhydrate. The inhibitory effect of each fraction was confirmed by cyanobacterial assays with *M. aeruginosa*, as described below.

Identification of allelochemical candidates

Fr. B, one of 2 fractions demonstrating growth inhibition of *M. aeruginosa*, was analyzed by using a gas chromatograph equipped with a mass selective detector (GC-MSD). Briefly, after full evaporation of the methanol eluate, the residue was treated with *N,O*-bis(trimethylsilyl)trifluoroacetamide (BSTFA, Tokyo Kasei, Japan) for 2 h at room temperature for trimethylsilyl (TMS) derivatization. Then the sample was dissolved in a small volume of *n*-hexane (100 1l) and subjected to GC-MSD analysis in electron ionization (EI) mode, as indicated in Table 1. Samples were identified by comparing the retention time and mass spectra of unknown samples with those of authentic samples. A methanol extract of *M. spicatum* obtained by a previously reported method (Nakai et al., 1996) was also fractionated and analyzed in the same manner to confirm that the identified compounds were released from *M. spicatum*.

Table 1. Operating conditions for GC/MSD

Gas chromatograph	Hewlett Packard 6890 series
Column	HP5-MS (30.0 m × 320 1m 0.25 1m)
Carrier gas	He (99.9999%), 1.3 ml min^{-1}
Oven temp.	50 °C (1 min); 10 °C min^{-1} to 280 °C; 20 °C min^{-1} to 310 °C
Injection mode	Splitless
Injection volume	1 11
Injector temperature	250 °C
Mass spectrometer	Hewlett Packard 5973 series
Ionization mode	Electron ionization (EI)
Mass interface temp	150 °C
Ion source temp	230 °C

Assaying allelochemicals

To confirm the anti-cyanobacterial activity of each fraction of the *M. spicatum* culture solution, each fraction was concentrated and assayed. Briefly, methanol in each fraction was evaporated in vacuo at 50 °C and passed through the C18HD solid extraction cartridge, followed by methanol elution. The methanol eluate of each fraction was concentrated to obtain a final volume of 100 11 and filtered through an autoclaved membrane filter (0.22 1m, Millipore). Finally, the filtrate was added to the CB medium (100 ml), which was immediately inoculated with *Microcystis aeruginosa* (about 10^4–10^5 cells ml^{-1}). Control experiments were performed by substituting methanol for the methanol solution. As for the identified compounds, each was dissolved in methanol and assayed by the same manner to determine whether they were allelochemicals. The assays were performed in triplicate. The inhibitory effects on the growth of *M. aeruginosa* were investigated by comparing the maximum growth affected by each fraction or identified compound with that in the control experiment. The amount of identified compound added in each assay was varied to obtain a dose-response relationship between each compound and its inhibitory effect.

Results

Fractionation of Myriophyllum spicatum *culture solution*

Fr. A and Fr. B inhibited the growth of *Microcystis aeruginosa* (Tukey: $p < 0.05$), but Fr. C did not show any effect on growth (Fig. 1). Although the fractionation of the *M. spicatum* culture solution and the subsequent assay were repeated, the results were similar each time (data not shown).

As mentioned before, Fr. A contained gallic and pyrogallic acids and (+)-catechin, and Fr. B contained ellagic acid. However, the inhibitory effect of gallic and pyrogallic acids on the growth of *M. aeruginosa* is much stronger than that of ellagic acid (Nakai et al., 2000). In addition, the concentration of ellagic acid in Fr. B was about 50 1g l^{-1}, much lower than 5 mg l^{-1}, the EC_{50}, the concentration at which ellagic acid inhibits maximum growth of *M. aeruginosa* to 50% of the control (Nakai et al., 2000). These results led us to suspect that Fr. B contained unknown allelochemicals with strong anti-cyanobacterial activities. Therefore, we focused on Fr. B in our further GC-MSD analysis.

Identification of allelochemical candidates

Many peaks can be seen on the total ion chromatogram obtained by the GC-MSD analysis of Fr. B (Fig. 2(a)). The mass spectral patterns of the peaks were identified by comparing them with patterns stored in the U.S. National Institute of Standards and Technology (NIST) mass spectral library ver. 2.0. Figures 3(a) and (b) respectively illustrate the mass spectral pattern of the peak occurring at 10.55 min and that of a nonanoic acid TMS derivative obtained from the NIST mass spectral library. These patterns show good agreement, thus suggesting that the peak at 10.55 min is a nonanoic acid (NA) TMS derivative. Similarly,

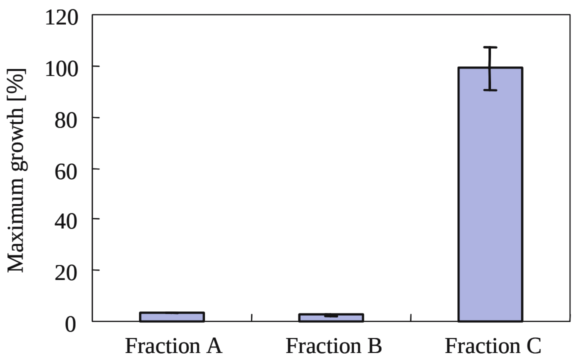

Figure 1. Effects of Fractions A, B, and C on maximum growth of *Microcystis aeruginosa*. Bars indicate standard deviation ($n = 3$).

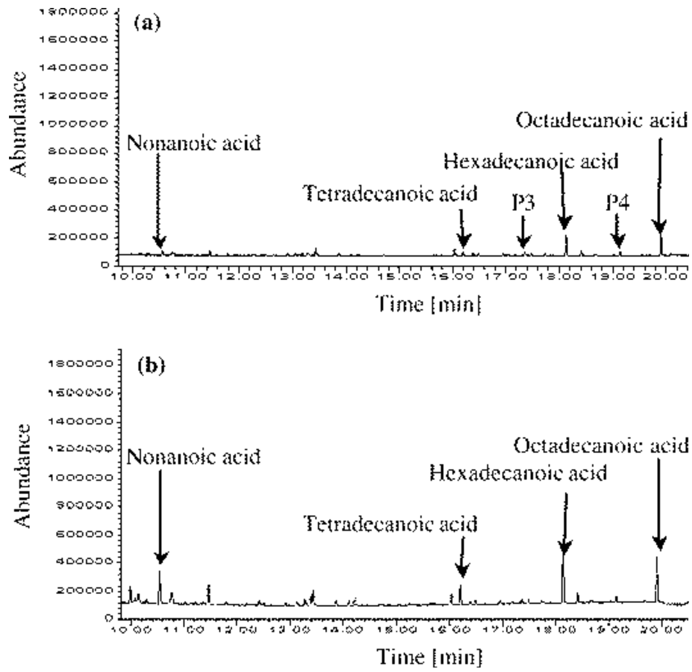

Figure 2. Total ion chromatogram of fraction B. (a) Not spiked, and (b) spiked with 4 fatty acids.

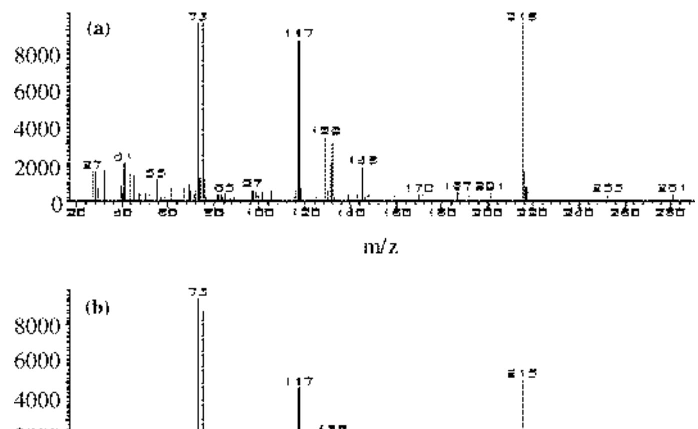

Figure 3. Comparison of the GC/MSD fragment pattern of the peak at 10.55 min (a) with that of the TMS derivative of nonanoic acid from the NIST mass spectral library (b).

the NIST mass spectral library search suggested the presence of tetradecanoic acid (TDA), hexadecanoic acid (HDA), and octadecanoic acid (ODA) in Fr. B, as shown in Fig. 2(a). The structures of these compounds are illustrated in Fig. 4. In order to verify the results obtained by the NIST mass spectral library search, we performed spike tests, in which a small amount of each authentic sample was added to Fr. B before the analysis was repeated. The results showed no change in the retention times, thereby confirming that Fr. B contained NA, TDA, HDA, and ODA.

As shown in Fig. 5, the mass spectral pattern of the peak eluting at 19.13 min (P4, Fig. 2(a)) matches

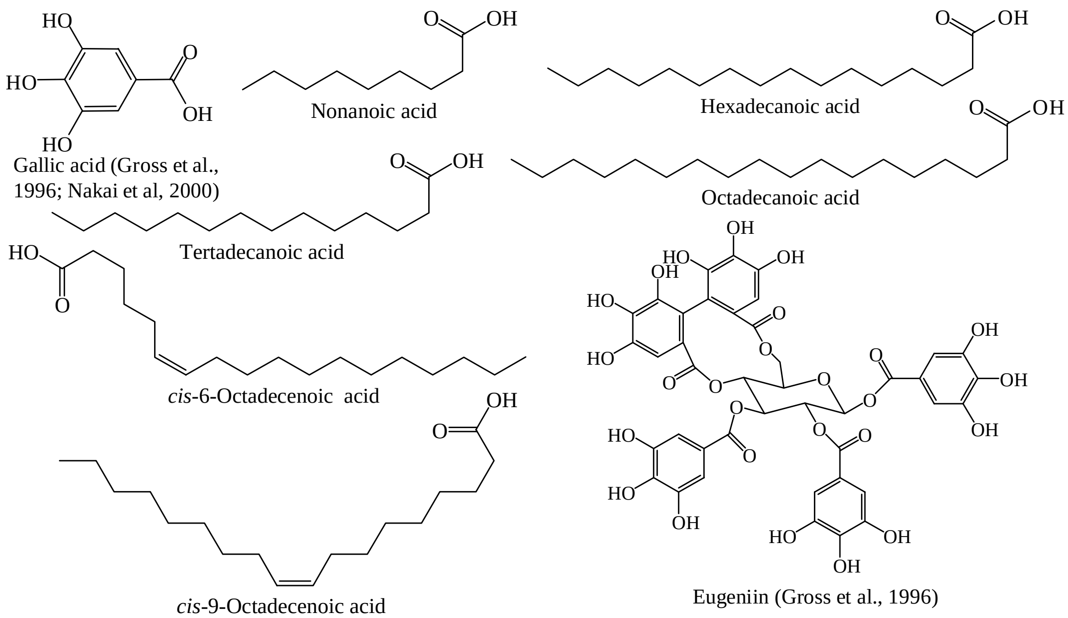

Figure 4. Structures of compounds released by *Myriophyllum spicatum.*

those of TMS derivatives of *cis*-6-octadecenoic acid (ODCA) and *cis*-9-ODCA obtained from the NIST mass spectral library, the structures of which are also illustrated in Fig 4. When authentic samples of *cis*-6-ODCA and *cis*-9-ODCA were analyzed by GC-MSD, their retention times were the same as that of P4 (data not shown). Thus *cis*-6-ODCA and/or *cis*-9-ODCA are present in Fr. B. Finally, the GC-MSD analysis showed the presence of NA, TDA, HDA, ODA, and ODCA(s) in the methanol extract of *M. spicatum* (data not shown). These results indicated that *M. spicatum* may release NA, TDA, HDA, ODA, and ODCA(s).

The mass spectral pattern of the peak eluting at 17.35 min (P3, Fig. 2(a)) matches that of gallic acid (data not shown), even though gallic acid should elute in Fr. A but not in Fr. B because of the use of 2 eluents during the HPLC fractionation, as described above. The presence of this peak might be explained by the hydrolysis of hydrolyzable tannins containing galloyl groups, such as eugeniin (Fig. 4).

Anti-cyanobacterial effects of the identified fatty acids

Figure 6 shows the inhibitory effect of each of the identified compounds at 10 mg l^{-1} including *cis*-6- and *cis*-9-ODCA, on the maximum growth of *M. aeruginosa.* TDA, HDA, and ODA did not demonstrate any effect, but NA, *cis*-6-ODCA, and *cis*-9-ODCA inhibited the maximum growth of *M. aeruginosa.* These results clearly indicate that NA and ODCAs, but not TDA, HDA, or ODA, are allelochemicals that may contribute to the allelopathic effects of *M. spicatum* on *M. aeruginosa.*

Figure 7 shows the dose–response relationships for NA, *cis*-6-ODCA, and *cis*-9-ODCA, which demonstrate that the inhibitory effect is concentration-dependent to some degree at the concentration under 5 mg l^{-1}. The EC_{50}s of NA, *cis-6*-ODCA, and *cis-9*-ODCA were 0.5 ± 0.3, 3.3 ± 0.4, and 1.6 ± 0.4 mg l^{-1}, as respectively determined using logistic regression at $a = 0.05$ (JMP 5.1.1, JMP). Among the 6 identified fatty acids, NA demonstrated the strongest growth inhibition of *M. aeruginosa.*

Discussion

Contribution of the identified compounds to the allelopathic effect of M. spicatum

It is interesting that NA was detected in the culture solution and the methanol extract of *M. spicatum.* NA was used as a herbicide component in Japan

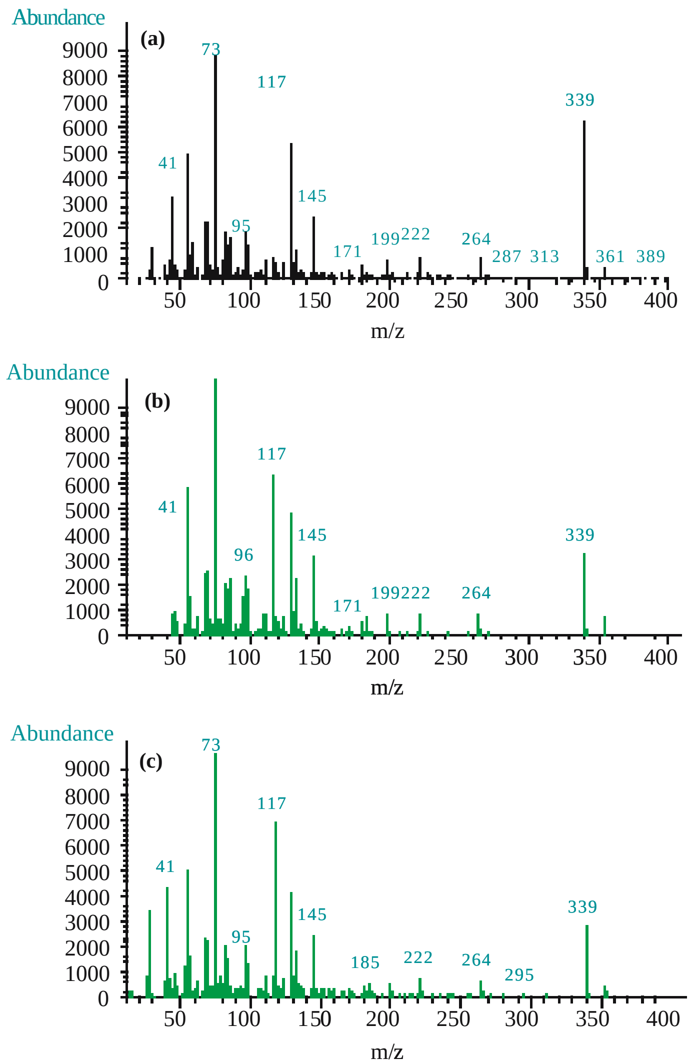

Figure 5. Comparison of fragment patterns of (a) the peak at 19.08 min with those of TMS deriviatives of (b) *cis*-9-octadecenoic acid and (c) *cis*-6-octadecenoic acid from the NIST mass spectral library.

until 2003 (JT Agribusiness Division, 1999). Although NA sometimes has adverse effects on plants, some terrestrial plants are known to contain NA derivatives (Okuno et al., 1993; Pelissier et al., 2001). However, it is also known that plants generally produce fatty acids with an even number of carbon. Since *M. spicatum* used in this research was not axenic, the possibility exists that microorganisms living in *M. spicatum* and/or *M. spicatum* itself produced the NA. The other fatty acids identified, TDA, HDA ,ODA, and ODCAs, are allelochemicals contributing to allelopathy among algae (Rice, 1984).

A few previous studies of allelochemicals released by *M. spicatum* identified polyphenols (eugeniin, gallic acid, and ellagic acid, Gross et al., 1996; pyrogallic, gallic, and ellagic acids and (+)-catechin, Nakai et al., 2000), whereas this study showed that *M. spicatum* releases not only polyphenols but also fatty acids. The EC_{50}s of these polyphenols for *M. aeruginosa* are 1.5 mg l^{-1} for eugeniin (Saito et al., 1989), 0.7 mg l^{-1} for pyrogallic acid, 1.0 mg l^{-1} for gallic acid, 5.5 mg l^{-1} for (+)-catechin, and 5.1 mg l^{-1} for ellagic acid (Nakai et al., 2000). Thus, compared with these polyphenols, NA was the most inhibitory

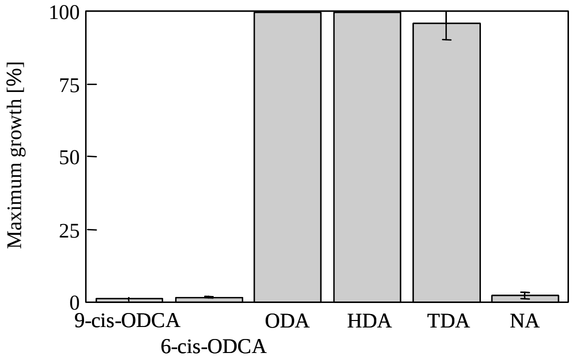

Figure 6. Inhibition of maximum growth of *Microcystis aeruginosa* by the identified fatty acids at 10 mg l^{-1}. Bars indicate standard deviations ($n = 3$).

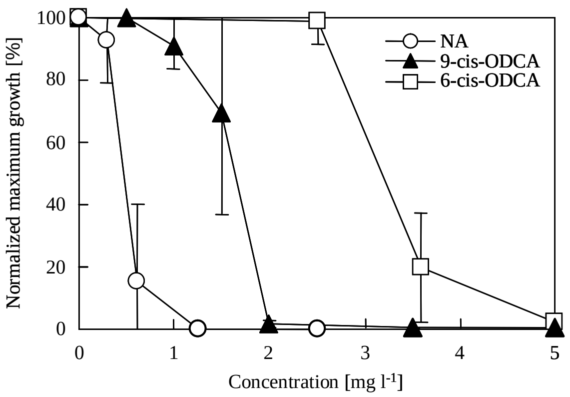

Figure 7. Inhibitory effects of different concentrations of nonanoic acid (NA), *cis*-9-octadecenoic acid (ODCA), and *cis*-6-ODCA on maximum growth of *Microcystis aeruginosa*. Bars indicate standard deviations ($n = 3$).

to *M. aeruginosa*. However, the total inhibitory effect of the *M. spicatum* culture solution could not be accounted for by NA, because the apparent concentration of NA in the *M. spicatum* culture solution was about 50 1g l^{-1}, much lower than the EC_{50}.

Because polyphenols and fatty acids have different chemical properties which may result in the different growth inhibition modes, it is reasonable to expect that their cyanobacterial growth inhibition activities may be additive or synergistic. In fact, our previous research showed experimentally that the autoxidizable polyphenols significantly inhibited the growth of *M. aeruginosa* (Nakai et al., 2003), whereas NA is not autoxidized in water. Therefore, not only the contribution of polyphenols but also that of fatty acids must be considered in any investigation designed to elucidate the mechanism of allelopathy between *M. spicatum* and *M. aeruginosa*.

Mechanism on the growth inhibition by fatty acids

To understand the mechanism of cyanobacterial growth inhibition by fatty acids, it is essential to identify the key structures that induce such effects. McCracken et al. (1980) showed experimentally that anti-algal effects of fatty acids were proportional to the number of unsaturated linkages by assaying 7 fatty acids extracted from the green alga *Chlamydomonas,* whereas our results confirmed that ODCAs but not ODA significantly inhibited the growth of *M. aeruginosa*. In addition, the inhibitory effect of *cis*-9-ODCA on the growth of *M. aeruginosa* was stronger than that of *cis*-6-ODCA. Among the 4 saturated fatty acids (TDA, HDA, ODA, and NA) that we identified, NA, which has the shortest carbon chain, was the only one demonstrating significant growth inhibition of *M. aeruginosa* at 10 mg l^{-1}, and Takamura et al. (1999) confirmed that butyric acid, another saturated fatty acid with a short carbon chain, inhibited maximum growth of *Microcystis novacekii* by 64% of the control at 8.8 mg l^{-1}. These results suggest that (i) length of carbon chain, (ii) number of unsaturated linkages, and (iii) positions of any double bonds may affect the anti-cyanobacterial activities of fatty acids. Further research is necessary to investigate the relationship between these 3 structural factors and anti-cyanobacterial activity.

Possibility of cyanobacterial growth inhibition by fatty acids in the natural aquatic environment

Fatty acids are widely distributed in aquatic and terrestrial environments (Jandl et al., 2002), indicating the possibility that fatty acids in the aquatic environment may affect cyanobacterial growth. We demonstrated the growth inhibition of *M. aeruginosa* by the four acids, while Yamada et al. (1993) showed that the growth of *Phormidium tenue* was inhibited by oleic and linoleic acids at 1 and 0.5 mg l^{-1}, respectively. In order to verify the possibility, the apparent concentrations of such fatty acids in the aquatic environment must be considered.

It is well known that the solubility of fatty acids decreases with an increase in the length of the alkyl chains, whereas an increase in pH value raises their solubility. For example, the calculation using Advanced Chemistry Development Software Solaris V4.67NA predicted that NA is slightly soluble at pH 7 but very soluble at pH10 (American Chemical Society, 2004). In the culture solution with high density of *M. spicatum* (100 g-wet wt l^{-1}), the apparent concentration of NA was approximately 50 1g l^{-1}, while its pH value was at a range between 6.5 and 7. Thus, the concentrations of NA and longer chain fatty acids in neutral pond and lake water may occur at 1g l^{-1} concentrations. Based on the above-mentioned EC_{50}s of the anti-cyanobacterial fatty acids, it is assumed that they may not cause growth inhibition of cyanobacteria such as *M. aeruginosa* and *P. tenue* by themselves but with other anti-cyanobacterial compounds in neutral pond and lake water. However, in alkaline pond and lake, contribution of anti-cyanobacterial fatty acids to the growth inhibition of cyanobacteria can become higher by an increase in their solubility. For the verification, future research must reveal the actual solubility of anti-cyanobacterial fatty acids and effect of pH values on their cyanobacterial growth inhibition.

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Outdoors: A lesson learned

Webster Lake weed kill devastates plant life.

COMMENTARY
July 08, 2012 | Louie Stout | Outdoors: Commentary

It was only couple of years ago when Lake Webster gamefish had plenty of habitat.

Today, about the only "fish cover" in the lake are 11 manmade fish attractors purchased, built and installed by a group of concerned anglers and citizens with help from local businesses.

The fish attractors were necessary because all of the weeds are gone in the 774-acre Kosciusko County lake.

That's what happens when residents get aggressive with weed-killing chemicals to make the lake more boater-friendly.

The chemical Sonar, one the most effective chemicals for treating aquatic vegetation, was applied in 2010 by a private company at a cost of $125,000.

The plan was to knock out non-native milfoil plants to allow native vegetation to grow.

It killed everything. Except for a few small areas, the lake is void of plant life and the water turned turbid. Decaying plants (from the weed kill) enhance turbidity and there aren't enough lively plants to filter the sediment.

The water has cleared some, but not as fast as anticipated. In the meantime, fishing has been mediocre at best and one has to wonder what impact the missing vegetation will have on spawning and young fish recruitment.

Once the crown jewel of Midwest muskie fishing, tourism dollars around North Webster have diminished. Most guides don't take their clients there anymore. The muskies are present but they have become more difficult to find and catch.

"I haven't been to Webster in two years," said muskie guide Randy Bush of Churubusco, Ind. "I used to be able to guarantee someone a shot at a muskie, but now, when clients want to go there, I steer them to other lakes due to the situation."

The weed kill was done legally. The Indiana DNR approved the permit on the presumption – offered by the chemical applicator and urging of lake residents – that it would be a selective weed kill and native plant life would thrive.

Didn't happen.

Fisheries biologist Jed Pearson predicted the present outcome and voiced his concerns at the time, but was overruled.

"I was looking at it from an ecological perspective and others were viewing it as an economical decision," Pearson said. "The lake association was spending about $25,000 a year to treat weeds selectively and the applicator told them they could save money in the long run by using Sonar in one treatment."

Pearson, who has been involved with the DNR muskie program from day one, isn't opposed to weed treatments and acknowledges the Webster weed problem had spread to 50 percent of the lake.

Something had to be done, but he opposed Sonar because he'd seen how previous Sonar nukings had affected Webster in 1999 and 2002.

The good news is vegetation, including milfoil, returned within a couple of years, and there are signs some plant life started coming back this summer.

"I'm hoping more native plants will return next year," said Pearson. "When Sonar was used in '99 and 2002, the vegetation returned in about three years."

In the meantime, the DNR has put a temporary hold on herbicide treatments at Webster and will rethink future Sonar applications on other Hoosier lakes.

“I think most of us (biologists) agree that the use of Sonar on some lakes isn’t going to work and the collateral damage is too severe,” Pearson said.

There’s no doubt that some weed control is necessary on natural lakes where boating is restricted by thick surface weeds. Milfoil, a non-native plant, can be a problem when it smothers expansive flats and grows to the surface.

But plant life, especially native plant life, is vital to a fishery and the entire ecology of a lake. No one knows that better than fishermen.

“It’s one of those deals where it’s boaters against the fishermen,” said Bush. “It’s always been that way.”

Until the plants come back, the fish attractors will help. If you want to know where they’re located, pick up a free map of the fish attractors from Ye Olde Tackle Box in North Webster. A donation to help defray the costs would be appreciated.

Biologist to speak

Elkhart aquatic biologist Dar Deegan will address an upcoming walleye stocking program on the Elkhart River at the Michiana Walleye Association (MWA) meeting Saturday night.

Deegan will speak at 7:30 at the MWA clubhouse and the meeting is open to the public. For more information, call Rick Nichols, 219-712-1369.

Skamania winners

Dan Roths of Chesterton, Ind. won a $200 Cabelas Gift Card in the Skamania Mania free fishing contest in Michigan City last weekend with a 14 pound, 4 ounce steelhead.

Second place was good for $50 and third through 12th received $25 gift cards.

Other Michiana winners were John Marshall, Jr., Michigan City, second, 11-8; Terry Jamieson, Michigan City, fourth, 10-11; Dillon Nissley, Goshen, sixth, 10-9; Matthew McDonald, Michigan City, seventh, 10-7; Carrie Patton, LaPorte, eighth, 10-4; and Maria Faltovics, Michigan City, ninth, 10-3.

Former South Bend resident Jack McGann finished “lucky” 13th to win a $225 rod/reel combo.

SWAC results

Rick Morison and Jason Morison (Niles) had five bass weighing 10.55 pounds to win the Southwest Michigan Anglers Club tournament on Fish, Finch and Saddle Bag lakes last weekend. They used Poor Boy’s Darters.

Second place went to Chuck Powell (Granger) and Jeremy Bunnell (Mishawaka) with 9.61 pounds caught on jigs while Chad and Jennifer Worvey (Niles) were third with 7.11 pounds while fishing Senkos. Charlie and Corey Bloss (Cassopolis) won big fish honors with a 4.34-pound largemouth caught on a jig.

In the Wednesday night event on the St. Joseph River at Buchanan, the Worveys caught three bass weighing 8.50 pounds to win.

The couple also took home big bass honors with a 4.36 pounder. All of their fish were caught on jigs and Senkos.

Mike Frank and Mason Stevenson (Niles) were second with 5.87 pounds caught on jigs while Ron Nelson and Mike Barber (Niles) were third with 5.46 pounds caught on Pop-Rs.

Benefit bass tourney

The annual Vance Parker Big Daddy team bass tournament is set for July 15 on Pine and Stone lakes in LaPorte, Ind.

Entry fee is $100 per team and tournament hours are 6 a.m. to 1 p.m. (central time) at the city ramp on Pine Lake. For more information, call Jan Robinson, 219-369-1430.

Anglers Choice winners

Brothers Phil (Chesterton) and Lee Duracz (South Bend) caught 12.47 pounds on Lake Manitou to win the US Anglers’ Choice Pro Tournament recently.

The winners caught their fish of worms, jigs and frogs in the lily pads to win $1,215.

Clint Gradeless (Huntington, Ind.) and Lee Pilz (Wawaka, Ind.) were second with 11.28 pounds while Mitch Bair (Columbia City, Ind.) and Brian Bair (Fishers, Ind.) were third with 10.74 pounds.

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Primary Research Paper

Anti-cyanobacterial fatty acids released from *Myriophyllum spicatum*

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Key words: allelochemical, fatty acid, *Microcystis aeruginosa, Myriophyllum spicatum*

Abstract

This study was carried out to identify unknown allelochemicals released from *Myriophyllum spicatum* and to investigate their anti-cyanobacterial effects. A series of analyses of culture solutions and methanol extracts of *M. spicatum* using gas chromatograph equipped with a mass selective detector revealed that *M. spicatum* released fatty acids, specifically, nonanoic, tetradecanoic, hexadecanoic, octadecanoic, and octadecenoic acids. Nonanoic, *cis*-6-octadecenoic, and *cis*-9-octadecenoic acids significantly inhibited growth of *Microcystis aeruginosa*, whereas tetradecanoic, hexadecanoic, and octadecanoic acids did not show any effect. When the inhibitory effect of nonanoic acid was compared with those of 4 polyphenols and eugeniin, which are anti-cyanobacterial compounds previously reported to be released by *M. spicatum*, nonanoic acid was found to be the most inhibitory to *M. aeruginosa*. These results indicate that not only polyphenols and eugeniin but also fatty acids such as nonanoic acid must be studied to reveal how *M. spicatum* exerts its allelopathic effect on *M. aeruginosa*.

Introduction

Certain macrophytes have been reported to contain anti-algal and anti-cyanobacterial compounds, which has led researchers to investigate the feasibility of controlling nuisance algal and cyanobacterial growth by using these fascinating macrophytes (Barrett et al., 1996; Ridge & Pillinger, 1996). Either living or withered macrophytes releasing anti-algal compounds such as allelochemicals can be used for algal growth control. For example, Ridge & Pillinger (1996) showed that rotting barley (*Hordeum vulgare*) straw inhibited algal growth and found that autoclaving the straw prior to use enhanced its anti-algal activity. We demonstrated growth inhibition of a cyanobacterium *Microcystis aeruginosa* by allelochemicals released from *Myriophyllum spicatum*. These results clearly indicate that some macrophytes can be used to control algal and cyanobacterial growth.

Myriophyllum spicatum, or Eurasian water milfoil, is a submerged macrophyte that inhibits the growth of cyanobacteria allelopathically (Gross et al., 1996; Nakai et al., 2000). Gross et al. (1996) showed that *M. spicatum* released the allelopathic compound hydrolyzable tannin (eugeniin), and its derivatives, ellagic and gallic acids. We found pyrogallic acid and (+)-catechin, in addition to ellagic and gallic acids, in the culture solution of *M. spicatum* (Nakai et al., 2000) and confirmed that these 4 polyphenols contributed to the allelopathic effect of *M. spicatum* on *M. aeruginosa* by comparing the growth-inhibiting effect of *M. spicatum* culture solution with that of a simulated culture solution prepared by estimating the release rates of these polyphenols from *M. spicatum*. The result showed that together these 4 polyphenols accounted for between 10 and 100% of the allelopathic effect of *M. spicatum*. Eugeniin may also contribute to the effect (Gross et al., 1996), and we expect that other unknown allelochemicals are also released from *M. spicatum*.

In order to understand the mechanism on the growth inhibition of cyanobacteria by the allelopathic effect of *M. spicatum*, allelochemicals must be identified. Therefore, we aimed to identify unknown allelochemicals released by *M. spicatum* and to investigate their inhibitory effects on the cyanobacterium *M. aeruginosa*.

Materials and methods

Cyanobacterium and Myriophyllum spicatum

Microcystis aeruginosa (NIES-87) obtained from the microbial collection of the National Institute for Environmental Studies (NIES), Japan, was used for cyanobacterial assays. *Myriophyllum spicatum* was collected from the Asakawa River, Tokyo, Japan, and then cultivated in a 20-fold dilution of Gorham's medium (Zehnder & Gorham, 1960) under a light intensity of 3000 lux at 25 °C. *M. aeruginosa* was cultivated in triplicate under a light intensity of 5000 lux in a modified C (CB) medium (Watanabe & Satake, 1991) at 25 °C for about 10–15 d, during which time its growth was monitored by measuring turbidity (T-2600 DA turbidity meter, Tokyo-Denshoku, Japan, Tokyo) to determine its maximum growth.

Fractionation

To collect unknown allelochemicals released from *M. spicatum*, its culture solution was subjected to a solid-phase extraction procedure combined with high-performance liquid chromatography (HPLC) fractionation. The *M. spicatum* culture solution was prepared by culturing the macrophyte in a 20-fold dilution of Gorham's medium at 100 g-wet wt l^{-1} for 3 d with rotation at 70 rpm, after which the culture solution was filtered through a membrane filter (0.22 1m). Five hundred milliliters of the filtrate was adjusted to pH 3 with 0.1 N HCl and then passed through a solid extraction cartridge (C18HD, 3 M Japan). Following methanol elution, the eluate was fractionated on an ODS column (TSK-gel ODS 80TS, 300 × 21.5 mm, Tosoh, Japan) at 25 °C using 2 eluents, eluent A (0.025% H_3PO_4 in water) and eluent B (0.025% H_3PO_4 in methanol), as follows: 0–55 min, 0–50% B; 55–92 min, 50–90%; and 92–100 min, 90–100% in the mixture, at a constant flow rate of 9 ml min^{-1}. Finally, the solid-phase extract was separated into 3 fractions according to the elution time: Fr. A, 34–64 min; Fr. B, 64–92 min; and Fr. C, 92–120 min. Although the HPLC was equipped with an ultraviolet detector (UV-8000, Tosoh, Japan), this detector was not used in the HPLC fractionation, to prevent allelochemicals from being destroyed. In the preliminary experiments, we confirmed that the previously reported allelochemicals gallic and pyrogallic acids and (+)-catechin (Gross et al., 1996; Nakai et al., 2000) were eluted in Fr. A (34–64 min) during HPLC, whereas the retention time of ellagic acid (Gross et al., 1996; Nakai et al., 2000) was 73 min (Fr. B) (data not shown). Unfortunately, eugeniin (Gross et al., 1996) was not analyzed, because we could not obtain an authentic sample. Each fraction was re-passed through the solid extraction cartridge followed by methanol elution, and then the resultant methanol eluate was dehydrated with sodium sulfate anhydrate. The inhibitory effect of each fraction was confirmed by cyanobacterial assays with *M. aeruginosa*, as described below.

Identification of allelochemical candidates

Fr. B, one of 2 fractions demonstrating growth inhibition of *M. aeruginosa*, was analyzed by using a gas chromatograph equipped with a mass selective detector (GC-MSD). Briefly, after full evaporation of the methanol eluate, the residue was treated with *N,O*-bis(trimethylsilyl)trifluoroacetamide (BSTFA, Tokyo Kasei, Japan) for 2 h at room temperature for trimethylsilyl (TMS) derivatization. Then the sample was dissolved in a small volume of *n*-hexane (100 11) and subjected to GC-MSD analysis in electron ionization (EI) mode, as indicated in Table 1. Samples were identified by comparing the retention time and mass spectra of unknown samples with those of authentic samples. A methanol extract of *M. spicatum* obtained by a previously reported method (Nakai et al., 1996) was also fractionated and analyzed in the same manner to confirm that the identified compounds were released from *M. spicatum*.

Table 1. Operating conditions for GC/MSD

Gas chromatograph	Hewlett Packard 6890 series
Column	HP5-MS (30.0 m × 320 1m 0.25 1m)
Carrier gas	He (99.9999%), 1.3 ml min^{-1}
Oven temp.	50 °C (1 min); 10 °C min^{-1} to 280 °C; 20 °C min^{-1} to 310 °C
Injection mode	Splitless
Injection volume	1 11
Injector temperature	250 °C
Mass spectrometer	Hewlett Packard 5973 series
Ionization mode	Electron ionization (EI)
Mass interface temp	150 °C
Ion source temp	230 °C

Assaying allelochemicals

To confirm the anti-cyanobacterial activity of each fraction of the *M. spicatum* culture solution, each fraction was concentrated and assayed. Briefly, methanol in each fraction was evaporated in vacuo at 50 °C and passed through the C18HD solid extraction cartridge, followed by methanol elution. The methanol eluate of each fraction was concentrated to obtain a final volume of 100 11 and filtered through an autoclaved membrane filter (0.22 1m, Millipore). Finally, the filtrate was added to the CB medium (100 ml), which was immediately inoculated with *Microcystis aeruginosa* (about 10^4–10^5 cells ml^{-1}). Control experiments were performed by substituting methanol for the methanol solution. As for the identified compounds, each was dissolved in methanol and assayed by the same manner to determine whether they were allelochemicals. The assays were performed in triplicate. The inhibitory effects on the growth of *M. aeruginosa* were investigated by comparing the maximum growth affected by each fraction or identified compound with that in the control experiment. The amount of identified compound added in each assay was varied to obtain a dose-response relationship between each compound and its inhibitory effect.

Results

Fractionation of Myriophyllum spicatum *culture solution*

Fr. A and Fr. B inhibited the growth of *Microcystis aeruginosa* (Tukey: $p < 0.05$), but Fr. C did not show any effect on growth (Fig. 1). Although the fractionation of the *M. spicatum* culture solution and the subsequent assay were repeated, the results were similar each time (data not shown).

As mentioned before, Fr. A contained gallic and pyrogallic acids and (+)-catechin, and Fr. B contained ellagic acid. However, the inhibitory effect of gallic and pyrogallic acids on the growth of *M. aeruginosa* is much stronger than that of ellagic acid (Nakai et al., 2000). In addition, the concentration of ellagic acid in Fr. B was about 50 1g l^{-1}, much lower than 5 mg l^{-1}, the EC_{50}, the concentration at which ellagic acid inhibits maximum growth of *M. aeruginosa* to 50% of the control (Nakai et al., 2000). These results led us to suspect that Fr. B contained unknown allelochemicals with strong anti-cyanobacterial activities. Therefore, we focused on Fr. B in our further GC-MSD analysis.

Identification of allelochemical candidates

Many peaks can be seen on the total ion chromatogram obtained by the GC-MSD analysis of Fr. B (Fig. 2(a)). The mass spectral patterns of the peaks were identified by comparing them with patterns stored in the U.S. National Institute of Standards and Technology (NIST) mass spectral library ver. 2.0. Figures 3(a) and (b) respectively illustrate the mass spectral pattern of the peak occurring at 10.55 min and that of a nonanoic acid TMS derivative obtained from the NIST mass spectral library. These patterns show good agreement, thus suggesting that the peak at 10.55 min is a nonanoic acid (NA) TMS derivative. Similarly,

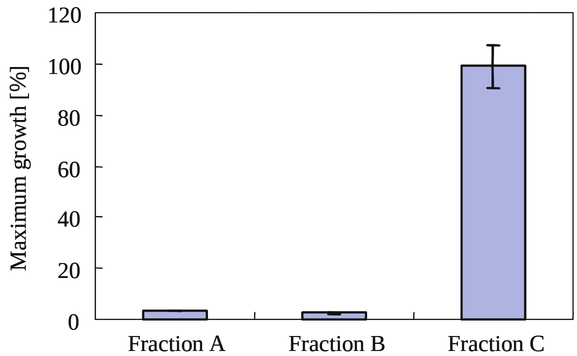

Figure 1. Effects of Fractions A, B, and C on maximum growth of *Microcystis aeruginosa*. Bars indicate standard deviation ($n = 3$).

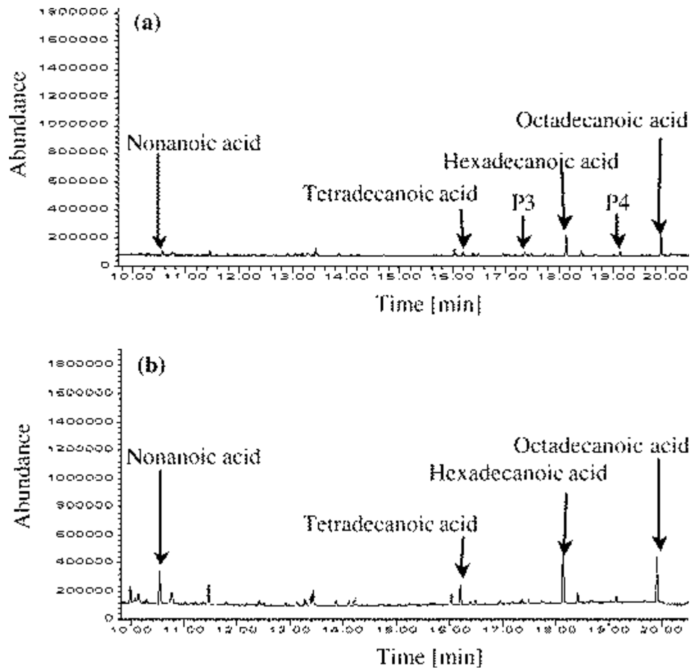

Figure 2. Total ion chromatogram of fraction B. (a) Not spiked, and (b) spiked with 4 fatty acids.

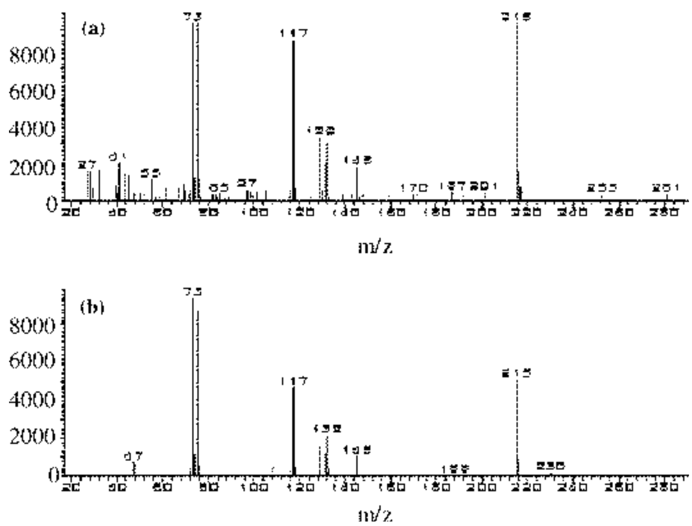

Figure 3. Comparison of the GC/MSD fragment pattern of the peak at 10.55 min (a) with that of the TMS derivative of nonanoic acid from the NIST mass spectral library (b).

the NIST mass spectral library search suggested the presence of tetradecanoic acid (TDA), hexadecanoic acid (HDA), and octadecanoic acid (ODA) in Fr. B, as shown in Fig. 2(a). The structures of these compounds are illustrated in Fig. 4. In order to verify the results obtained by the NIST mass spectral library search, we performed spike tests, in which a small amount of each authentic sample was added to Fr. B before the analysis was repeated. The results showed no change in the retention times, thereby confirming that Fr. B contained NA, TDA, HDA, and ODA.

As shown in Fig. 5, the mass spectral pattern of the peak eluting at 19.13 min (P4, Fig. 2(a)) matches

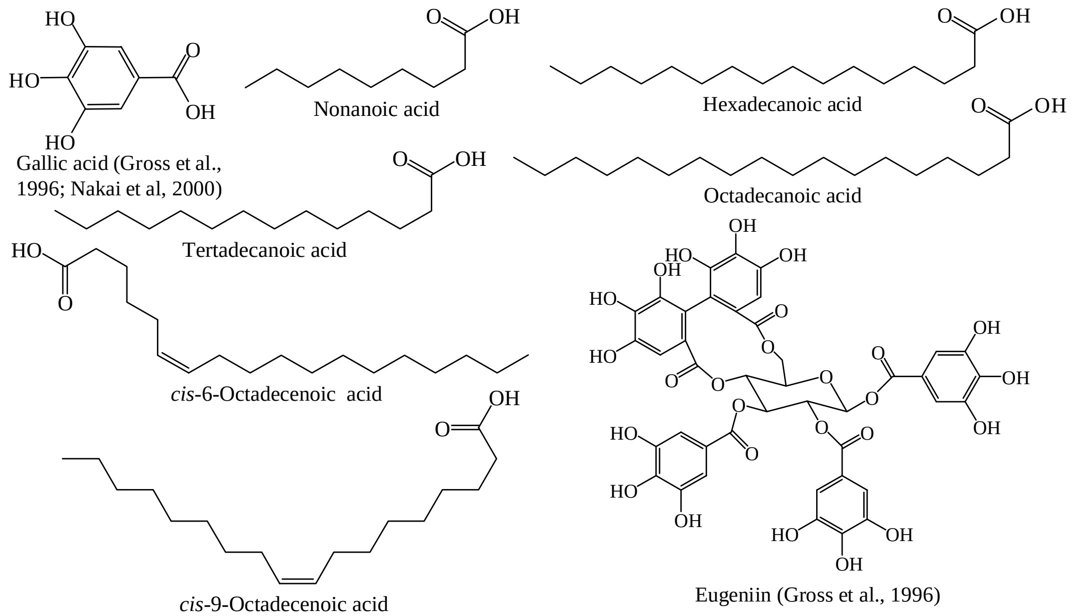

Figure 4. Structures of compounds released by *Myriophyllum spicatum.*

those of TMS derivatives of *cis*-6-octadecenoic acid (ODCA) and *cis*-9-ODCA obtained from the NIST mass spectral library, the structures of which are also illustrated in Fig 4. When authentic samples of *cis*-6-ODCA and *cis*-9-ODCA were analyzed by GC-MSD, their retention times were the same as that of P4 (data not shown). Thus *cis*-6-ODCA and/or *cis*-9-ODCA are present in Fr. B. Finally, the GC-MSD analysis showed the presence of NA, TDA, HDA, ODA, and ODCA(s) in the methanol extract of *M. spicatum* (data not shown). These results indicated that *M. spicatum* may release NA, TDA, HDA, ODA, and ODCA(s).

The mass spectral pattern of the peak eluting at 17.35 min (P3, Fig. 2(a)) matches that of gallic acid (data not shown), even though gallic acid should elute in Fr. A but not in Fr. B because of the use of 2 eluents during the HPLC fractionation, as described above. The presence of this peak might be explained by the hydrolysis of hydrolyzable tannins containing galloyl groups, such as eugeniin (Fig. 4).

Anti-cyanobacterial effects of the identified fatty acids

Figure 6 shows the inhibitory effect of each of the identified compounds at 10 mg l^{-1} including *cis*-6- and *cis*-9-ODCA, on the maximum growth of *M. aeruginosa.* TDA, HDA, and ODA did not demonstrate any effect, but NA, *cis*-6-ODCA, and *cis*-9-ODCA inhibited the maximum growth of *M. aeruginosa.* These results clearly indicate that NA and ODCAs, but not TDA, HDA, or ODA, are allelochemicals that may contribute to the allelopathic effects of *M. spicatum* on *M. aeruginosa.*

Figure 7 shows the dose–response relationships for NA, *cis*-6-ODCA, and *cis*-9-ODCA, which demonstrate that the inhibitory effect is concentration-dependent to some degree at the concentration under 5 mg l^{-1}. The EC_{50}s of NA, *cis-6*-ODCA, and *cis-9*-ODCA were 0.5 ± 0.3, 3.3 ± 0.4, and 1.6 ± 0.4 mg l^{-1}, as respectively determined using logistic regression at $a = 0.05$ (JMP 5.1.1, JMP). Among the 6 identified fatty acids, NA demonstrated the strongest growth inhibition of *M. aeruginosa.*

Discussion

Contribution of the identified compounds to the allelopathic effect of M. spicatum

It is interesting that NA was detected in the culture solution and the methanol extract of *M. spicatum.* NA was used as a herbicide component in Japan

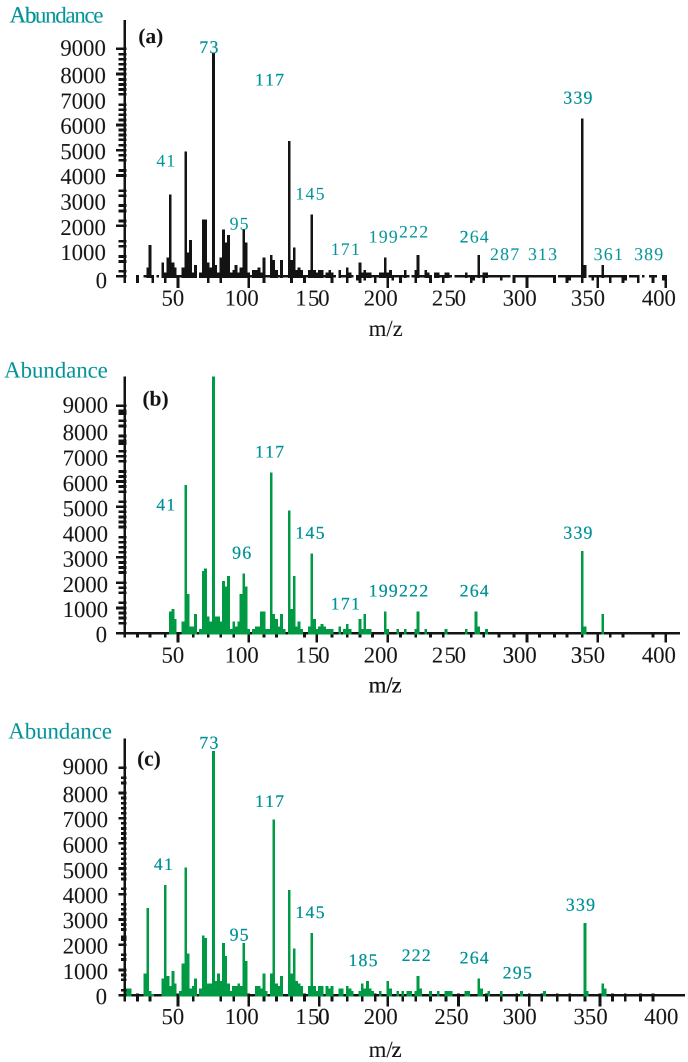

Figure 5. Comparison of fragment patterns of (a) the peak at 19.08 min with those of TMS deriviatives of (b) *cis*-9-octadecenoic acid and (c) *cis*-6-octadecenoic acid from the NIST mass spectral library.

until 2003 (JT Agribusiness Division, 1999). Although NA sometimes has adverse effects on plants, some terrestrial plants are known to contain NA derivatives (Okuno et al., 1993; Pelissier et al., 2001). However, it is also known that plants generally produce fatty acids with an even number of carbon. Since *M. spicatum* used in this research was not axenic, the possibility exists that micro-organisms living in *M. spicatum* and/or *M. spicatum* itself produced the NA. The other fatty acids identified, TDA, HDA ,ODA, and ODCAs, are allelochemicals contributing to allelopathy among algae (Rice, 1984).

A few previous studies of allelochemicals released by *M. spicatum* identified polyphenols (eugeniin, gallic acid, and ellagic acid, Gross et al., 1996; pyrogallic, gallic, and ellagic acids and (+)-catechin, Nakai et al., 2000), whereas this study showed that *M. spicatum* releases not only polyphenols but also fatty acids. The EC_{50}s of these polyphenols for *M. aeruginosa* are 1.5 mg l^{-1} for eugeniin (Saito et al., 1989), 0.7 mg l^{-1} for pyrogallic acid, 1.0 mg l^{-1} for gallic acid, 5.5 mg l^{-1} for (+)-catechin, and 5.1 mg l^{-1} for ellagic acid (Nakai et al., 2000). Thus, compared with these polyphenols, NA was the most inhibitory

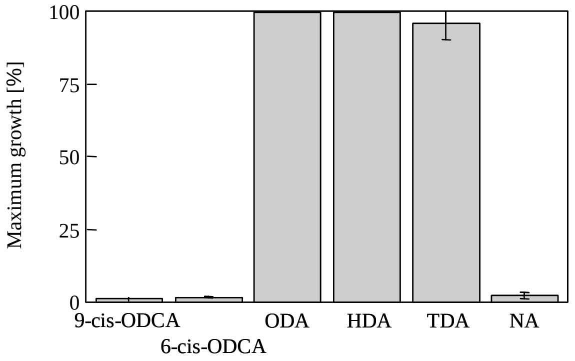

Figure 6. Inhibition of maximum growth of *Microcystis aeruginosa* by the identified fatty acids at 10 mg l^{-1}. Bars indicate standard deviations ($n = 3$).

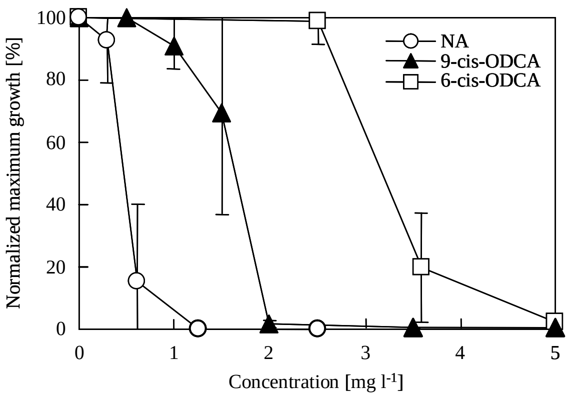

Figure 7. Inhibitory effects of different concentrations of nonanoic acid (NA), *cis*-9-octadecenoic acid (ODCA), and *cis*-6-ODCA on maximum growth of *Microcystis aeruginosa*. Bars indicate standard deviations ($n = 3$).

to *M. aeruginosa*. However, the total inhibitory effect of the *M. spicatum* culture solution could not be accounted for by NA, because the apparent concentration of NA in the *M. spicatum* culture solution was about 50 1g l^{-1}, much lower than the EC_{50}.

Because polyphenols and fatty acids have different chemical properties which may result in the different growth inhibition modes, it is reasonable to expect that their cyanobacterial growth inhibition activities may be additive or synergistic. In fact, our previous research showed experimentally that the autoxidizable polyphenols significantly inhibited the growth of *M. aeruginosa* (Nakai et al., 2003), whereas NA is not autoxidized in water. Therefore, not only the contribution of polyphenols but also that of fatty acids must be considered in any investigation designed to elucidate the mechanism of allelopathy between *M. spicatum* and *M. aeruginosa.*

Mechanism on the growth inhibition by fatty acids

To understand the mechanism of cyanobacterial growth inhibition by fatty acids, it is essential to identify the key structures that induce such effects. McCracken et al. (1980) showed experimentally that anti-algal effects of fatty acids were proportional to the number of unsaturated linkages by assaying 7 fatty acids extracted from the green alga *Chlamydomonas,* whereas our results confirmed that ODCAs but not ODA significantly inhibited the growth of *M. aeruginosa.* In addition, the inhibitory effect of *cis*-9-ODCA on the growth of *M. aeruginosa* was stronger than that of *cis*-6-ODCA. Among the 4 saturated fatty acids (TDA, HDA, ODA, and NA) that we identified, NA, which has the shortest carbon chain, was the only one demonstrating significant growth inhibition of *M. aeruginosa* at 10 mg l^{-1}, and Takamura et al. (1999) confirmed that butyric acid, another saturated fatty acid with a short carbon chain, inhibited maximum growth of *Microcystis novacekii* by 64% of the control at 8.8 mg l^{-1}. These results suggest that (i) length of carbon chain, (ii) number of unsaturated linkages, and (iii) positions of any double bonds may affect the anti-cyanobacterial activities of fatty acids. Further research is necessary to investigate the relationship between these 3 structural factors and anti-cyanobacterial activity.

Possibility of cyanobacterial growth inhibition by fatty acids in the natural aquatic environment

Fatty acids are widely distributed in aquatic and terrestrial environments (Jandl et al., 2002), indicating the possibility that fatty acids in the aquatic environment may affect cyanobacterial growth. We demonstrated the growth inhibition of *M. aeruginosa* by the four acids, while Yamada et al. (1993) showed that the growth of *Phormidium tenue* was inhibited by oleic and linoleic acids at 1 and 0.5 mg l^{-1}, respectively. In order to verify the possibility, the apparent concentrations of such fatty acids in the aquatic environment must be considered.

It is well known that the solubility of fatty acids decreases with an increase in the length of the alkyl chains, whereas an increase in pH value raises their solubility. For example, the calculation using Advanced Chemistry Development Software Solaris V4.67NA predicted that NA is slightly soluble at pH 7 but very soluble at pH10 (American Chemical Society, 2004). In the culture solution with high density of *M. spicatum* (100 g-wet wt l^{-1}), the apparent concentration of NA was approximately 50 1g l^{-1}, while its pH value was at a range between 6.5 and 7. Thus, the concentrations of NA and longer chain fatty acids in neutral pond and lake water may occur at 1g l^{-1} concentrations. Based on the above-mentioned EC_{50}s of the anti-cyanobacterial fatty acids, it is assumed that they may not cause growth inhibition of cyanobacteria such as *M. aeruginosa* and *P. tenue* by themselves but with other anti-cyanobacterial compounds in neutral pond and lake water. However, in alkaline pond and lake, contribution of anti-cyanobacterial fatty acids to the growth inhibition of cyanobacteria can become higher by an increase in their solubility. For the verification, future research must reveal the actual solubility of anti-cyanobacterial fatty acids and effect of pH values on their cyanobacterial growth inhibition.

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Short communication

The influence of aquatic macrophytes on *Microcystis aeruginosa* growth

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ABSTRACT

Microcystis aeruginosa is a cyanobacterium species that can form harmful algal blooms in freshwater bodies worldwide. The use of aquatic macrophytes to control nuisance algae by allelopathic inhibition will be environmentally friendly and promising. The effects of 8 species of aquatic macrophytes on the growth of *M. aeruginosa* were investigated, and total phenolics and tannin contents in the macrophytes were determined to reveal the nature of algal inhibition. Artificial addition of 0.1–1% autoclaved leaves and 1% extract from fresh leaves of *Iris wilsonii* significantly inhibited the growth of *M. aeruginosa* after 19 days incubation while no significant change was found in the presence of fresh *I. wilsonii* leaves and 0.1% or 0.5% fresh leaf extracts. Comparative algal inhibition assay showed that all examined tissues of tested macrophytes could significantly inhibit *M. aeruginosa* whilst the leaves of *Nymphaea tetragona*, *Typha orientalis*, *Nelumbo nucifera* and *I. wilsonii* presented the most powerful algal inhibition by 75–82% after 19 days, and the leaves of *N. tetragona* and *N. nucifera* had higher anti-algal activity than their petioles. Correlation analysis demonstrated that cell density of *M. aeruginosa* exposed to aquatic macrophyte tissues was negatively correlated with total phenolics and tannin levels in macrophytes, and aquatic macrophytes should have other allelochemicals besides phenolic compounds involved in algal inhibition. Findings suggest that aquatic macrophytes offer the potential for low-effort and sustainable management of freshwaters so as to reduce excessive algal growth.

1. Introduction

Microcystis aeruginosa is a common freshwater cyanobacterium in freshwater lakes and reservoirs worldwide. As eutrophication continues to proliferate and worsen in freshwater ecosystems, *Microcystis* blooms frequently occur that impede recreation sports, reduce aesthetics, lower dissolved oxygen concentration and create unpalatable drinking water and noxious odors (Carmichael, 1995). Microcystins produced by *M. aeruginosa* have been implicated in wildlife, livestock, and pet fatalities as well as human poisonings worldwide (Carmichael and Falconer, 1993; Bell and Codd, 1994; Jochimsen et al., 1998). Therefore, the control of microcystin-producing *Microcystis* is an urgent issue with regard to improving water and ecosystem quality and public health.

The mechanical removal of algal scum is energy- and time-consuming, and thus impractical. Also, the chemical treatment is undesirable in potable water supplies (Ball et al., 2001). Allelopathic inhibition by macrophytes on cyanobacteria provides a novel method for controlling harmful algal blooms, which is considered to be environmentally sound and economically favourable. Barley straw has been shown to be a useful alternative to physical or chemical treatment for algal control (Welch et al., 1990; Ball et al., 2001; Ferrier et al., 2005; Xiao et al., 2010). Some other litter such as brown-rotted wood, deciduous leaf litter and coniferous leaf litter (Pillinger et al., 1995; Ridge et al., 1995; Park et al., 2006), batangas mandarin (*Citrus reticulata*) skin and dwarf banana (*Musa cavendishii*) peel (Chen et al., 2004) can also suppress the growth of nuisance algae. Park et al. (2009) found that rice hull extract has a strong specific algicide potential when used to combat *M. aeruginosa*. However, the use of these types of plant litter requires considerable management effort and the long-term ecological safety is unknown (Ridge et al., 1999). Moreover, all these types of litter require oxidizing conditions for anti-algal activity, and thus artificial addition of these types of plant litter is best regarded as a short-term, emergency measure to reduce algal growth rather than a long-term management strategy (Ridge et al., 1999).

The inhibition of algal growth by plant litter has been mainly attributed to allelochemicals such as phenolic compounds including tannic acids (Pillinger et al., 1995; Nakai et al., 2001). The use of allelochemicals produced by aquatic macrophytes to

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minimize the likelihood of excessive algal growth can be considered as a more reliable option in that these allelochemicals can be directly secreted into waters, while artificial addition of terrestrial plant litter releases allelochemicals as well as other nutrients and has adverse effect. However, only limited information is available demonstrating the allelopathy between aquatic macrophytes and nuisance algae.

The purpose of this present work was to examine inhibitory effects of 8 species of aquatic macrophytes on the growth of *M. aeruginosa* and to explore the anti-algal mechanism of aquatic macrophytes by determining total phenolics and tannin concentration in macrophytes. This study is potentially important for breeding of new inhibitors-rich aquatic macrophytes by molecular biology to control harmful *Microcystis* blooms.

2. Materials and methods

2.1. Materials

M. aeruginosa STH070626 was originally isolated from south Taihu Lake, Huzhou, Zhejiang, China and microscopically identified using the method described by Smith (1920) and Hu (1980). Cultures were maintained in BG-11 medium (Allen and Stanier, 1968). By mouse bioassay the cyanobacterium *M. aeruginosa* STH070626 produces hepatotoxin (data not shown).

Healthy plants from 8 species of aquatic macrophytes (*Zizania aquatica*, *Typha orientalis*, *Iris wilsonii*, *Phragmites australis*, *Arundo donax*, *Nymphaea tetragona*, *Nelumbo nucifera*, and *Alternanthera philoxeroides*) were obtained from the littoral zone of Lake Deqing at Huzhou University (Zhejiang, China) in June 2009. The leaves of *Z. aquatica*, *T. orientalis* and *I. wilsonii*, the stalks of *P. australis* and *A. donax*, the leaves and petioles of *N. tetragona* and *N. nucifera*, and the stems of *A. philoxeroides* were washed with tap water and distilled water, and then dried in air.

2.2. Preparation of *I. wilsonii* leaf extract

The leaf extract was prepared according to the method described by Ball et al. (2001), slightly modified. Fresh *I. wilsonii* leaves (50 g) were cut into pieces <5 mm × 5 mm. After blending, an aliquot (10 g) of these pieces was boiled in 100 mL of distilled water for 2 h. Following cooling, the solution was filtered through glass fibre paper (Whatman GF/C), and the filtrate volume was adjusted to 100 mL.

2.3. Assessment of the anti-algal activity of *I. wilsonii* leaf extract

The anti-algal activity of *I. wilsonii* leaf extract was examined by the addition of the extract to BG-11 medium in 400 mL flasks. The final volume of bioassay is 200 mL. After the addition of the extract (0.1%, 0.5% and 1%), the medium was autoclaved. Following cooling, the medium was inoculated with 2 mL of *M. aeruginosa* culture (in exponential growth phase) for each flask. All flasks were placed onto the shelf in a culture room at 25 °C, illuminated in a 12 h/12 h light–dark cycle with fluorescent tubes in a light intensity of 5000 lx and shaken twice daily. For each test 3 mL of the culture per flask was removed 0, 1, 3, 5, 7, 9, 11, 13, 15, 17, and 19 days after inoculation, respectively.

2.4. Assessment of the anti-algal activity of fresh *I. wilsonii* leaf tissue

Fresh *I. wilsonii* leaves were disinfected in 10% $Ca(ClO)_2$ solution for 15 min and then washed four times with sterile water. After 0.1%, 0.5% and 1% sterile leaf tissues (<5 mm × 5 mm cut) were added to the autoclaved BG-11 medium (200 mL) in each flask (400 mL), the medium was inoculated with 2 mL of *M. aeruginosa* culture (in exponential growth phase) for each flask. The flasks were incubated for up to 19 days on the same shelf as that mentioned above and shaken twice daily.

2.5. Assessment of the anti-algal activity of autoclaved aquatic macrophyte tissues

Fresh tissues (<5 mm × 5 mm cut, 0.1%, 0.5% and 1% for *I. wilsonii* leaves and 0.5% for other macrophyte tissues) were added to BG-11 medium (200 mL) in each flask (400 mL), and then the medium was autoclaved. After cooling, the medium was inoculated with 2 mL of *M. aeruginosa* culture (in exponential growth phase) for each flask. The flasks were incubated on the same shelf as that mentioned above and shaken twice daily.

2.6. Biomass estimation

M. aeruginosa growth was quantified by determining $OD_{665\,nm}$ using spectrophotometer, and $OD_{665\,nm}$ was then converted into cell density of *M. aeruginosa* by $OD_{665\,nm}$ and cell density standard curve. Experiments were carried out on a range of doses of aquatic macrophyte tissues, using four replicate flasks for each dose.

2.7. Determination of total phenolics and tannin contents in aquatic macrophyte tissues

Total phenolics and tannin contents were determined by the slightly modified methods described by Price and Butler (1977) and Wang et al. (1998). The fresh aquatic macrophyte tissue (1 g) was finely chopped, ground to a slurry with a mortar and pestle with 5 mL of absolute methanol and shaken on a reciprocating shaker for 30 min. An aliquot was centrifuged at 13 000 rpm for 15 min. The supernatant was diluted 100 times with distilled water mixed with 3 mL of 0.1 M $FeCl_3$ in 0.1 N HCl for 3 min, followed by the timed addition of 3 mL of 0.008 M $K_3Fe(CN)_6$. The absorbance was read after 10 min at 720 nm on a spectrophotometer. For total phenolics a blank of identical composition, but replacing the sample extract with absolute methanol, was analyzed. A duplicate extraction in 0.2 M NaCl was conducted and this "NaCl blank" was used for determining tannin content. The standard curve for total phenolics and tannin was prepared with catechin, and the results were expressed in terms of catechin equivalents.

2.8. Statistical analysis

The data is expressed as mean ± standard deviation (S.D.). Significant differences between data sets were detected by one-way analysis of variance (ANOVA). Results were considered significant at a P-level < 0.05. Correlation coefficients (r) were calculated by linear regression analyses of correlations between *Microcystis* cell density and total phenolics and tannin levels of aquatic macrophytes.

3. Results and discussion

3.1. Effect of *I. wilsonii* leaf tissues in different pretreatments on *M. aeruginosa* growth

Anti-algal activity by allelopathy depends on the inhibitors produced by plant tissues during aerobic decomposition in water (Ridge et al., 1995). Ridge et al. (1999) showed that freshly fallen leaf litter from 11 deciduous species released substances inhibitory to *M. aeruginosa* after autoclaving. Ball et al. (2001) demonstrated

Table 1
Effect of *I. wilsonii* leaves in different pretreatments on the growth of *M. aeruginosa*.

Treatment	Cell density ($\times 10^7$ cells/mL)	
	9 days	19 days
Control	0.816 ± 0.045 cd[a] BCD[a]	2.732 ± 0.114 a AB
0.1% extract	0.637 ± 0.080 e DE	2.642 ± 0.261 ab ABC
0.5% extract	0.902 ± 0.101 bc B	2.930 ± 0.347 a A
1% extract	1.001 ± 0.124 b AB	2.197 ± 0.142 bc BCD
0.1% autoclaved tissue	0.488 ± 0.023 f E	2.164 ± 0.213 c CD
0.5% autoclaved tissue	0.656 ± 0.069 e D	1.857 ± 0.203 c D
1% autoclaved tissue	1.121 ± 0.086 a A	1.809 ± 0.190 c D
0.1% fresh tissue	0.654 ± 0.024 e D	2.690 ± 0.215 a ABC
0.5% fresh tissue	0.850 ± 0.071 c BC	2.761 ± 0.198 a AB
1% fresh tissue	0.727 ± 0.065 de CD	2.831 ± 0.349 a A

[a] Means not sharing the same letter within each column are significantly different at $P = 0.05$ for lowercases and $P = 0.01$ for capital letters.

that an extract from decomposed-barley straw was capable of inhibiting *Microcystis* sp. while the addition of an extract prepared from fresh barley straw resulted in a small additional growth. The anti-algal effects of *I. wilsonii* tissues in different pretreatments were investigated (Table 1). The results show that autoclaved *I. wilsonii* leaves at the concentrations of 0.1–1% significantly inhibited the growth of *M. aeruginosa* after 19 days incubation ($P < 0.01$), with no significant differences detected between different concentrations. In the presence of an extract (1%) from fresh *I. wilsonii* leaves, algal growth was also significantly inhibited after 19 days ($P < 0.05$). In contrast, fresh *I. wilsonii* leaves disinfected by 10% $Ca(ClO)_2$ did not significantly inhibit algal growth after 19 days (Table 1). These results are in agreement with the observations of Ridge et al. (1999) that unless autoclaved, whole or large fragments (without mechanical fragmentation) of decaying oak leaves showed little or no anti-algal activity; algal inhibition by fresh unprocessed mandarin skin and banana peel disinfected by 0.1% $HgCl_2$ (Chen et al., 2004) probably results from the remaining Hg^{2+} although fresh mandarin skin and banana peel had been washed four times with sterile water after sterilization. Therefore, autoclaving or mechanical grinding to create artificial FPOM (fine particulate organic matter) is necessary for releasing more algal inhibitor.

3.2. *Effect of different aquatic macrophytes on M. aeruginosa growth*

Although autoclaving could greatly reduce FPOM anti-algal activity (Ridge et al., 1999), the cell density of *M. aeruginosa* exposed to 0.5% autoclaved *I. wilsonii* leaves was 47% lower than the control after 19 days incubation, measuring 1.857 ± 0.203 and 2.732 ± 0.114 ($\times 10^7$ cells/mL), and was statistically significant ($P < 0.01$) (Table 1).

To assess different effects on algal growth among different aquatic macrophytes and different tissues, 0.5% of autoclaved aquatic macrophyte tissues were used. Fig. 1 reveals that different aquatic macrophyte tissues exhibited very different anti-algal activity. The leaves of *T. orientalis* and *I. wilsonii* strongly inhibited the growth of *M. aeruginosa*. Almost no algal growth was detected in the presence of the leaves of either *N. tetragona* or *N. nucifera* over the 19 days experiment while the petioles of *N. tetragona* and *N. nucifera* had lower algal inhibition than their leaves (Fig. 1). Algal inhibition by stalks of *P. australis* and stems of *A. philoxeroides* was not obvious during the experiment though the growth of *M. aeruginosa* was significantly inhibited after 19 days when compared with the control ($P < 0.01$ and $P < 0.05$, respectively) (Fig. 1, Table 2). The effects of leaves of *Z. aquatica* and stalks of *A. donax* on *M. aeruginosa* appear very similar; no

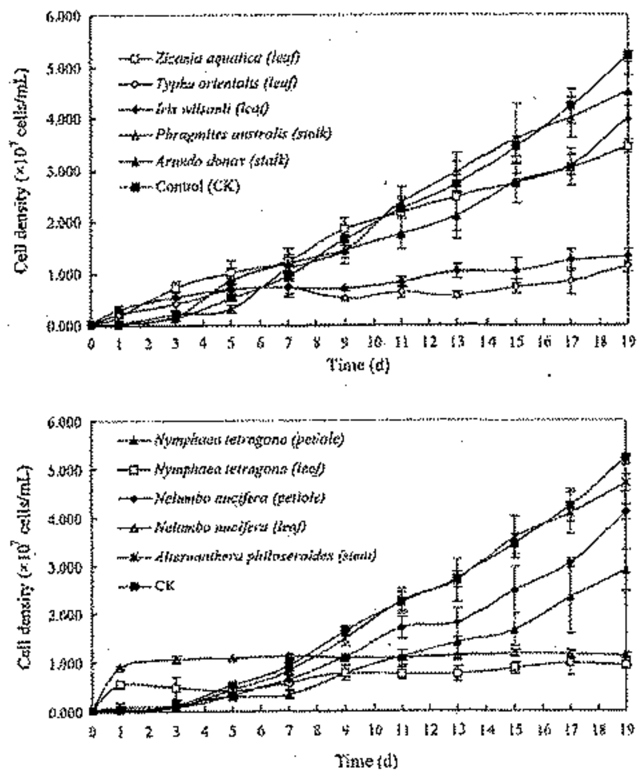

Fig. 1. Comparison of anti-algal effects of different aquatic macrophytes.

significant change in algal biomass was observed at the beginning of the experiment whereas algal growth at the end of the experiment significantly decreased in the presence of *Z. aquatica* and *A. donax* tissues (Fig. 1, Table 2). As a whole, the growth of *M. aeruginosa* was significantly decreased after 19 days of exposure to all aquatic macrophyte tissues examined ($P < 0.05$ for stem of *A. philoxeroides*, $P < 0.01$ for other tissues); the four most potent aquatic macrophyte tissues, leaves of *N. tetragona*, *T. orientalis*, *N. nucifera* and *I. wilsonii*, inhibited algal growth by 82%, 78%, 78% and 75%, respectively (Table 2). The results indicate that algal inhibition by aquatic macrophytes is widespread with different anti-algal activities, and leaf tissues are presumably responsible for the production of inhibitors and thus have higher anti-algal activity. Nakai et al. (1999) demonstrated that only two species of macrophytes

Table 2
Cell density of *M. aeruginosa* after 9 and 19 days treatment of different aquatic macrophytes.

Treatment	Cell density ($\times 10^7$ cells/mL)	
	9 days	19 days
Control	1.641 ± 0.101 ab[a] AB[a]	5.188 ± 0.108 a A
Z. aquatica (leaf)	1.849 ± 0.219 a A	3.443 ± 0.126 e DE
T. orientalis (leaf)	0.311 ± 0.041 e D	1.118 ± 0.099 g F
I. wilsonii (leaf)	0.696 ± 0.037 de D	1.306 ± 0.142 g F
P. australis (stalk)	1.435 ± 0.134 b B	4.529 ± 0.294 bc BC
A. donax (stalk)	1.443 ± 0.273 b B	3.998 ± 0.488 d CD
N. tetragona (petiole)	0.783 ± 0.145 d D	2.890 ± 0.423 f E
N. tetragona (leaf)	0.781 ± 0.083 d D	0.927 ± 0.015 g F
N. nucifera (petiole)	1.115 ± 0.032 c C	4.098 ± 0.150 cd C
N. nucifera (leaf)	1.088 ± 0.038 c C	1.128 ± 0.050 g F
A. philoxeroides (stem)	1.477 ± 0.153 b B	4.688 ± 0.176 b AB

[a] Means not sharing the same letter within each column are significantly different at $P = 0.05$ for lowercases and $P = 0.01$ for capital letters.

Table 3
Correlation between total phenolics and tannin levels of aquatic macrophytes in terms of catechin equivalents on the basis of fresh and dry mass, and cell density of *M. aeruginosa* after 9 and 19 days exposure to aquatic macrophytes.

	Total phenolics		Tannin	
	mg/kg FW	mg/kg DW	mg/kg FW	mg/kg DW
Cell density on 9 days				
r	−0.460	−0.520	−0.296	−0.316
P	0.181	0.123	0.407	0.374
Cell density on 19 days				
r	−0.514	−0.403	−0.339	−0.228
P	0.129	0.248	0.339	0.526

(*Myriophyllum spicatum* and *Cabomba caroliniana*) among 9 species inhibited the growth of blue-green algae using coexistence assay. The difference between the observations of Nakai et al. (1999) and the present results might be explained by the importance of aerobic decomposition to generate more inhibitors for algal suppression.

3.3. Inhibitory mechanism of aquatic macrophytes on M. aeruginosa

The exact nature of allelopathic inhibition has yet to be elucidated. Released algal inhibitors, *i.e.* allelochemicals, are considered to be responsible for algal inhibition. Several researchers suggest that phenolic compounds, especially tannins as allelochemicals, play an important role in algal suppression (Pillinger et al., 1995; Ridge et al., 1999; Nakai et al., 2001; Chen et al., 2004; Park et al., 2006). In order to investigate the inhibitory mechanism of aquatic macrophytes on *M. aeruginosa*, total phenolics and tannin contents in 8 species of aquatic macrophytes were determined and correlation analysis was carried out between phenolic compound concentration and cell density of *M. aeruginosa*. Table 3 shows that cell density of *M. aeruginosa* after 9 and 19 days of exposure to aquatic macrophyte tissues was negatively correlated with total phenolics and tannin contents in macrophytes. However, most of correlation coefficients were lower than 0.5 (Table 3), which suggests that phenolic compounds are just one type of metabolites in aquatic macrophytes that cause algal inhibition. Whittaker and Feeny (1971) demonstrated that allelochemicals included mainly flavonoids, terpenoids, steroids, alkaloids and organic cyanide besides phenolic compounds.

Macrophyte restoration in eutrophic lakes or wetlands has been extensively studied in recent years (Wang et al., 2009; Hu et al., 2010; Pan et al., 2011; Wu et al., 2011). The present work indicates that aquatic macrophytes have potential ability in lake remediation due to algal inhibition by releasing allelopathic compounds besides competing with harmful algae for nutrients.

4. Conclusions

Autoclaved *I. wilsonii* leaves have more powerful anti-algal activity than their extracts and fresh tissues probably because autoclaving provides a favorable condition for algal inhibitor release. Most aquatic macrophytes can inhibit the growth of *M. aeruginosa*, however, the anti-algal activity is very different with different species and tissues, and leaves might have stronger algal inhibition than petioles. More allelochemicals besides phenolic compounds in aquatic macrophytes should be involved in allelopathic inhibition on *M. aeruginosa*, and the nature of the inhibition should be further investigated.

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MYRIOPHYLLUM SPICATUM-RELEASED ALLELOPATHIC POLYPHENOLS INHIBITING GROWTH OF BLUE-GREEN ALGAE *MICROCYSTIS AERUGINOSA*

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Abstract—A culture solution of macrophyte *Myriophyllum spicatum* was subjected to algal assay-directed fractionation on the basis of polarity and molecular weight. As the water-soluble fraction below molecular weight 1000 was the only fraction to inhibit the growth of blue-green algae *Microcystis aeruginosa*, it was analyzed by analytical high-performance liquid chromatography (HPLC) and atmospheric pressure chemical ionization mass spectrometry (APCI-MS) in order to identify *M. spicatum*-released growth-inhibiting allelochemicals. Both HPLC and APCI-MS revealed the release of four polyphenols exhibiting growth inhibition effects, i.e., ellagic, gallic and pyrogallic acids and (+)-catechin. A quantitative investigation of their respective inhibitory effects showed that gallic and pyrogallic acids are more inhibitory than (+)-catechin and ellagic acid, and that the autoxidized products of each polyphenol demonstrated growth inhibition. Finally, when the collective activity of a mixture of the polyphenols was examined, synergistic growth inhibition of *M. aeruginosa* occurred. © 2000 Elsevier Science Ltd. All rights reserved

Key words—*Myriophyllum spicatum*, allelochemical, polyphenol, synergistic growth inhibition, autoxidation, blue-green algae

INTRODUCTION

With regard to the antagonistic relationship occurring between algae and macrophytes in natural and experimental aquatic ecosystems (Hasler and Jones., 1949), the competition for available nutrients and light is generally known to inhibit algal growth. Hogetsu *et al.* (1960) proposed another mechanism, in which macrophytes release allelochemicals that inhibit algal growth. Such a growth inhibition mechanism strongly suggests that macrophytes could be used to control undesirable algae. We recently investigated the allelopathic effects produced by nine species of macrophytes (Nakai *et al.*, 1999) and found that *Myriophyllum spicatum* produced the most inhibitory effects on two species of problem-causing blue-green algae (*Microcystis aeruginosa* and *Phormidium tenue*). Moreover, the inhibitory effects of *M. spicatum* were demonstrated to be due to its release of allelochemicals, thereby confirming the feasibility of using macrophytes as a control tool for algal growth.

Planas *et al.* (1981) found that an extract of *M. spicatum*—which included 12 kinds of phenols and polyphenols, e.g., gallic acid and ellagic acid—could inhibit algal growth. They did not, however, investigate the inhibitory effects produced by each individual compound. Regarding other species of the genus *Myriophyllum*, Saito *et al.* (1989) showed that the growth of blue-green algae *Anabaena flos-aquae* and *M. aeruginosa* could be inhibited by the hydrolyzable tannins eugeniin and 1-desgalloyl eugeniin extracted from *M. brasiliense* and as well by gallic and ellagic acids, which are components of these hydrolyzable tannins. Later, Aliotta *et al.* (1992) extracted three polyphenols from *M. verticillatum* and confirmed the associated inhibitory effects on algal growth.

Now, in view of the fact that phenols, and especially polyphenols, have high water solubility due to their hydroxyl groups, and that *M. spicatum* contains phenols and polyphenols (Planas *et al.*, 1981), it is reasonable to surmise that *M. spicatum* releases phenols and/or polyphenols which cause the resultant growth inhibition of algae. In fact, Gross *et al.* (1996) showed that *M. spicatum* released tellimagrandin II and ellagic acid, and that each compound produced an inhibitory effect. Questions

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remain, though, because the amounts released by *M. spicatum* have not been evaluated, and some phenolic compounds released by it have not been identified.

Although the feasibility of controlling algal growth by the addition of allelopathic macrophyte *M. spicatum* and/or its allelochemicals has been demonstrated, further research must be carried out to establish this as a safe, effective method for aquatic ecosystem management. Essential tasks are (1) to reveal the allelopathic compounds released from *M. spicatum*, (2) to determine a quantitative relationship that clarifies how the inhibition of algal growth is affected by the concentration of each allelochemical, and (3) to study collective activity of the allelochemicals on algal growth inhibition. Toward this end, here we identify the allelochemicals released by *M. spicatum* and report on a quantitative investigation of the growth inhibitory effects of the identified allelochemicals. In addition, collective activity of the identified allelochemicals and their inhibitory effects were investigated to determine whether or not the identified allelochemicals demonstrate synergistic growth inhibition of algae.

MATERIALS AND METHODS

Algae and M. spicatum

As one of the most undesirable blue-green algae in Japan, *Microcystis aeruginosa* (NIES-87) obtained from the microbial collection of the National Institute for Environmental Studies (NIES), Japan was used for algal assays. *M. spicatum* was collected from the Asakawa River, Tokyo, Japan and then cultivated in a 20-fold dilution Gorham's medium (Zehnder and Gorham, 1960) using a light intensity of 3000 lux at 25°C for 3 days.

Algal assays were used to: (1) accomplish assay-directed fractionation of the culture solution (Fig. 1); (2) analyze concentration-dependent inhibitory effects of each identified allelochemical; and (3) determine collective activity of the identified allelochemicals as a result of their inhibitory effects on *M. aeruginosa*'s growth. Under a light intensity of 5000 lux, *M. aeruginosa* was cultivated in triplicate in a modified C (CB) medium (Watanabe and Satake, 1991) at 25°C for about 10–15 days, during which time its growth was monitored by determining cell numbers with a hemocytometer (Thoma JHS, Hishikaki). Maximum growth was determined from data obtained at the stationary phase.

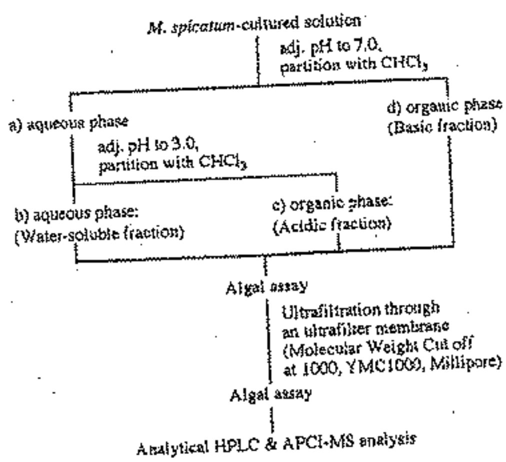

Fig. 1. Analytical process used in identification of allelochemicals released by *M. spicatum*.

Identification of allelochemicals

Figure 1 graphically shows the procedure employed for identifying the allelochemicals released by *M. spicatum*. The *M. spicatum*-cultured solution was prepared by culturing the macrophyte (100 g wet l^{-1}) in a 20-fold dilution of Gorham's medium for 3 days without rotation, after which the solution was subjected to the algal assay-directed fractionation on the basis of polarity and molecular weight of the allelochemicals. Because the results showed that the ultrafiltered water-soluble fraction (UWF) with molecular weight <1000 was the only one to inhibit growth (data not shown), this fraction was analyzed using high-performance liquid chromatography (HPLC) followed by atmospheric pressure chemical ionization mass spectrometry (APCI-MS).

HPLC and APCI-MS

The UWF (100 μl) was subjected to HPLC on an ODS column (TSK-gel ODS 80TS, 250 × 4.6 mm, TOSOH) at 35°C using two eluents (Zhu *et al.*, 1992): that is, eluent A (0.025% H_3PO_4 in water) and eluent B (0.025% H_3PO_4 in methanol) using an elution profile 0–55 min 0–19.8% B, 55–90 min 19.8–47.8% at a constant flow rate of 1 ml min^{-1}. As the detection device, we used an electrochemical detector (HP1049A, Hewlett Packard) set as follows: mode, amperometry; working electrode, glassy carbon; potential, 0.9 V (vs Ag/AgCl). Qualitative confirmation of the allelochemicals detected in the UWF was performed by HPLC using a spike test in which the UWF was spiked with commercially available standard compounds.

HPLC results were verified by subjecting concentrated UWF to APCI-MS. Briefly, the residue obtained by freeze-drying 2 l of the UWF was dissolved in 10 ml of methanol and concentrated to a 2 ml solution using gaseous N_2. The concentrated sample (20 μl) was then subjected to APCI-MS analysis in which a HPLC system separated the concentrated UWF and an APCI-MS detector (HP1100 MSD, Hewlett Packard) operated at the conditions listed in Table 1.

The concentrated UWF was separated by an ODS column (Develosil ODS UG, 250 × 2.1 mm, Yokogawa Analytical Systems) operated at 40°C using eluent C (0.05% CF_3COOH in pure water) and eluent D (0.05% CF_3COOH in 80% methanol) with an elution profile: 0–55 min 0–33% D, 55–90 min 33–75% at a constant flow rate of 0.2 ml min^{-1}.

Table 1. Operating conditions of the APCI-MS detector

Instrument	HP1100MSD
Fragmentor	80 V (0–30 min) 120 V (30–90 min)
Nebulizer	Nitrogen gas (50 psi)
Drying gas	Nitrogen gas (10 l min^{-1}, 350°C)
Mode	Positive selected ion monitoring (positive SIM)
Mass fragment	m/z 127 (PA) m/z 1771 (GA) m/z 291 (CATECH) m/z 303 (EA)

Assaying allelochemicals and their autoxidized products

To obtain respective dose–response relationships between added amounts of each identified allelochemical and their inhibitory effects on the growth of *M. aeruginosa*, algal assays were performed in which the amount of added allelochemical was varied. That is, commercially obtained allelochemicals were respectively dissolved in methanol and filtered through an autoclaved membrane filter (0.22 μm, Millipore), after which a small volume of the filtrate (< 1.5 ml) was added to the algal medium (100 ml) and *M. aeruginosa* was immediately inoculated (~10^4–10^5 cells ml^{-1}). Control experiments were performed by substituting methanol for the filtrate.

The inhibitory effects of allelochemical-autoxidized products were confirmed by ensuring full autoxidation of the allelochemical in the algal medium, i.e., sufficient time was allowed to pass between the addition of the filtrate and the inoculation of *M. aeruginosa*. Full autoxidation was HPLC-verified by confirming that the allelochemical was no longer present in the algal medium.

Estimation of allelochemical collective activity

The collective activity of allelochemicals on growth inhibition of *M. aeruginosa* was estimated by comparing experimentally obtained inhibitory effects produced by a mixture of the identified allelochemicals with those predicted using a calculation based on the inhibitory effects of an individual allelochemical at the concentrations used to obtain the dose–response relationships. The predicted inhibitory effect (PIE) of a mixture of the allelochemicals was calculated by Colby's equation (Colby, 1967), i.e.,

$$\text{PIE}\,[\%] = (\underline{A} \times \underline{B} \times \underline{C} \times \cdots \times \underline{N})/(100)^{n-1}, \quad (1)$$

where $\underline{A}$, $\underline{B}$, $\underline{C}$, . . . $\underline{N}$ are the normalized maximum growth with allelochemical $A, B, C, \ldots N$ at the added amount $a, b, c, \ldots n$ μg l^{-1}, respectively, and n is the total number of allelochemicals considered.

The PIE indicates the predicted normalized maximum growth of *M. aeruginosa* when inhibited by a mixture of allelochemicals. An experimental normalized maximum growth of *M. aeruginosa* that is above or below the PIE respectively indicates an antagonistic or synergistic response.

RESULTS AND DISCUSSION

Identification of allelochemicals

Figure 2(a) shows the resultant HPLC chromatogram of the UWF. Comparing retention time of the occurred peaks with that of authentic standards, peak 1 at 11.89 min, 2 at 16.44 min, 3 at 48.25 min, 4 at 87.10 min are considered to indicate polyphenols, i.e., pyrogallic acid (PA), gallic acid (GA), (+)-catechin (CATECH), and ellagic acid (EA) whose structures are shown in Fig. 3, however many unknown peaks are presented. Tellimagrandin II (Gross *et al.*, 1996) is thought to elute between GA (peak 2) and EA (peak 4), although this cannot be confirmed because we could not obtain an analytical grade standard sample of this compound.

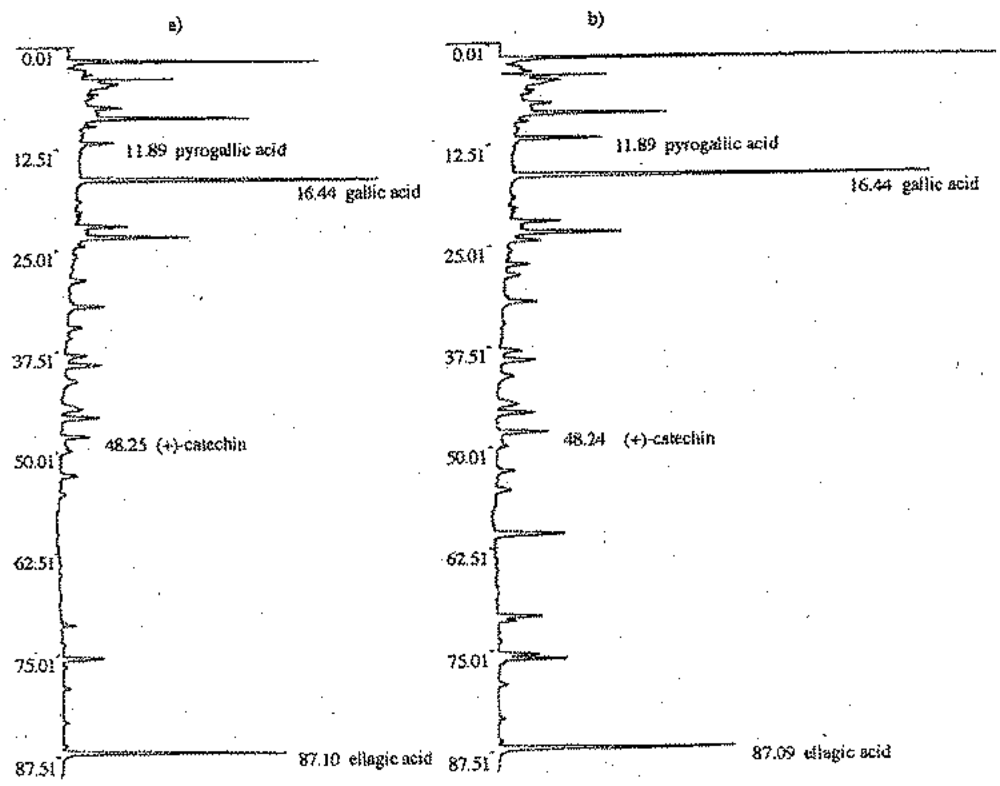

Fig. 2. Chromatograms of the water-soluble fraction of the culture solution of *M. spicatum*: (a) not spiked, (b) spiked with standard samples (PA, GA, CATECH, EA and six phenolic compounds).

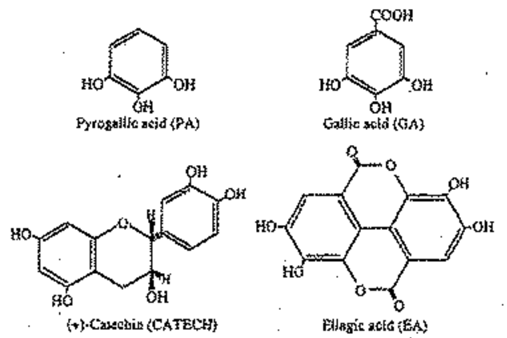

Fig. 3. Structures of polyphenols PA, GA, CATECH and EA detected in the UWF.

Note that Planas *et al.* (1981) reported that PA, GA and EA are produced by *M. spicatum*, but not CATECH.

Results of the spike test showed no change in the retention time of these four polyphenols (Fig. 2(a) and (b)), thereby confirming their presence in the *M. spicatum*-cultured solution. Using their peak areas, the concentration of each polyphenol was calculated. GA (62.8 $\mu g\ l^{-1}$) and EA (76.6 $\mu g\ l^{-1}$) were presented in much higher concentrations than PA (5.2 $\mu g\ l^{-1}$) and CATECH (16.6 $\mu g\ l^{-1}$). Although another six phenolic compounds, such as syringic acid, were also examined in the spike test, they were not presented in the *M. spicatum*-cultured solution.

When standard samples of the four polyphenols were subjected to APCI-MS, PA, GA, CATECH and EA were detected as proton-added ions (MH^+): $m/z = 127$, 171, 291 and 303 at a retention time of 10.58, 12.46, 37.18 and 73.83 min, respectively (data not shown). Figure 4 shows the total ion chromatogram (TIC) obtained from APCI-MS of the concentrated UWF using the positive SIM mode ($m/z = 127$, 171, 291 and 303), where the peaks at 10.59, 12.46 and 73.86 min have mass fragment ions $m/z = 127$, 171 and 303 corresponding to those of PA, GA and EA. The peaks at 20.68 and 26.19 min, however, indicate the presence of other unknown compounds in the concentrated UWF.

These results confirm HPLC which indicated that the UWF contained PA, GA and EA released from *M. spicatum*; however the presence of CATECH is not confirmed. This result might be due to the fact that it occurs at concentrations below detector thresholds. Since CATECH was not found by Planas *et al.* (1981), we decided to confirm whether or not *M. spicatum* contains CATECH. Briefly, a methanol extract of *M. spicatum*, obtained using our previously described method (Nakai *et al.*, 1996), was subjected to APCI-MS using the positive SIM mode ($m/z = 291$), with results showing a peak at 37.16 min (Fig. 5), which corresponds to that of CATECH standard compound, thereby indicating that CATECH is also released by *M. spicatum*.

Inhibitory effects of polyphenols

Figure 6 shows the effect of PA on the growth curve of *M. aeruginosa*, where the inhibitory effects are apparent as the concentration increases. While the addition of PA concentrations over 1.26 mg l^{-1} (10 μM) significantly inhibited the growth of *M. aeruginosa*, it still survived at this concentration.

Figure 7 shows dose–response relationships for the four polyphenols, where each polyphenol demonstrates some degrees of concentration-depen-

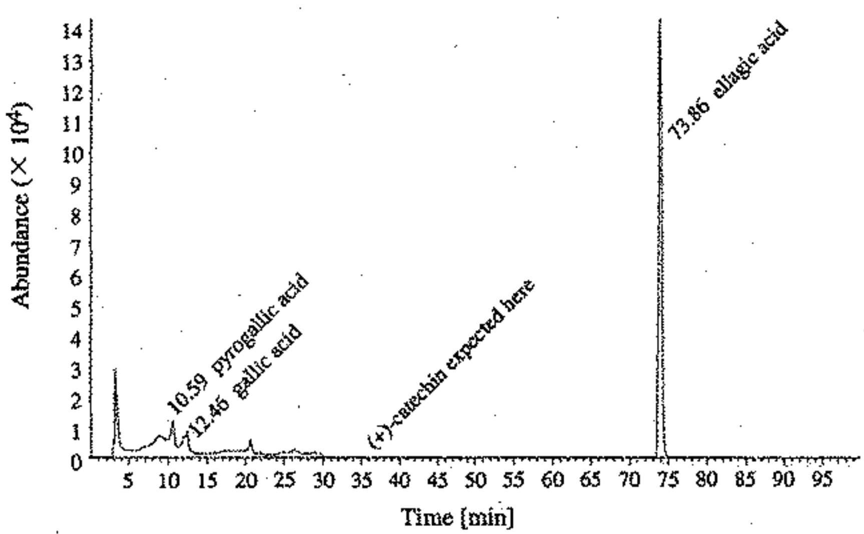

Fig. 4. TIC chromatogram obtained from APCI-MS analysis of concentrated UWF using the positive SIM mode ($m/z = 127$, 171, 291 and 303).

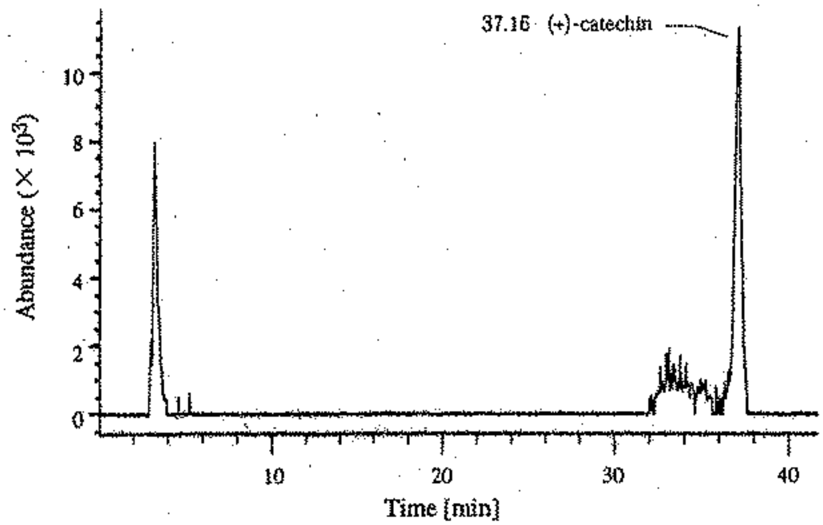

Fig. 5. Mass chromatogram (m/z = 291) obtained from APCI-MS analysis of the methanol extract of *M. spicatum*.

dent inhibitory effect. The concentrations at which each compound inhibited normal growth of *M. aeruginosa* by 50% were determined, i.e., the EC_{50} concentration of PA, GA, CATECH and EA were 0.65, 1.0, 5.5 and 5.1 mg l^{-1}, respectively. Thus, among these polyphenols, PA and GA demonstrated strong growth inhibition of *M. aeruginosa*, whereas growth inhibition by CATECH and EA was weak. In comparison with results by Saito *et al.* (1989), who used a different strain of *M. aeruginosa* (NIES-44), the EC_{50} concentrations of GA and EA (1.0 and 5.1 mg l^{-1}) are comparable (3.2 and 7.6 mg l^{-1}).

Polyphenols such as PA and GA are known to be easily autoxidized by dissolved oxygen in a basic solution (Inescu *et al.*, 1978; Doona and Kustin, 1993). Due to this characteristic, whether or not autoxidation occurred during the algal assay was confirmed. After adding to the algal medium an amount of individual compound which was confirmed to inhibit the growth of *M. aeruginosa* (PA, 1.2; GA, 1.5; CATECH, 7; and EA, 7.5 mg l^{-1}), the presence of each compound was found to vanish over time (PA and GA, 1 h; CATECH, 8 days; and EA, 12 days).

In the experiments to determine whether or not the autoxidized products of these polyphenols inhibit growth of *M. aeruginosa*, i.e., after inoculating the algal medium with *M. aeruginosa* following complete autoxidation of the above amounts, results showed that growth inhibition occurred. Figure 8 shows the effects of autoxidized products of each polyphenol on the maximum growth of *M. aeruginosa*, where the maximum growth is inhibited to 0% relative to that of controls, thereby indicat-

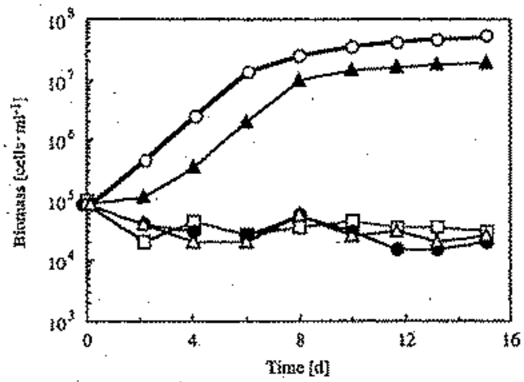

Fig. 6. Growth curve of *M. aeruginosa* as affected by indicated concentrations of PA. Symbols correspond to (○) control, (▲) 0.63 [mg l^{-1}], (□) 1.26 [mg l^{-1}], (●) 2.52 [mg l^{-1}], (△) 5.04 [mg l^{-1}].

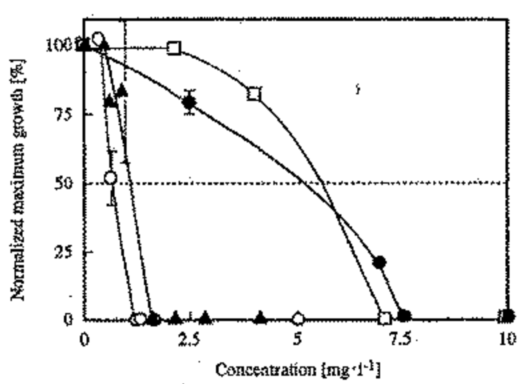

Fig. 7. Respective inhibitory effects of the polyphenols PA, GA, CATECH and EA on the maximum growth of *M. aeruginosa*. Symbols correspond to (○) PA, (▲) GA, (□) CATECH, (●) EA. Bars indicate standard deviation (n = 3).

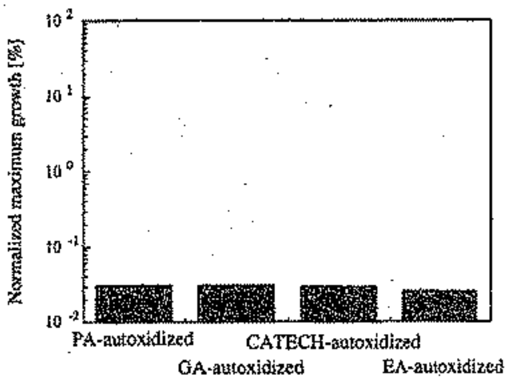

Fig. 8. Inhibitory effects of autoxidized products of each polyphenol (PA, GA, CATECH and EA) on the maximum growth of *M. aeruginosa*.

ing that autoxidized products of the four polyphenols also demonstrate growth inhibition effects.

Collective activity of polyphenols

In the experiments to determine how algal growth is inhibited by the collective action of a mixture of the polyphenols, the used concentrations of the polyphenols were determined on the basis of both their detected concentration in the *M. spicatum*-cultured solution and their autoxidation rate, i.e., PA, 297; GA, 596; CATECH, 44; and EA, 570 $\mu g\ l^{-1}$. The PIE of this mixture was determined using equation 1 in which $n = 4$ and the values of normalized maximum growth of *M. aeruginosa* after adding PA, GA, CATECH and EA were obtained from Fig. 7. That is, we used the normalized maximum growth with PA at 297 $\mu g\ l^{-1}$, $\underline{A} = 100\%$; with GA at 596 $\mu g\ l^{-1}$, $\underline{B} = 65$–100%; with CATECH at 44 $\mu g\ l^{-1}$, $\underline{C} = 100\%$; and with EA at 570 $\mu g\ l^{-1}$, $\underline{D} = 94$–96%. Substituting values into equation 1 gives PIE = 61–96%, which indicates that the mixture of the four polyphenols is predicted to inhibit the normalized maximum growth of *M. aeruginosa* by 61–96% relative to that of controls.

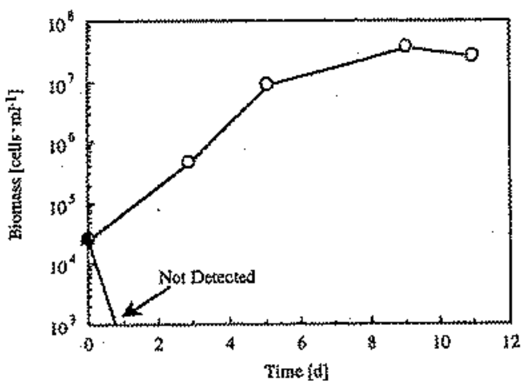

Fig. 9. Growth inhibition of *M. aeruginosa* by a mixture of PA, GA, CATECH and EA. Symbols correspond to (○) control, (▲) polyphenol mixture.

As shown in Fig. 9, at the obtained PIE, the mixture of the four polyphenols completely inhibits growth of *M. aeruginosa* to 0% relative to controls. Where the actual inhibitory effects of the mixture are stronger than the PIE, this indicates that the mixture induces synergistic actions as part of their inhibitory effects on *M. aeruginosa*. Accordingly, if further research can determine the appropriate combination to be added for optimal growth inhibition, then utilization of such additives may prove to be a safe and effective method for practically controlling algal growth in aquatic ecosystems.

Contribution of the four polyphenols to the allelopathic effects of M. spicatum

During the three-day cultivation period of *M. spicatum*, it probably continuously releases various amounts of PA, GA, CATECH and EA which in turn are autoxidized into products that accumulate in the culture solution. Regarding PA and GA, due to their rapid autoxidation (1 h), comparatively large amounts of their autoxidized products will be present. In addition, because the autoxidized products of each polyphenol inhibited the growth of *M. aeruginosa* (Fig. 8), it is reasonable to assume that the polyphenols together with their autoxidized products contribute to allelopathic effects produced by *M. spicatum*. It is for this reason that research directed at further elucidating the allelopathic effects of *M. spicatum* must consider the inhibitory effects produced by the collective activity of allelochemicals together with those produced by the autoxidation of allelochemicals such as polyphenols.

CONCLUSIONS

Using HPLC and APCI-MS analysis, we found that (1) macrophyte *M. spicatum* releases four polyphenols, i.e., PA, GA, CATECH and EA, each of which inhibits the growth of blue-green algae *M. aeruginosa*, and (2) the autoxidized products of these polyphenols also produce growth inhibition effects. A quantitative investigation of their respective inhibitory effects on the maximum growth of *M. aeruginosa* showed that PA and GA produce strong inhibitory effects compared to those of CATECH and EA which are much weaker. When the calculated PIE of a mixture of these polyphenols was compared to experimentally obtained inhibitory effects, it becomes apparent that synergistic actions are collectively induced by the polyphenols as part of their inhibitory effects on *M. aeruginosa*.

Acknowledgements—We are grateful to the National Institute for Environmental Studies, Japan, for supplying *M. aeruginosa*.

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DNR stocks larger muskies in Lake Webster

Start Date: 5/24/2016

Event Description:
Responding to a decline in muskie fishing at Lake Webster, the DNR is modifying its muskie stocking program at the popular lake in northern Indiana.

On May 19, biologists released 1,500 muskies into Lake Webster that were 12-14 inches long. Normally, the fish would have been part of a group stocked last October when they were 8-10 inches long.

Instead, the 1,500 fish were held at the Fawn River State Hatchery in Orland over winter and fed minnows. The minnows were purchased from a commercial source and paid for by the Hoosier Muskie Hunters.

By stocking larger muskies in spring, biologists hope to overcome factors that reduced muskie survival in recent years.

“We’ve seen a big drop in muskie fishing at Webster during the past 10 years,” said Jed Pearson, DNR biologist. “Holding half of the muskies we stock each year for a longer period in the hatchery should help reverse the trend.”

To compare survival of the larger spring-stocked muskies, each fingerling was tagged with a transponder before release. A similar group of 1,500 smaller muskies scheduled to be stocked this fall also will be tagged.

“The tags will allow us to test which group survives better,” Pearson said. “If the spring-stocked muskies win out, we’ll probably switch the stockings at Webster entirely to the spring.”

Pearson said studies in Iowa proved spring-stocked muskies survive better than muskies stocked in the fall because more food and cover are available during summer than winter. Larger fingerlings can also avoid more predators.

Muskies were first stocked into Lake Webster in 1981. By the mid-1990s, the lake developed into a fishing hotspot that attracted muskie anglers from throughout the Midwest.

As muskie fishing interest increased, so did muskie numbers. By 2005, biologists estimated 5,000 adult muskies were present in the lake. That year anglers spent 65,000 hours fishing for the species.

In a move to improve stocking efficiency, the length of time muskie fingerlings were fed minnows before release was shortened to 30 days. As a result, the fingerlings were smaller and less robust.

Additionally, weed control altered muskie habitat and reduced the amount of cover where fingerlings could hide.

Pearson also thinks the large population of adult muskies preyed on the newly stocked fingerlings.

Because of these changes, survival of stocked fingerlings took a nosedive. Eventually the number of adult muskies dropped too.

In 2005, anglers caught 2,200 muskies. Last year, they caught 560. Fishing efforts directed at muskies dropped by 50 percent over the same period.

DNR
Indiana Department of Natural Resources

State calendar entry type:
Press Release

State calendar entry category:
Announcements

State calendar classification:
- Residents
- Visiting and Playing

Agency Name:
- Natural Resources, Department of

“We estimate there are now fewer than 500 muskies in the lake,” Pearson said. “That’s a huge decline from the 5,000 we had 10 years ago. We’re hoping the switch to a spring-stocking program will get the number back up somewhere in the middle.”

Muskie anglers hope so too.

To view all DNR news releases, please see dnr.IN.gov.

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post-gazette.com
Pittsburgh Post-Gazette

Decline in Lake Arthur muskellunge fishing has anglers, state trolling for answers

October 9, 2011 4:00 AM

By John Hayes Pittsburgh Post-Gazette

PORTERSVILLE -- The waters of Lake Arthur were calm Monday evening. But in a meeting room at Mount Zion Baptist Church, on the shoreline of Shannon Run Bay, a maelstrom of controversy swirled as anglers, the state Fish and Boat Commission and Moraine State Park management clashed over what's happening beneath the surface.

The 3,225-acre Lake Arthur impoundment has long been considered one of Pennsylvania's premiere muskie lakes, stocked yearly by the state with 3,300 young muskies averaging 6 inches. Survival rates are low, but good forage, a stable weed mass for cover and catch-and-release practices resulted in higher than normal catch rates for what has been called the "fish of 10,000 casts."

But in recent years, anglers have noticed a decline in catches. In a routine survey this summer, Fish and Boat biologists found lots of muskies at Lake Arthur, particularly big ones, but were startled to log a total absence of entire year classes of muskies, those from 26 to 32 inches.

No doubt something is changing at Lake Arthur. The mystery grows as anglers and the agencies that maintain the lake spar over what's to blame for the missing muskies.

At last week's meeting, members of the Moraine Muskie Association presented enterprising informal research they believe shows the impacts of aquatic herbicides used to control weed growth at the lake. Tim Wilson, the Fish and Boat biologist who manages the Lake Arthur fishery, shared research that confirmed some of the anglers' concerns but challenged their conclusions. Following the meeting, park manager Dan Bickel defended the use of herbicides to control the plants, and inferred possible linkage to Moraine's ongoing problems with municipal sewage processed by the park.

Herbicides

"We've noticed a sharp decline in muskie numbers in Lake Arthur. Probably four years ago it started," said Fombell muskie guide and Moraine Muskie member Howard Wagner. "We wanted to see the effects of herbicide use on places we knew had good weed beds, so we went from bay to bay. Portersville Bay, Bear Run, Osprey, under the Route 528 bridge, the five fingers including Muddy Creek Bay -- wherever we went, we found no weeds or poor weed growth."

The group's main concern is the park's use of two aquatic herbicides (trade names Reward and Navigate) to clear the water for boaters. Group members presented photos of de-weeded areas and charts comparing muskie stocking rates and harvest reports. Some feared muskies were directly poisoned by herbicides; others were convinced the weed-control policy destroys habitat for forage fish.

Since Moraine State Park opened in 1971, the state Department of Conservation and Natural Resources has used Reward and Navigate to clear weeds from the swimming beach, 10 boat launches, marinas and other areas.

"We have to manage for multiple uses -- fishing, swimming, pontoon boats, sail boats, canoes and kayaks, hydrofoils," said Bickel. "We had a lot of complaints from the marina this year from people having trouble getting out of their slip spaces due to aquatic weed growth. . . . When we use it, we use the minimum amount of herbicide that we possibly can."

Since 1971, DCNR has treated as many as 43 acres of Lake Arthur per year, at 1 gallon per acre, depending upon need. In 2004, a year with a high muskie population, no herbicides were used. But in another peak year, 2007, 39 acres were treated. In 2010, DCNR used herbicides on about 12 acres. This year control agents were used on nearly 23 acres of the lake.

The herbicides used at Lake Arthur are common. Neither directly kills the plants -- they cling to plant surfaces and disrupt growth. Both are approved by the U.S. Environmental Protection Agency and used by some 40 states, other governmental bodies and private landowners. Both are used by DCNR throughout Pennsylvania. Fish and Boat does not use the herbicides in the wild, but employs far higher doses at its hatcheries.

Sewage

Like many parks in Pennsylvania's state park system, Moraine's sewage processing system takes in pre-processed sewage from a nearby municipality. At Moraine, outflow from Prospect Borough is processed in the park's system and released below the dam into Muddy Creek.

Bickel said cement-encased sewage pipes cross the lake bottom at two places before entering the park's processing system, which is inspected monthly by park staff. But long-standing problems with the municipality's incoming sewage remain unresolved.

"Faulty equipment in Prospect's system before it comes to us -- yes, that's an ongoing problem," said Bickel.

Prospect Borough sewage officials did not immediately return calls from the Post-Gazette.

It's unclear, however, how potential sewage releases might relate to Lake Arthur's muskie problem. PFBC biologist Wilson said if biological matter was leaching into the lake, it would be a problem for all fish, yet only the muskies are experiencing sharp losses of entire year classes. Biological waste would likely decrease water clarity, he said, which would in turn impact aquatic vegetation.

Habitat

For many years, Lake Arthur's forage fish, game fish and angling success rates were directly linked to the aquatic plant milfoil. An invasive species that choked out native growth, milfoil nevertheless provided perfect cover for little fish. Big fish lurked under and at the edges of weed beds waiting for a snack, giving anglers an easy casting or trolling target.

Since about 2007, when muskie catch rates began to decline, a new invasive plant species has quickly spread through Lake Arthur. Hydrilla, sometimes called Esthwaite waterweed, entwines in thick beds on the bottom, crowding out the less dense milfoil.

"It's too thick. The little fish can't use it to hide, and the big fish don't use it as a point of ambush," said Wilson. "Like other game fish, muskies are cannibalistic. Baby muskies need weeds to survive and without the good milfoil, they're more susceptible to predation from big muskies."

In fact, Wilson said the 2004 and 2007 spikes in muskie population that anglers sorely miss could be responsible for the current absence of later year classes. He cited a Wisconsin study showing that in lakes with unusually large numbers of big muskies, little muskies were eaten at such levels as to cause the collapse of the entire muskie population.

Wilson theorizes that the loss of some weed beds to herbicide is small potatoes compared to the sea change that rocked Lake Arthur with the arrival of hydrilla and subsequent demise of milfoil. The resulting muskie cannibalism, he speculated, may have caused the population changes experienced by anglers and detected in PFBC surveys.

Wilson said he will recommend doubling the number of young muskies planted in the next state stocking, but it may take a while to get the muskies back on track.

"Even with the hole in the population, it's still a pretty good muskie fishery now," he said. "The population is about the same as it was before those two really good years. The guys who adapt to the new conditions and change their gear and tactics will eventually come upon a formula that works."

Be careful what you wish for when managing aquatic weeds

Shallow lakes often suffer from excess nutrient inputs. Dense growth of aquatic plants can result, but plant management efforts can sometimes result in loss of water clarity and long-term problems with algae growth.

Posted on **July 9, 2013** by Dan O'Keefe (http://msue.anr.msu.edu/experts/daniel_o_keefe), Michigan State University Extension

Merriam-Webster (http://www.merriam-webster.com/dictionary/weed) alternately defines “weed” as a plant that is not valued where it is growing or any aquatic plant. The first definition acknowledges that human values determine which plants are deemed weeds, while the second could be taken as proof that many people do not place much value on aquatic plants.

Aquatic ecologists tend to avoid the term “weeds” when referring to macrophytes – the rooted aquatic plants that many swimmers and boaters disdain. These plants provide food for waterfowl and habitat for fish, but they can also play a critical role in maintaining water clarity.

This is especially true in shallow lakes and ponds. In ecology, the alternative stable states (http://www.sciencedirect.com/science/article/pii/016953479390254M) concept acknowledges that ecosystems can sometimes have more than one stable equilibrium point. Many lakes and ponds have two stable states: weedy and clear or devoid of weeds and muddy. This leaves riparian landowners and lake managers with a choice between two undesirable endpoints when nutrient levels are intermediate.

Nutrients (primarily phosphorus) have an important role in determining the balance between rooted plants (“weeds”) and the suspended phytoplankton (algae) that contributes to turbidity (“muddiness”).

At low nutrient levels, the rooted plants win out because water is clear and plenty of light reaches the bottom of the lake. At high nutrient levels, the algae win out and effectively shade out rooted plants – this means extremely low water clarity and sometimes harmful algal blooms (pdf). At intermediate nutrient levels, things get a bit tricky. In this case, lakes can be pushed in one direction or the other – sometimes inadvertently.

In these intermediate lakes, additional nutrient inputs (perhaps from septic fields or urban and agricultural runoff) can push a lake past its threshold and result in " catastrophic transition (pdf)" to a muddy and algae-dominated state. When this happens, it can be very difficult to restore water clarity and rooted plant communities.

Weed management might also push a lake over its threshold point. One study (pdf) used computer simulations to investigate the outcome of various management strategies and found that management for intermediate vegetation density can be impossible in certain lakes. While intermediate levels of rooted vegetation are often ideal for fish (http://www.youtube.com/watch?v=dnBXW7r-OAU) , wildlife and human users, they can be impossible to attain in shallow lakes with intermediate nutrient levels.

While this might sound complex, reasons for the loss of water clarity following aquatic plant control are straightforward. Rooted plants prevent mucky bottoms from being stirred up by wind-driven currents, boating activity, and other disturbances. They also suppress algae growth by taking up nutrients. Some plants even release chemicals (http://pubman.mpdl.mpg.de/pubman/faces/viewItemFullPage.jsp?itemId=escidoc:1508475) that further impede algae growth.

When rooted plants are destroyed, mucky bottoms get stirred up and re-suspend nutrients. Competition with algae ceases and foul blooms occur. If plant biomass is not mechanically removed, the rotting vegetation further adds to nutrient availability, turbidity, and algae growth.

If you are concerned about water clarity, be wary of large-scale vegetation control programs on shallow lakes. In other words, be careful what you wish for.

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Algae, Nutrients & Aquatic Plants – A Delicate Balance

BY CLAIRE QUADRI
CWC Conservationist

Algae and aquatic plants are two very visible and significant concerns with Chautauqua Lake. Potential remedies to these concerns are as complex and interconnected as the ecology of the lake itself. The factors that cause a problem and those that may solve the problem are part of a delicate balance.

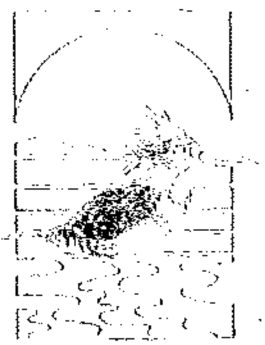
Several towns around Chautauqua Lake are considering the use of herbicides for control of aquatic plants. The proposed herbicide treatment would cover, in total, more than 1,000 acres of the lake.

It is important to note that these herbicide treatments target aquatic plants, not algae. However, because of the delicate balance in this ecosystem, it is possible that this effort to control the aquatic plants will affect algae blooms, but not in a good way.

Here are scenarios worth considering:

- If herbicides are used to kill emerging aquatic plants in the spring, the nutrients in the water column that would have been absorbed for the growth of the plants become available for uptake by algae. The resulting nutrient abundance can provide ideal conditions for rapid algae growth.
- If herbicides are applied when plants are larger (such as in late June or July), the targeted plants die, decay and release nutrients back into the water. As a result, these plants are no longer competing for nutrients but, instead, are making nutrients more abundant for rapid algae growth.
- Potential unintended consequences of the proposed herbicide treatments may include increased algae growth around the treatment areas and earlier seasonal algae blooms.

According to the article Nuisance Aquatic Plant



Control Using Algaecides and Herbicides by Donald Garling and Howard Wandell of Michigan State University (2006), aquatic plants killed by herbicides "are often replaced by other forms of vegetation, annoyingly soon in some cases. Less than a month after treating rooted plants, the area may become clogged with masses of stringy algae ..." Garling and Wandell also state that "as long as light, warmth and nutrients exist in a lake, nature will strive to fill the water with some form of vegetation, often with aggressive nuisance forms of plants and algae." This clinging green filamentous algae is already a seasonal problem for fishermen in some areas of Chautauqua Lake and a decay problem when it dies and accumulates as stinking black masses along the shoreline.

In 2013, Dan O'Keefe of the Michigan State University Extension posted an article on this subject entitled, "Be Careful What You Wish for When Managing Aquatic Weeds." His article describes how management of aquatic plants can affect algae growth and water clarity. O'Keefe states that "rooted plants prevent mucky bottoms from being stirred up by wind-driven currents, boating and other disturbances. They also suppress algae growth by taking up nutrients. When rooted plants are destroyed, mucky bottoms get stirred up and resuspend nutrients. Competition with algae ceases, and foul blooms occur. If plant biomass is not mechanically removed, the rotting vegetation further adds to nutrient availability, turbidity and algae growth." The article concludes by stating: "If you are concerned about water clarity, be wary of large-scale vegetation control programs on shallow lakes. In other words, be careful what you wish for."

It is generally agreed that the ultimate cure to the problems of aquatic plants and algae is to reduce the nutrient concentrations in the lake. This can be accomplished by treating the causes (excessive nutrients) by various means – by limiting discharges from wastewater treatment plants and septic systems, by conserving and restoring much of the lake watershed and tributary stream corridors to forest, and by reducing nutrient and sediment runoff from agricultural and other developed land uses. Progress is starting to be made in the Chautauqua Lake watershed to accomplish these goals. However, it will take time to see the results of these efforts.

In evaluating whether herbicides are necessary and appropriate to control aquatic vegetation in Chautauqua Lake, the potential for disrupting the delicate balance between aquatic vegetation, nutrients and algae should be carefully considered.

The Chautauqua Watershed Conservancy is a local not-for-profit organization dedicated to preserving and enhancing the water quality, scenic beauty and ecological health of the lakes, streams, wetlands and watersheds of the Chautauqua region. For more information, call 664-2166 or visit chautauquawatershed.org or facebook.com/chautauquawatershed.

APPENDIX C: PUBLIC HEARING TRANSCRIPT

C1. Public Hearing Transcript

C1. Public Hearing Transcript

DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (DSEIS)

PROJECT (ACTION)

CHAUTAUQUA LAKE HERBICIDE TREATMENT

PROJECT SPONSOR

TOWN OF ELLERY
PO BOX 429
BEMUS POINT, NEW YORK 14712

PROJECT LOCATION

CHAUTAUQUA LAKE
CHAUTAUQUA COUNTY

MINUTES OF PUBLIC MEETING, held at Fluvanna Fire Hall, 3536 Townline Road, Jamestown, New York, on Thursday, March 1st, 2018, commencing at 7:45 p.m.

A P P E A R A N C E S:

RUPP, BAASE, PFALZGRAF, CUNNINGHAM, LLC
BY: ANNE BOWLING, ESQ.
1600 Liberty Building
424 Main Street
Buffalo, New York 14202
716.854.3400

TOWN BOARD:

ARDEN JONSON, SUPERVISOR
DAVID WESP
G. CRAIG MILLER
JOHN CRESANTI, SR.
MARK SCHLEMMER

TOWN ATTORNEY:

NEIL ROBINSON, ESQ.

S P E A K E R S:

SUPERVISOR JOHNSON: Thank you for coming. We have bad weather out there. I'll make this as short as we can so everybody can go home safely. I'd like to thank all of you for coming. I and the entire town board appreciate your interest in the Supplemental Environmental Impact Statement for application of herbicides that is targeted in Chautauqua Lake.

We call this meeting -- we are here to discuss the Draft Supplemental Impact Statement which was issued on February 8th, 2018. I have asked Mrs. Bowling of the law firm of Rupp Baase to assist the board in managing the meeting. I will now turn the matter over to Mrs. Bowling.

MS. BOWLING: Hi, everyone. I'm going to try this without a microphone, so if you can't hear me let me know and I'll use one, but thank you for coming here tonight, for your interest in the draft SEIS. As many of you know, we have been battling invasive macrophytes on the lake for over 75 years.

For decades both weed cutting and herbicides were used to manage the invasive species. However, barring two exceptions, herbicides have been notably missing as a method of lake macrophyte management. The draft SEIS we are discussing tonight is a key step in the process of adding herbicides back into the tool kit.

Twenty-five years ago, the annual application of herbicides to the lake stopped. Since then there has been an increase in populations of invasive macrophytes throughout the lake. The ability to use the lake for recreational purposes is declining, tourism is declining, property values are threatened and businesses that depend on that tourism and summer residents are suffering.

While current and planned nutrient reduction efforts will have long term benefits for the lake, they are currently insufficient to achieve phosphorus reductions required by federal and state regulators and to combat the invasive macrophyte problem.

Short and midterm measures, including herbicides, are necessary until the required nutrient reductions are achieved. The Town of Ellery is now leading a process to study how herbicides can be safely included in the macrophyte management toolkit in several locations in the lake.

The heart of this process is the completion of a Supplemental Environmental Impact Statement, or SEIS, which has been required by the New York State Department of Environmental Conservation. The SEIS will supplement a 1990 SEIS that provided for the widespread use of herbicides on the lake.

It will also supplement EISs that the DEC has completed for herbicides that are approved for use statewide. Please keep in mind that the purpose of this SEIS is not to show that herbicides should be the only macrophyte management method, but to add herbicides as an additional tool to be used in portions of lake.

The purpose of this meeting is for the

public to provide substantive comments on the draft SEIS which was issued on February 8th, 2018. Our purpose is not to take positions, debate issues or otherwise attempt to determine outcomes.

Each person who would like to provide comments on the draft SEIS must sign in with the town clerk and will be given approximately three minutes to speak. Before speaking, please introduce yourself and give your name, any organization you are speaking on behalf of as appropriate and your address for the record.

Please be as succinct with your comments as possible. We have allotted two hours for the meeting tonight and would like to give everyone who wants the opportunity to speak the chance to be heard.

We ask that everyone remain respectful of others. If you have prepared written remarks, we ask that you summarize the remarks when you speak and provide a copy for the record. Please also be aware that comments do not become more significant simply by being repeated multiple times. If someone already presented your comment, we ask that you refrain from repeating it.

Written comments for the record will also be accepted. They must be received by the Town of Ellery no later than 4:00 PM on Monday, March 12th. The comments may be sent to Becca Haines either by regular mail or email. Ms. Haines' contact information is available on the Town of Ellery website.

After the comment period has expired the town will issue a final SEIS. I will be serving as our timer tonight and will let you know when your time has expired. Our court reporter got stuck in the weather and was unable to make it so we are going to be recording this meeting, so I just ask that you speak up so we can catch everything that is said on the recorder.

I have a list of people who have signed up. If your name is not on the list, please come up and see Ms. Haines. We want to make sure that everyone who has something to say gets a chance to speak. Doug Champ?

MR. CHAMP: I'm first on the list because I thought the meeting started at 7:00. I've been here a long time. As I said the last time, I grew up a mile from here on Lake Chautauqua and spent all my time in and around the lake, so appreciation of the lake has been something I've been born with and even now I'm still on the lake as much as I can.

I have a place at Camp Chautauqua primarily for the summer and fall. I live in Jamestown, New York. Heavily involved in environmental reviews over the years. In fact, I was the city's environmental coordinator for sometime when the SEQR program got first started and then worked on all types of projects and bottom line, when you do a SEQR evaluation, of course, the thorough analysis is very complete and very important, but the real crux of the thing is what do you want to accomplish? What is the end result with it?

And when you deal with chemistry, chemistry has a lot of what I refer to as linkages, both on short term and long term and specifically how that really works is that everything has a shelf life and has a period of time where you can either mitigate it through dissolving it or you can hope that the natural environment takes it and flushes it away, so each one of those designated herbicides when combined will have a chemical effect on just about anything over the long term.

What I'm concerned about, too, is the spawning effect that occurs in species in our lake. Specifically, the muskellunge which spawns in May. I know that the fish hatchery is heavily involved in that process of creating artificial spawning, but we still have a natural aspect with spawning in this lake and the food chain associated, the bait fish, all of this stuff is relatively important in terms of what happens in terms of chemistry in the lake.

So the first thing that we have to think about when we're doing this is that we do not want to do any harm. And only time will tell. I know it's been done before and, again, pro/con herbicide, I can't really say I lineup on either side at this point.

It's results that I'm talking about and this lake is different than other lakes. Just like everybody who is a human has a different effect with cancer in terms of what the effects are with the chemotherapy treatment and what that represents, so remember, as we expose water to chemistry whether it becomes drinking water that is intaked into the Chautauqua Institution, or the natural aspects of our lake which is living and breathing and really rejuvenating or in some cases not too well with that, it's going to have an impact and those impacts have yet to be defined I think because these herbicides as a triumphant trifecta, if you will, have not been introduced before either by themselves or individually all the time for a number of years so we really know what those effects are.

So that's my concern with any environmental review, and I know it's difficult to prove upfront, to do no harm because if you do harm it's awfully hard to stop the harm from happening and not really I guess doing what you hope it will do which is do no harm. Thank you.

MS. BOWLING: Is Ed Crum here?

(No response)

MS. BOWLING: Andy Ohl?

MR. OHL: Hi. My name is Andy Ohl. I'm a licensed fishing guide on Chautauqua Lake and I prepared some remarks just so I can keep it brief and wanted to share some points with you. You know, I recognize that there's a problem with the weed density and the algal blooms which could affect people and probably does affect people from visiting and vacationing and enjoying the lake.

I do not personally support the use of the chemical herbicides as a replacement for the common sense management practices and watershed stewardship as a matter of convenience.

For many years I think from the last study moving forward there's been recommendations to reduce the nutrients to the lake, buffer zones, fertilizer use on the lakeshore, septic systems. I spend most of the weekends and almost everyday in the summer on the lake and I have seen -- one instance I can remember was a Save the Lake sign in the yard as the Chemlawn man was administering the fertilizer so, you know, I just think that some of those aspects that have been, you know, founded practices and made sense, they are just not being -- had that stuff been done for 15 years I guess, and the problem still existed, I maybe would have been a little bit more supportive of the process.

In my opinion as a fisherman, I would say that the health of Chautauqua Lake as a fishery continues to improve. I think many of the species such as walleye and muskie have rebounded to some of the best fishing that we've seen in a long time.

There is very -- there is a high number of fishermen from various states, Pennsylvania, Ohio. There's almost a fishing tournament every weekend on the lake and one local tackle shop reported that he sold $30,000 in New York State fishing licenses and hunting licenses, but licenses over the course of last year and that's just one shop. There's other shops. There is Walmart and there's online purchases, so I think to overlook the fishing community and the revenue that is involved and tourism that is involved with the fishing community would be a big mistake.

You know, if the decision to spray moves forward, I would think that there's a few measures that have been provided to me by Regis Thompson that would I think reduce the environmental impact and decrease the chance of a fish kill. If you were to pair a fish kill -- if you remember back a few years that carp kill where we had thousands of dead carp around, if you were to pair that with an herbicide application and then you had a fish kill as a result, it would be detrimental to tourism.

The things that he has kind of provided and outlined to just take into account if you were going to spray, was really not using any herbicides on the lake until the end of June. You've got areas of spawning, late spawning and especially those new young in the year fish that are using those weeds for cover.

Another thing is not going 200 feet from shore or exceeding four feet of depth. That would allow you to have that deep water habitat, those weeds that are out in that deeper water that really wouldn't effect any of the recreational activities on the shore and allow those fish to still have that cover.

And then with dissolved oxygen, when you kill that amount of weeds in a short term you can really put a significant impact on the amount of dissolved oxygen in the water and when that value falls below four down to three, you can have significant fish kills and you combine that with hot weather or the right things happen and that could potentially happen.

And then no herbicides on any undeveloped shoreline, so any place that there's not a home or, you know, on the state properties, not spraying those areas and then looking at that fifty percent density of weeds, so really not spraying any area that doesn't have more than fifty percent weed density, that allows that balance to occur.

I can provide these in a written form as well. Thank you.

MS. BOWLING: Bob Johnson?

MR. JOHNSON: Back again. Bob Johnson. I live up on 430 at Belleview. I've been there roughly 60 years. The wife has been there her whole life. The weeds back 25 years ago were bad. They sprayed. We swam the day after they sprayed. Had no problems. I'm still here.

And my father-in-law was a fisherman

everyday. He'd go out the whole summer after they sprayed and come back with as many fish as he did before. Never complained. He fished that whole bay and across the lake and up the lake.

I think that there's a need for both cutting the weeds and spraying and I think if spraying, you come up with this big report which is fine and I think if they cut they've got to go through the same process, so we know where they're doing and what they're doing.

They're cutting now, I don't know, seven, eight feet down. They say what is it? Ten percent of the weeds are dropping off? Well, you got one organization that says mow your lawn and leave the grass clippings down for fertilizer. I guess that is what we're doing now with mowing the weeds in the lake. What goes down in the bottom is fertilizer.

We're blaming the farmers. We're getting less farmers all the time and I still haven't heard where these nutrients, what percentage is coming off from farmland. We've got all this scientific equipment and brains. Somebody ought to be able to figure out are the farmers the ones that is causing the problem, when there aren't any.

In the end if nothing is done and we continue the way we are and get more weeds, then I think the town, the county and the state better start looking at the assessments around the lake. Start lowering them. That's it.

MS. BOWLING: Jim Paige?

MR. PAIGE: Good evening. I'm a resident on Chautauqua Lake and Bemus Point and I've been on the lake for over 60 years growing up with my grandmother's cottage up on Warner Bay. I guess not to hit on the same point that people have mentioned, I would like to hit a couple other points which is I do support the use of herbicides.

I think it's long overdue. If we don't stop the deterioration of the lake we won't have a lake and we won't have the entertainment value and the recreational value that goes along with that. The ecosystem in the lake, I hear different comments on it, but I can tell you from walking out there every year, it's worse. Three, four foot and then going out it's all muck down there, so what supports fish out there in that muck, I don't know, but you know that it's terrible out there.

Nothing grows out there. The things that used to be out there are gone. Some of the fishes are gone that are out there. So we definitely need to address that. Herbicides nowadays are not the herbicides of fifty years ago. They can be pinpointed with GPS accuracy like never before so they can go in thicker areas and it can be surveyed and done much better.

The herbicides use is a welcome idea. The people who are behind the Chautauqua Lake Partnership are people who are arm's length. They are intelligent people. They are accomplished people and they are not paid. They are volunteers which says it all about what is there just in doing this is to see the lake improve. That's undeniable. Otherwise, people who have that who are very busy business people who get involved in this for nothing other than to see the lake improved.

Doing nothing is not acceptable and we haven't done anything but weed cutting in a number of years and it's getting worse. You look at the hundreds of thousands of dollars, and I did a little research and had a little research done online here about how much money has gone to these associations and these partnerships and alliances, the hundreds of thousands of dollars.

It's fine we're doing something, but it's not getting the job done. It's getting worse every year and yeah, there's a payroll and yeah, there's a lot of things that these companies are doing that I'm sure has the best interest in mind, but it's not working.

So if our generation that's here tonight doesn't take this thing by the tail and start to fix it, we will leave nothing for our kids in the years to come, so it's our responsibility to try to improve the situation.

I guess the other thing I'd like to say is that if you don't push this thing through -- first of all, I have to compliment all these communities that have climbed on board and said we want to fix the problem. You go up and down this lake along the shoreline, and I don't mean just the three or four feet in the water. I'm talking about going out in ten or twelve foot of water, the weeds are coming up to the top. What really thrives in that kind of thing?

It used to be when I was a kid you walked into the water and the water was clear out and the fish was so abundant. I'm not sure I'd want to eat a fish on Chautauqua Lake when you look at some of the stuff that's out there now and there's been no herbicides out there for decades now, but it's time.

It's time to fix the problem. It's time to move ahead with the people. The DEC wants to move ahead. Everyone is trying to do something and I really have to compliment the boards and the towns that have done this and climbed on board to try to solve the problem. It's just time to do it and I thank you for your time.

MS. BOWLING: Karen Rine?

MS. RINE: (Shakes head)

MS. BOWLING: Randy Present?

MR. PRESENT: Everybody in this room wants what's best for Chautauqua Lake. We might have a lot of different opinions, but I urge everybody to take a deep breath and consider everyone else's opinion, too.

When I was a criminal investigator that was my job and what I learned very early is if you make an assumption about something before you start your investigation, it's flawed. Do the study, but consider other people. Consider what they think is right.

I hear science from both sides opposing and in favor of this. I'm in favor of it. I'm a third generation of five living on the same lot. I can't be there too much longer if we don't see improvements in the lake for my own health. I can't do it.

Keep up the good work, everybody, and get everybody's opinions in, but let's get something moving here. Let's not beat heads and make opinions personal. Let's get this done. Thank you.

MS. BOWLING: Bruce Erickson?

MR. ERICKSON: Bruce Erickson, Lakewood, New York. Yes, I am on the CLA board and have been for 40 years. My questions more are related to the yacht club. Is there a representative from the DEC here?

MS. BOWLING: No.

MR. ERICKSON: Whoops. Okay. Lady lawyer said that the lake is worse than it's ever been. That's an opinion and not a fact. The fact is twenty or thirty years ago a twenty-five foot sailboat between the yacht club and Celoron in ten knots of wind would stop in the weeds. That hasn't happened in years.

The lake is better than it's been. It's not good and the problems have changed and I'm afraid this SEIS is missing some very critical, critical issues. Last year there was a demonstration project. The yacht club runs a summer program for kids. It happened to start right after the herbicides were done when I was president of CLA and we put herbicides on.

We had to quarantine the lake. There were signs every where. I called the DEC in Buffalo Region 9 and asked is there a quarantine? Oh, he's in Albany. Does he have a telephone? I have fifty kids going in the water right now. Can they go or not?

This SEIS has to address a quarantine problem. If they don't who is going to be in charge? Do we call Arden? Are you going to be the guy to make that decision? Who is going to make the -- Jim Cirbus? Is he going to make the decision? Who is going to be responsible for the kids in the lake?

The SEIS must address that. Then there is the other issue. Really the weeds aren't the major problem in the lake. There are two separate problems, one of which started this whole process and I applaud it. It's the crap that blows up on the shoreline and rots and stinks and smells.

Yes, we have to address the near shore cleanup and shoreline cleanup. That gets to be the huge problem, but then there is the stinking thing underneath. Nutrients are coming into the lake. That's been mentioned. Two things can happen to them. The weeds are going to eat them or the algae is going to eat them.

And if you take all of the weeds out of the lake and the oxygen level drops, I think the phrase for it is HABs, hazardous algal blooms. The SEIS has totally ignored algal blooms and that is what is killing dogs and really poisoning people so the SEIS has to address what they are going to do to mitigate the HABs or we've got a bigger problem than anybody ever thought of, so that's my two cents' worth. Thank you.

MS. BOWLING: Jonathan Durkee?

MR. DURKEE: Good evening. My name is John Durkee. My wife and I purchased a home on Lakeside Drive, 4347, two years ago. We're directly on the water between Bemus Point and Long Point. We are seasonal residents. I in fact drove here from Cleveland to be here tonight.

And I believe that myself and my family are in many ways exactly what the Chautauqua area needs. This region so dependent on tourism, parts of which are still economically challenged, needs families and people like us to bring their investments here to help the local economy.

When we purchased our home two years ago we were thrilled. It was a big investment for us. We rushed to get the house ready for the upcoming summer. We invited friends and family from all over the country. We were excited about the memories we would make here.

The seaweed in Bemus Bay that season hit us like a ton of bricks, severely compromised our ability to enjoy the summer.

We invested hundreds of hours and thousands of dollars to clean the shoreline. As we headed into that winter we were concerned, but hopeful. Perhaps the previous winter had just been too mild. Surely this wasn't what the lake would be like every year.

Our second season was in fact much, much worse. Seaweed on our shore in what can only be described as biblical proportions. Again, thousands of dollars to clear the shore. We invited fewer people to visit us last summer. Sadly, some of our family said they did not intend to come back.

This time we headed into winter with more of the concerns. We were scared. Had we made a mistake purchasing a house on Lake Chautauqua? Should we sell the house? How much money did we stand to lose? I honestly feel foolish for having bought a house here unaware of the seaweed problem.

Without a solution we feel trapped and

desperate for results. With that background on my situation I'd like to make five quick points. One, Lake Chautauqua should be a cornerstone of economic development in Western New York and Jamestown. Instead, Lake Chautauqua has a serious problem. It is getting worse and we need immediate action.

Anyone who says otherwise is confused and hasn't had the privilege of cleaning 140 feet of shoreline in Bemus Bay.

Two, I have followed the problem very closely over the last two years and I am mystified by the lack of accountability, the lack of urgency and the level of political dysfunction between the groups trying to improve the lake. Rather than being open-minded and working together, it seems some groups are more interested in competing with one another and protecting personal interests and agendas. It is deeply frustrating to watch.

Three, I support every method of addressing the invasive species problem and every group or agency that can play a productive role in that process. The DEC, the CLA and the CLP. I am comfortable with herbicides. I trust that with a proper review and oversight by the DEC that any environmental issues will be handled appropriately as they are in lakes all over New York State.

Four, despite my best efforts, I cannot understand why Lake Chautauqua is treated so differently than other lakes in New York State that regularly use herbicide as part of the comprehensive approach to fighting invasive species.

And lastly, I applaud the efforts of the CLP. I am grateful that that leadership team there has so relentlessly continued to work the problem, push the thinking and challenge the status quo. It is clear we need change.

I'd like to thank the Town of Ellery, the CLP and other agencies supporting the SEIS and the application for herbicide treatment. Thank you for listening.

MS. BOWLING: Becky Nystrom?

MS. NYSTROM: Hi. I live in Jamestown, but my parents owned a cottage in Arnold's Bay for 35 years and I spent many, many half days on the lake. I will be submitting written comments, but I wanted to make a few points.

First, this is a very complicated issue so the comment period again should be extended. Many of us in the science community feel that this process is being steamrolled too quickly. It is a complicated thing and there is no reason why we should be rushing this.

I also want to question the Bemus Bay macrophyte surveys that were done this past summer in terms of the scientific legitimacy, data collection issues, interpretation of data, conflict of interest.

The very company making determinations on macrophyte densities using techniques that are somewhat questionable, making interpretations that are somewhat questionable, not vetted by the scientific community should not be considered as the basis for much of what is being proposed.

I continue to agree with others that are in the fishing community as biologists, the herbicides should not be applied before July 1st to protect spawning and rearing periods for the fish and, again, I know there's an intent and a hope to apply the herbicides early in May when plant growth is smaller, but this is going to disturb the entire ecosystem of the lake.

Herbicides I think it was already said by Andy Ohl should not be applied in any area unless there is fifty percent or more of the invasive species. Not just all species, but we're talking invasive species that are being targeted based on rooted measurements. So we're not looking at visual. We're talking about good scientific procedures here that should be followed.

The herbicide applications should be if required and needed and justified, not done at all along wetland areas, along preserve areas, along state designated areas that are public drinking water intakes and fish hatchery intakes.

I have special concerns as a biologist for the plants for Burtis Bay which I know can have a huge amount of milfoil in it and I recognize that, but very concerned with the downstream outcomes on the outlet which is considered an ecological oasis and part of our New York State environmental planning area that has received funds for protection in the past.

Potential impacts on other places and other aspects, I'm very concerned that there are claims that the native macrophytes will come back and be re-established once the non natives and aggressive invasives are targeted.

These herbicides that are being proposed will not just target the non native aggressives. Many of us are concerned with the pond weeds that are going to be targeted by Aquathol K, many of which are native and important for the ecology of the lake.

Finally, I want to again, as I think

others have mentioned and I need to reiterate, the wiping out, the nuking of the macrophytes that many want to see happen, may well cause much greater problems with the algal and cyanobacterial growth.

There are other studies around the country. There is one report that recently Michigan State University Extension talking about the tipping points in lakes. When you wipe out the macrophytes which are absorbing nutrients and competing for light with the algae and the bacteria, the cyanobacteria, the HABs which were mentioned earlier, you're going to have dead and dying plants, first of all, oozing nutrients in the water column.

There will be more nutrients and phosphorus for the algae, the cyanobacteria. There will be less competition for those obviously, the macrophytes are gone, and you're going to have more light getting into the water column.

So many of us recognize the cyanobacteria, the HABs, the algae, are a big part of our problem. This attempt to fix fast, quick fix kind of approach, nuke those plants because we're entitled. I heard that phrase from some members that were very in favor of this. Entitled to a clean lake.

Be careful what you ask for. And I think the SEIS has not addressed the algae. Many comments reported before have still not addressed that. The resulting DEIS and the SEIS have not looked at that sufficiently and it's a big oversight, so be careful what you ask for. Thank you.

MS. BOWLING: Claire Quadri?

MS. QUADRI: My name is Claire Quadri. I'm with the Chautauqua Watershed Conservancy and I'm here to speak on behalf of the Conservancy. The Chautauqua Watershed Conservancy's mission is to preserve and enhance the water quality, scenic beauty and ecological health of lakes, streams and watersheds of the Chautauqua Region.

The Conservancy owns waterfront nature preserves in several locations on Chautauqua

Lake. These preserves contain wetlands and New York shore fish and wildlife habitats that may be negatively effected by the proposed herbicides treatments.

We offer the following comments: One, the time provided for review and analysis of this important evaluation is not sufficient, in our opinion. We respectfully request that the draft SEIS comment period be extended to at least 90 days. This would be consistent with other complex controversial projects that are going through the New York State SEQR process.

Two, the draft SEIS, similar to what Becky said, does not address the significant reduction in nutrients that may result in fueling algae growth. Harmful algal blooms are one of our major concerns. They are a serious health hazard to humans, dogs, animals and while rooted aquatic plants may interfere with recreation, harmful algal blooms shut down recreation. We need to be concerned about what impact application of herbicides will have on these algae.

Next, in our previous comments we made during scoping, we requested that formal consultation with the New York State DEC Natural Heritage Program be made regarding the presence of rare, threatened and endangered species in the areas of herbicide application.

While we acknowledge that the Town of Ellery did consult with the Natural Heritage Program, the review of potential impacts and mitigations on these species identified was far from thorough. The SEIS should be supplemented to include on-site surveys and studies which are necessary to fully assess potential impacts for these species.

Herbicides should not be applied to the habitats of those species, and if anyone is interested I have some maps that show the locations of known habitats and overlaid with the herbicide application and they do overlap directly on the known habitats.

Four, Chautauqua Lake has wind-driven currents as well as an outflow current that leads the water towards the outlet. Product and treatment site selection must consider wind and current transport to avoid off-site impacts. The draft SEIS did not consider impacts to submergent and emergent aquatic plants living in the lake outlet that are in proximity to terrestrial wetlands and dismisses impacts to these wetlands.

We ask that dispersion modeling and current flow modeling be completed and that the treatment zones and the proposed herbicide products be modified based on these model results to assure adequate safety.

We also request that the herbicides treatment proposal be refined to fully comply with the zone recommendations that already exist in the Chautauqua Lake Macrophyte Management Strategy which was prepared as mandated by the State of New York as a guide for future herbicide treatments.

The preparation of the strategy was a significant expense to the taxpayers of Chautauqua County, the State of New York and participating private and public organizations.

We also request that the SEIS thoroughly consider the benefits of the no action treatment alternative and fully explain this option of allowing herbivores to build strong populations to have the opportunity to naturally control milfoil.

We thank you for considering these concerns. We will be submitting a more detailed response in writing and we ask that the town and village boards take our comments and those of others into serious consideration when determining where, what and how these herbicide treatments will be made.

We invite municipal leaders and others to contact us to further discuss this and future lake and watershed management proposals to better manage, protect and enhance the Chautauqua Lake environment. Thank you.

MS. BOWLING: Jennifer McDowell?

MS. MCDOWELL: Good evening. Thanks for this opportunity. I'm Jennifer McDowell. I'm a relative newcomer compared to a lot of people in this room. I have a cottage at Chautauqua Institution. I think this is my seventh or eighth year here and I spend a lot of time on or around the lake.

I bike around it routinely and have smelled the horrible stench of these weeds down in Bemus Point. We don't even stop there. We go right through. I have kayaked many places around the lake and seen this weed. Just a mess and the stench and the stuff piling up.

I really get that this is a terrible issue for people especially who are on the lakefront and so I totally agree that we need to do something about that. However, I don't feel that this document -- has everybody read this document? The whole thing?

There's a lot of extra verbiage in this document, but to get to the points that are really specific to the scientific method of determining what is the best thing to do is really hard to understand unless you're a scientist, and I think it's really important that we get that science right, that we do this methodically, that we do it using a scientific method that really sets a foundation for whatever we're going to do for these weeds and I do not believe that this current document, which I think we're all here to comment on, the document actually, not necessarily on our positions, that the document is not the one we need to move forward, that we need something that really takes into account the ecology and the environmental impact of what is going to happen to this lake, so that's my comment.

MS. BOWLING: Jan Bowman?

MS. BOWMAN: Good evening. Can you hear me okay? I don't want to get too close. I'm Jan Bowman. I'm a professor of biology and I'm here and I will be submitting some written comments as a biologist, but I'm here more as a human being.

I understand the conditions relative to the lake, I do not agree that it is the worst that it's ever been. I do believe the history of the lake shows that it's been very dynamic and it continues to be dynamic. My concerns are about the SEIS, using this particular document as our baseline.

I'm very concerned about the process by which this is occurring. The timeline is accelerated. The urgency I understand. Those that live on the lakeshore actually feel this urgency, but as was just mentioned, we have to get the science right. That's extremely important.

I'm very concerned that what has been released to the public is this idea of a silver bullet and many individuals are buying into that and I really, truly wish that herbicide use or whatever management strategy that you choose was indeed that silver bullet, but to be perfectly honest, we're in the situation because of our own human activities.

The bridge went in. There were warnings. There were considerations at that time and what we are seeing is part of that legacy decades later. The McMansions with the expansive fertilized lawns, the breakwalls, the loss of tree cover along the shorelines.

We have created the situation and it's important that we get the science right to not go back to what we used to have because we can't do that. We can't go back. This lake continues to age. It continues to change and we can't go back to what we had, and actually I think we have a glorified idea of what that used to be.

I don't think it's a realistic view when we say that it was clear water and there were fish everywhere. That is ecologically not a sound statement, okay, and it's easier for us to say what we want and do what we want and then cry about the mess that we've made later and I say that with all due respect.

I again do hear the pleas of the individual who has been here for two years and bought that property and is dealing with a mess and I do get that, but the cause is what we need to be really focusing on and this quick fix idea is not necessarily going to be a solution that's going to bring us where we want to be.

The cause is nutrient loading and we are a big part of that, so if you really want to be part of the solution you need to take a look at your own contribution and see where you can actually make a difference and that's extremely important.

It's a long term commitment, but the quick fix I think is going to be something that is not going to be favorable in the long run.

So what do plants do? We constantly hear people say the weeds. These are plants. Just like plants have a place in our terrestrial community, they have a place in our aquatic community and they provide oxygen within the water, they stabilize the lake bottom which is extremely important.

They are a vital part of the fishery for spawning. When you're out there fishing, and I happen to be a fisherwoman, I fish on the lake quite often and you need the weed lines. You wipe those out, you wipe out the fishery.

It becomes an issue.

And they also remove nutrients from the water column. If the plants are not there, it's been mentioned before, we right now have this battle between plants and algae. If we come in and remove those plants, and let's be clear. We're not proposing a removal of the plants with this herbicide application. We are proposing a killing of the plants and that means that all of that biomass goes to the bottom and acts just like the fertilizer that we're concerned about that has been mentioned.

All right. So that's going to add more nutrients and that's going to make the algae very, very happy. Becky Nystrom made reference to a study. Actually, it was an article that was published by a professor at the University of Michigan and he basically said you can have two types of lake and you get to choose.

When you have a productive lake like we have you're going to have a lot of weeds. You're going to have a clear column. You're going to have a fishery that's very productive. There are issues with that. We get that, but if you take away those weeds, if you take them out in huge amounts and knock them back, what we are going to actually produce is a muddy, algae dominated lake.

We will lose our fishery. The water won't be just toxic due to the chemicals that we've dumped into it; it will be toxic due to those algae in a greater capacity and I am saying this to you because we have seen this happen.

I am not just hypothesizing that this could happen. I'm saying this has happened in other lakes so we have to get the science right. We have local biologists, and I happen to be one of them, that have worked on Chautauqua Lake for a good number of years. I have been working on the lake for 30 years and we know the lake today.

We don't know the lake fifty years ago. We're talking about the lake that it is today and we all agree, all of us that are on the lake today that have spoken and have collaborated, that this is not a good management strategy and that this is dramatically lacking and the rate at which it's being pushed through is disturbing and could be catastrophic and I don't think I'm being -- I don't think I'm exaggerating with that.

I think we really have great fear for what could happen to our lake. When you have an issue with your pipes, you call a plumber. When you have an issue with your electricity, you call an electrician. When you are sick you consult a physician.

Why would you not listen to those who have the expertise when it comes to lake ecology and algae? It doesn't make sense. It's easy to believe the misconceptions, okay, the silver bullet promise. That's what is easier to believe and I understand that tendency as human beings, but it's a dangerous position to take.

Those who draw their drinking water from the lake have expressed concern. Why are we not addressing their right to not be exposed to the toxins? I fish on the lake. I want to be able to eat the fish from the lake. Yeah, the HABs are of concern, but I have more concern taking my grandson out on the boat with all the toxins you're proposing we put in this lake and, again, I am not anti herbicide.

If I haven't said that I'm going to say it. There are times when it is required, when we need to do that ecologically. That time is not now. I have heard people say that you've studied the lake enough. I'm just another biologist. I'm just a scientist saying study, study, study, study. I see head shakes and ugh, more studies.

Let's put this in perspective if I can. Let's say you've had an assessment for your health when you were five. Does that mean that you never need to have another one? As you age you change. Your microbial floor evolves. You'll never be five again and your issues and problems will change as you age.

So we monitor your health over a lifetime, creating healthcare plans based on who you are now. The lake is very much the same. It is not the same lake and it can't go back to what it was no matter how much toxin we dump into it.

It's a complex ecosystem that's dynamic from year to year and I was out there. SOLitude did their assessment in May. I was out there when they did their assessment. I was out there a month later and that community at Bemus Bay in terms of plant composition was totally different and the treatment was based on what was there a month ago.

It changes that rapidly. It's very quick. That doesn't make sense. So we can't really study the lake too much. It changes like you do. From week to week it's different. We have to understand the risks and what we are doing to determine if the risk is worth the desired benefit that we are looking to get.

Okay. I feel that this process is being shoved down our throats way too fast. I know that those of you that are dealing with the stench and the weed shore cleanup feel like it should have happened ten years ago and yesterday. I get that. I understand that. I sympathize with that.

I'm on that lake all the time. I do understand the condition, but we have to get the science right. It's crucial that we get the science right. And I think that we really need to be listening to those, and I'm not the expert relative to the specific algae, but we have that expert.

Okay, so my plea to you is we take a look at this document and we make it right. We take the time to do it and that's not by dumping chemicals in the lake this May.

MS. BOWLING: Jane Conroe?

MS. CONROE: Good evening. My name is Jane Conroe. I live on Whiteside Parkway in Maple Springs which is now also a part of the Town of Ellery. This document is labeled an SEIS, but I kind of in my own head have changed it from a supplementary to a special because this lake is different than most other lakes and the three reasons are because it is a Class A lake. We drink the water from it.

That's combined with the fish hatchery on our lake that also requires fresh water and that's combined with a world class muskie fishery. There are few lakes that have those three things in combination, so this document becomes extremely critical for a special lake, this one.

And oh, by the way, it's much larger than many of the others that have had this kind of document written for it. On page 45, Table 3.6 indicates that the common loon is a special species of concerns. That's true. It was also written in the document that it was documented last in 2005 and that is simply not true. The loons are here and they are breeding.

The document does not provide any information for how to mitigate this application or these applications for that particular species. So page 106 and 107 needs to be changed.

On page 45, Table 3.6, total Potamogeton hillii is listed as threatened. True. It was last documented in 2017, in the spring of 2017, and that's also true. The fact that it was not found in the fall of 2017 does not mean it's gone away. It decays, just like the milfoil pond weed. It is a pond weed and therefore it's gone in the fall when the second plant survey was done, so the structure of the plant wasn't there to be scraped up in the fall. The plant is still there.

So it being a pond weed is incredibly sensitive to Endothall and especially in May when it is doing the most of its growing. That's not the time to apply Endothall to pond weeds.

Page 51, Section 3.4 indicates the lake is owned by the people of New York State. It further states that the municipalities that surround the lake have no zoning authority over the water body itself. Please indicate in the section how the Town of Ellery acquired zoning authority over the sections of the lake because as lead agency it now has to render a judgment of approval or disapproval on this very important document.

It was especially asked in the last public hearing that you state the names of the individuals who will be rendering that approval or disapproval of this document, so I ask again because they are not in this draft document that the names of the people who will approve or disapprove this document be written for the public record.

Also, please indicate by name the authors of this draft document. There are no names indicated as the authors of this document. They need to be identified. Please. Along with professional certifications because that is what you always do when you write a document of this importance.

Please also indicate the names of the authors of the Appendices E, F and H. A large amount of information in this document is based on those three appendices and those plant studies are done with no names. There are no names identified there and when a document is vetted and when it is peer reviewed, that is one of the most important things you do. You ask the persons who wrote them, so those names need to be identified.

And I will reemphasize that the Cornell Modified Army Corps of Engineers method of plant sampling protocol was not used in any of the plant samples used for any of the plant background information for this SEIS and without it you cannot make comparisons.

You can't look before and after because the information is incorrectly acquired. Thank you for this opportunity to give my comments.

MS. BOWLING: The Chautauqua Utility District?

MR. CHERRY: I am Tom Cherry. I am employed by Chautauqua Utility District. I am representing them this evening. Our chairman, Bob McClure, is in California and was unable to get here. He asked me to address this group with a letter and asked me, I'm sorry, to read it verbatim.

If that's an issue I'll try to do something different. It's not long and it's addressed to Rebecca. And by the way, I've been here since 1960 on Chautauqua Lake and it was a filthy mess then, too.

The following comments from the Chautauqua Utility District or CUD express our extreme concern for the protection of our water source, Chautauqua Lake, and I'm going to read this fast. If it's too fast let me know. I'll slow down.

Please consider our comments to the Draft Supplemental Environmental Impact Statement, and I think I'll just call that SEIS from now on, and incorporate the changes and answers into the final SEIS.

Point one, the SEIS draft is not specific as to what chemicals will be used in what areas and when those chemicals will be applied. The SEIS generally and generically states any application of herbicides would be in accordance with the permits received from the DEC and in accordance with the New York State product labels.

An intention to use these products simultaneously, this would be the 2,4-D and Endothall which is Navigate and Aquathol K. If you're going to use them simultaneously and in conjunction with one another as clearly expressed on page 104 under Section 4.9, cumulative impacts which states these products have been used together in treatments at other lakes and there have been no cumulative effects. No negative effects were observed as a result of the use of both Aquathol K and Navigate in Bemus Bay in 2017.

The New York State label for the product Aquathol K, Endothall, specifically states the herbicide should not be used in conjunction with any other chemicals, fertilizers or herbicides. When used together what chemical or chemicals does it create? They don't stay independent. They have a synergistic relationship.

Is there any information available as to what chemical is actually created when you combine these two? And I doubt if it is their label. Point 2, deterioration of the intended use chemicals from full concentration to harmless levels varies dramatically with water temperature, oxygen concentration and other factors.

The literature states that it may take months or days for water treated with 2,4-D to become potable, depending upon conditions. Due to the low rate of turnover of the upper Chautauqua Lake basin, it's reasonable that 2,4-D could be present at the Chautauqua Utility District water intake in unacceptable concentrations.

This is especially true if water is driven by wind. And I saw nothing in the draft that said anything about exactly where these wind currents are coming from. I know it's supposedly being addressed from the DEC model, but I have had a DEC model. It didn't work out well. What is the half life of 2,4-D in the treated areas? It doesn't say.

Point 3, per the Supplemental Environmental Impact Statement, the application of herbicides relative to the CUD water intake will be much closer than the test application which was back in Bemus Bay, the other side of Long Point.

The conclusion is that the Supplemental Environmental Impact Statement that water tests near the CUD water intake were negative in 2017 and are therefore of no value to the future proposed application. It's closer. They become more important.

Point 4, if the likelihood for 2,4-D and Endothall to get into the CUD water system is dangerous and dangerous levels is remote, the consequences thereof are high. Approximately 10,000 people per day rely upon CUD for potable water. The CUD water system is not and cannot take out by design these herbicides.

Point 5, because there is delay in receiving water test results for 2,4-D and Endothall, thousands of people may ingest chemicals at unacceptable level for days prior to the determination that those chemicals exist in the water.

And I want to add two more things. I was at my grandfather's house. He's long since gone. And there was a box from a long time ago of 2,4-D in a plastic bag sitting on the shelf where the garden supplies were. This is not new technology. It was made in the 1950s and in the 1950s we also put sodium arsenate in the north basin and it was just great with everybody then, too, and we now have arsenic on the bottom of the lake and sediment so we have to watch what we're doing.

I'd just like to know what we're doing. Thank you very much.

MS. BOWLING: Cheryl Edwahl?

MS. EDWAHL: Others have given my comments.

MS. BOWLING: Doug Conroe?

MR. CONROE: Douglas Conroe, Town of Ellery resident, Chautauqua Lake shoreline riparian property owner. Tonight I'm here on behalf of the Chautauqua Lake Association where I currently serve as executive director.

The Executive Committee of the Board of Directors of the Chautauqua Lake Association intends to comment upon the SEIS and is currently in the process of forming those comments.

Analysis of the document is requiring a significant amount of time given the intricacies of the subject matter as you have heard the tip of the iceberg tonight. The comment preparers find given the multitude of issues that are involved that an inadequate amount of time is being provided for the filing of comments.

The Chautauqua Lake Association therefore requests that the comment filing deadline be extended by at least 30 days.

Further, the CLA executive committee would like to share its draft comments with its full board of directors and receive back any suggestion, revision, guidance they might wish to give. The current deadline will not allow for such to happen.

Extending the comment deadline will thus allow for more persons to be able to comment on this important matter. Thank you.

MS. BOWLING: Rudy Mueller?

MR. MUELLER: Rudy Mueller. I live in Lakewood. We wouldn't live here if it wasn't for the lake. We wouldn't have moved here 26 years ago and there's a lot of smart people and this room is full of people who really care about this lake and I think it's really important that we all work together.

We need to keep an open mind and listen to everybody and just to let you know that my sister just built a really nice house on the lake in South Dakota and it's a beautiful house and it's a lake about a quarter of the size of ours and it's a beautiful lake and they had a horrible algal bloom this year and people wouldn't go in the lake at all and they didn't do any weed cutting.

A few years ago I was at Lake Tahoe, deep lake, a thousand feet deep, whatever, really deep, cold lake. Algal bloom. I spent all of my summers when I was young up in Lake Michigan, beautiful lake.

One of the reasons we moved here was very similar to that lake and it's a beautiful lake. Algal bloom. And they didn't do weed cutting on any of those lakes that I'm aware of.

This is an ongoing problem. It's very complicated. We need to listen to everybody. Keep an open mind. I'm a physician. I'm worried about the health. There is drinking water. People do drink this water. We're down in the south end. Are we absolutely sure these chemicals that we're putting in there, that it's going to be safe to drink the water? I'm really worried about that. There's a lot of people who eat the fish and are we sure that it will be safe to eat?

My other comment, I just -- we need to work the other -- there's a lot of smart people, organizations really working on the lake. I have heard a lot of different comments, but I really am concerned that groups are undercutting each other. Please, listen to each other. We can work out some compromises.

Oh, I know. I want to tell my Gordon Anderson story. He was a patient and I believe he was on the county legislature for many years and he had to battle for years to get the sewer lines just halfway around the lake, I believe, and this is before my time, but he used to tell me about it and we do need to finish the sewer lines around the lake.

We are putting a tertiary treatment into the water treatment plants which will help take out some of the nutrients and we do need to do things to the farmers and we do have all these different organizations and the CLP is doing good work, but so is the CLA and the Watershed and these other organizations and, please, work together.

There's a lot of smart people in this room. Not everybody knows everything and then just some other things. Gordon used to tell me when he would go swimming there would be stool and toilet paper floating in the lake, so you might have your algal bloom, but there were times when this lake was a lot worse and so I don't know.

We all care about this lake. Let's do the right thing and I don't have all the answers and you guys are in a tough spot, but I'm willing to work with anybody on this. It's a complicated matter. There's a lot of science here. I don't want to hurt the public health. I want this lake to be a beautiful lake for a long time to come and it's complicated. Thanks.

MS. BOWLING: John Conley?

MR. CONLEY: My name is John Conley. I have lived here in Lakewood. I have never been fortunate enough to have owned lakefront property, but I for 35 years have grown up as a kid and now as a homeowner within a stone's throw of the lake. I'm not here to give any scientific information, but just as a lifelong resident and an avid outdoorsman, I guess.

I spend three to five days of the week year-round in the water or on the water in a boat. I have seen the lake go through a lot of changes. I remember it being as a kid just as bad then as it is now and I know they sprayed back then and I don't know that I have ever gone through a summer where I can't remember an algal bloom. It seems to happen irregardless of whether they spray or not or how much harvesting they say they do every year.

I was fortunate enough to work for the Lake Association as a high school student and as a college student, so I thought I did my part. The weeds change on the lake every year. I have cleaned thousands of feet of lake shoreline on this lake. I have harvested weeds with a weed cutter throughout the lake.

The weeds grow in certain places some years. Some years they don't. So I guess my concern would be mostly are we jumping into something where, you know, we think we're treating an area that's potentially bad now but, you know, five years ago it wasn't that bad or five years ago it's not going to be as bad.

It's an evolutionary thing and I guess over the years I have gotten used to the smell. It reminds me of summer. You know, it doesn't bother me any more. It's just part of living on the lake. You get used to it.

I'm a bass fisherman. I'm the vice president of the Chautauqua Lake Bass Masters. I see some retirees that have made a good living starting a guide service, a school teacher who takes his summers and has started a muskie guide service.

I think that's a potential business and in the fishing industry we had the major league fishing, the NASCAR, the pro elites of bass fishing came to this lake two, three years ago. They held a week-long event. They all stayed up at the Chautauqua Institution.

It was well televised on national TV. Bass Master magazine which is the premier bass publication of the professional bass fishing has listed for the last three years, Bob, Chautauqua Lake is number 25 in the northeast? And it was number 75 in the country.

We're getting a lot of publicity and this lake has the potential to be a top bass fishery. You got Lake Erie an hour away just over the road.

Guys will travel hundreds of miles to come here to fish both lakes. The pros travel across the country. They come to the northeast for one or two tournaments. They usually fish one of the Finger Lakes in the St. Lawrence. They used to fish Buffalo Harbor every year which was rated the number one fishery in the country and they always stop at Chautauqua Lake.

I see their boats here as they travel back and forth throughout the state towards the end of summer. I see a lot of the marinas doing well now. Asheville Bay I notice as I drive by. What do they have out front? Fishing boats.

So I guess again, as a fisherman, I would ask that you seriously consider the impact on the fishing industry and perhaps consider what we could do as a community to give that industry a boost. So thank you.

MS. BOWLING: John Shedd.

MR. SHEDD: Thank you. There is some pretty incredible people here. It's amazing. I feel proud to be part of this lake community. From what you've heard, everybody here, no matter who you are, has a vested interest in this lake.

We really want it to be better. We want it to be the best that it can be. I'm John Shedd. I'm the vice president of campus planning and operations of Chautauqua Institution so I'm representing Chautauqua Institution here.

I'm also a resident of Lakewood, the Village of Lakewood. We have a shared dock that we're a part of. My family fishes, swims, skis. We do everything in the lake. So I have a joint representation here so I think that I'll speak on behalf of both of us with the same message.

Chautauqua Institution has been here since 1874. We own a mile and a quarter, a mile and a half of lakefront, including a significant amount of the land underneath the lake 500 feet out from our shoreline. We're one of the only entities in New York State that has that. We actually own the earth under the water and we derive our drinking water from Chautauqua Lake.

We have over a hundred thousand visitors each year that come to Chautauqua Institution who participate in activities on our lake and drink our water and their children go to our boys and girls clubs and swim in our lakes. We have multiple beaches that are effected by everything that happens in this lake.

So we have a sincere interest in protecting the people who are drinking the water, the people who are using our beaches and the lakes and our ecology. We all know that the ecology of Chautauqua Lake brings people here, makes us all want to live here.

Like Dr. Mueller, I moved here because of this lake and I want to make sure it's the best it can be. Chautauqua Institution thrives because of this lake in large part.

So we want to make sure that everything is done appropriately in this SEIS process. The process itself we have questions about, but the SEIS document has some shallow responses in many areas. We've looked it over, and again I'm not a scientist, and so we've retained a consulting group of scientists to review the document and because of the depth like Doug Conroe said, the depth of this document, it requires some real time to go into it and appropriately address the very important issues relative to health, safety and our ecology.

So we also are respectfully requesting an additional 30 days at least to continue to review this document. We'll be issuing additional comments in writing, but we want to strongly urge you to take the time to look at all these questions.

Most of our questions have been mentioned here again, but some of the ones that we brought up earlier in the draft scoping session were not addressed fully. There were very shallow comments to those questions and our scientific group really wants to give us the amount of information that we need to help understand how safe or unsafe this is going to be.

We can't have our water effected by these herbicides. They are dangerous we believe from what we're told. At Chautauqua Institution we're fortunate to have had forward thinking leadership. Our former operations director who is here today took it upon himself along with the guidance from many of the scientists here to take an approach at Chautauqua where we're trying to prevent the growth of weeds and the growth of the algae, the harmful algal blooms, through control of storm water, storm water management.

Chautauqua Institution owns the entire watershed along our lakefront, so we own all the way up to where the water starts to come towards the lake. We're fortunate in that regard that we have an impact on whatever storm water comes off of our property, we can try to control it, so because of the forward thinking of my predecessor, we've built rain gardens, we've planted multiple trees.

We have regulations at Chautauqua that require semi pervious pavers to allow the storm water to soak into the ground. Generally we are a model community for storm water management in the projects that we've taken on and we've collected data under my predecessor's tutelage that indicates that we have made significant reductions in the phosphorous and nitrogen that have gone into the lake.

So we believe that prevention is the best attack for this lake and possibly at some point maybe we'll need some help from other tools that need to come together, but we sincerely believe in prevention first and if we need to take a pill like herbicides, it's something to look at, but in this SEIS there are a lot of shallow answers in there and we'd like to have additional time to respond to those from our scientific group because like someone else said, not all of us are scientists. Most of us are not scientists and we can't pretend that we understand what a lot of this is saying and how harmful it could possibly be to us.

We want to make sure that everyone is safe, including the ecology of our lake, and we think it's that important and we believe you believe that is important as well to extend the amount of time to review this. Thank you very much. Appreciate it.

MS. BOWLING: Kathleen McCarthy?

MS. MCCARTHY: My name is Kathleen McCarthy. I live on Whiteside Parkway in Maple Springs. My family has had property right on the lake in Maple Springs for 60 years. I can look back and it wasn't so perfect a long time ago living near Midway Park.

The raw sewage went into the lake. It was not a pretty picture. I think extending the sewer system is certainly something that is very, very important and I know people are working on that going forward.

I do have an issue with the timing of response in that 95 percent of Maple Springs are not year-round residents. There are very few of us who live there year-round and I would say many, many of those people are not even aware of what is going on.

I think they need to have a better chance to read documents and respond. Not as scientists necessarily, but as people who are impacted by the lake, the lakeshore.

I would also like to say that because I'm a rower at the Chautauqua Lake Rowing Association and I have spent many years on the Chadakoin River on the inlet, the algal blooms are horrible. I know there were signs put up when the lake was treated last year that it would be 24 hours before people should go in the lake in terms of the treatment or the river.

There was one issue because, of course, in 24 hours people were on the lake and I guess I'm not so sure that that was really the safest thing to be doing, but also if we continue to feed the lake and we have more algal blooms, when you're rowing you get splashed.

You don't really go in the water. You know, we stay above the water, but it really is not a pretty picture as we're putting people on the river all summer, so I'm concerned that treatment may increase the algal blooms and Chautauqua Lake Rowing has become a really fabulous nonprofit organization.

We send many kids to college through our high school program and I'm just concerned about what treatment would do, so I'm not in favor of it at this time. I would like to see an extension of the comment period. Thank you very much.

MS. BOWLING: Bob Woolor?

MR. WOOLOR: Hi. I'm Bob Woolor, a resident of Maple Springs, Whiteside Parkway. So I'd like to -- I'm not going to speak about the science, but I do want to ask about since a number of speakers have spoken about effects of the proposed treatment that go far beyond the physical boundaries of the town and not just physically.

I mean, we care about water quality. There are issues with drinking water that have been brought up, the health of the fishery, the potential damage to the economy in a wider sense, so clearly the question of the town's standing as a sponsor of this SEIS and lead agency with the treatment needs to be brought into question.

So I'd like the town to be more transparent about its procedures and its policy around how you choose what privately funded initiatives you'd like to get behind. This is not an initiative that is being sponsored primarily by town dollars or something that's in the town budget or something that's processed at a town meeting.

This is something that has kind of come up as a private concern and so it begs questions for the future. Where does this end? It's kind of a slippery slope as you get into saying, well, if somebody -- it's not town money, so we can get behind this and see where it goes but, you know, what if the next deep pocketed person wants to do a lake dredging project? Is that okay?

MS. BOWLING: Do you have any comments on the SEIS itself?

MR. WOOLOR: Well, this is in relation to the town's position with the SEIS, so you wouldn't be in this position with the SEIS if you didn't have a policy and procedure around, you know, how you were going to choose projects to sponsor.

MS. BOWLING: I would ask that you wrap up your comments.

MR. WOOLOR: So that is what I would like, the town to be more transparent about its policies and procedures relative to the projects that it chooses to get behind, particularly when it's not with town dollars.

MS. BOWLING: Thank you. Hillary Hornyak?

MS. HORNYAK: I'll try to include everybody. Hello. I wrote on my paper to make it brief so I'm going to try, but I am going to take a minute to introduce myself. My name is Hillary Hornyak. I'm a citizen of the City of Jamestown. I have grown up in Chautauqua County and I remain here still as an adult.

I studied environmental science at SUNY JCC for two years and was afforded some really wonderful learning opportunities there. I also have spent a good portion of my time working for local businesses that are very involved in the tourism industry, so I have worked for Evergreen Outfitters who I'm sure many of you are familiar with. I worked with them for a year and I've been employed at Bag and String Wine Merchants -- I see some familiar faces -- for over two years now.

As you might now know, I'm very invested in this community. Tourism impacts my income very greatly, but I'm also very concerned with -- well, I'm concerned with everybody's public health, so public health and environmental health are very intricately interwoven.

Let me go back to my notes here. Certainly the issues facing the lake need to be addressed and as you're all now very well aware, I hope, it's very multidimensional.

There's many sides to this issue. It's more than HABs. It's more than phosphorus and nitrogen input. I would like to bring up something that hasn't exactly been mentioned, so referring to the DEIS, there was like -- there was a no action plan that was stated, so this idea of no action versus herbicide use.

Those are not the only actions that can be taken. There are other actions that can be taken. Something I'd like to bring up that hasn't really been mentioned is legislating the use of fertilizer in the area and initiating mandated buffer zones along the entire lake along with wash stations and water stewards so that we can further control the use -- further control the introduction of invasive species to the area.

I would now like to take a moment and mention one of the pesticides that has been --- pesticides for use that has been mentioned in the DEIS, so Endothall or Aquathol is one of the pesticides that was mentioned for possibly being used. Spraying Endothall does not destroy the root systems of the plants, of these lake plants, and if any of you have ever pulled dandelions, you know that leaving the roots allows the plants to grow back.

And I just wanted to read a brief little tidbit on this herbicide from a USDA Forest study. So this was an ecological risk assessment done by the USDA Forest Service. So Endothall is used to help control water plants as -- invasive water plants, not only -- water plants everywhere really. So through the EPA there is what is called a re-registration eligibility decision. So every once in a while your synthetic chemicals have to be re-registered. They have to go through a process to make sure they are safe for use.

This eligibility decision for Endothall included a 79 page bibliography of unpublished studies. There were approximately 900 citations going back to the 1950s, hitting on an earlier point that these synthetic chemicals are not new.

They have been around for quite a while and one of the biggest problems with synthetic chemicals is that very minute amounts of them can cause very harmful effects in all mammals at gestational periods of life further down the line.

So there was a Freedom of Information Act request made to obtain the available EPA cleared reviews pertaining to Endothall. Only 87 cleared reviews were provided for the creation of this individual report which is 184 pages long. I don't know about you, but only 87 reviews out of 900?

Scientific studies doesn't cut it for me. I am not behind a chemical that is only minimally approved. That's really all I have.

MS. BOWLING: Nick and Julia McMahon?

MS. MCMAHON: I'll be brief. My name is Julia McMahon. I'm a real estate broker and my husband is also. We've been selling real estate for about twenty years on the lake, so my view is more of an economical and tourism.

When I first started out dealing with lake buyers the question first was how much is the property? How much are the taxes because most of them are from Ohio and PA so I had to get that obstacle out of the way and then water quality.

Well, over the past five or six years it's reversed. I have buyers that come out and ask me right upfront not how much the price is, not what the taxes are, but how bad is the lake? And I have had -- I have lost, unfortunately, clients because they've read or come out for weekends or rented for a week and leave saying this is just a horrible lake.

It's a beautiful area, but I can't go boating without my prop getting, you know, stuck or whatever the case may be.

So my view is -- here's my concern. My concern is we'll be here next year with the same questions and the same answers and nothing will be done. I think something has to be done.

I don't think Mother Nature is going to take care of it all. I don't think diminishing -- you can't get rid of the breakwalls that are here. Natural breakwalls, that's terrific, but that's not enough. A border isn't going to alleviate the problem with the lake.

It's a shallow lake. When we have sunny days, hot days, it doesn't take much for the weeds and then the weeds I know are probably the least of the problem when we deal with the milfoil and all of that, but my concern is if tourism -- the economy, we don't have an industry here as far as industry except for tourism.

If that goes I'm afraid we're going to be an Appalachia. We're not going to have people that come into this area and want to enjoy it, because the lake is why they come. It's no other reason. It's the lake and after the lake the byproduct is skiing or institution, but the lake is still the key point for people coming here.

So I hope something is done and then people keep on mentioning this spraying. It's not spraying. It's pellets which is two different things. So at this point I'm for it. I understand that there's concerns, but if nothing is done I think there's going to be more serious concerns. That's all I have to say.

MS. BOWLING: Ed Crum?

(No response).

MS. BOWLING: Is there anyone else who didn't get a chance to speak who would like to speak?

MS. RINE: I'd like to speak. I'm Karen Rine. I was the president of the CLP when we sprayed three different lakes in 2000 with success through the Town of Ellicott. I have lived on the lake since 1977. I have seen all the changes. My kids swam in the lake when the CLA sprayed the lake and they have never had any problems with it.

I have been working with this EIS since 2004, the CLP with citizens, you know, contributions, volunteer hours and working with the Town of Ellicott we went through three consultants. Then we went with the county through the MMS.

We tried and tried and tried to get an environmental impact statement done and updated and approved by the DEC. We're finally almost there. You can't believe how many hours have gone into this, what dedication the volunteers of the new CLP have given this and if we don't do something and let the EIS go another whole year or another ten years or another fourteen years, which is going to happen at the rate we're going right now, then nothing is going to be done.

I think you can appreciate what has been put into this plan, how much time, how much energy, how much science, how much dedication and at least give it a chance. We're finally doing something and I just hope before I turn 80 which is coming up real close that I can say that we've accomplished an SEIS. We have one more year to go, so get busy.

MR. WENDEL: I just want to be brief. My name is PJ Wendel. I'm currently the chairman of the Chautauqua County Legislature. To speak a little bit to Dr. Mueller, last night we did approve a resolution unanimously for a bond of $16.8 million to bridge that gap of the Southern Chautauqua Sewer District, so we are looking forward to that.

I think the one thing that I have done and I think we have done here recently is when we first started we met with Lyle Hajdu, Bill Evans and they were first charged with the Chautauqua Lake Management Commission and the three of us met along with Lyle and Fred Crosscut and we said we can't let this stop.

We've got to get something going. We've created the new alliance and I know I see Linda Swanson at many of these events and I remember one of the first ones we said we're here to find out where the investment is, where is the best place to invest this and the bottom line is we felt we have to work together.

This is not going to happen without cooperation. I like to think that now in the legislature that's been our big flagship. We work together on issues. This is -- you guys all know this is heated. This is passionate. This is lifelong residents.

Lyle said if we have a $75 million amusement park that we all built we'd all want a part of it. We were given a $75 million amusement park and the state has left it. You know, the state will tell you they have jurisdiction, but where is the state when they say -- no offense to Mr. Odell. We're not pushing the state, but where is the state in all this?

The state wants to regulate it. The state is not putting in the money. With that said, we need to work again with one another and we need to have compromise.

We know this is heated. We know this is going to be a critical issue. We know this is not a one -- this isn't a silver bullet approach. It can't be. The CLA has had the stewardship for years. The CLP has got a great initiative moving on.

This isn't a one year deal. This has been time in the making, so I urge and I know the legislature, we want to be behind you as much as we can. I can't commit to anything as far as dollars. We know that, but what we'd like to do is express cooperation.

I have been asked to chair a couple of committees in the last couple of years and when I walk in I say, listen, if we can't leave our swords and axes at the door, we might not sit at the table.

We've got to work together. I'm not saying that in this group, but we really need to work together. Everybody needs to listen to one another. We have great minds, scientific minds, on both sides of this issue. Look together. Look for compromise.

Maybe something the CLA wants, another group might be able to bend and vice-versa. This is a jewel in our community. We all take pride in it. We just applaud everybody who does have an effort in this because this isn't easy.

We know a lot of you, I'm sure there's been heated discussions amongst some of the neighbors as you sit out there at picnics in the summertime, but again, working together and compromise is what we've seen work for a lot of us and a lot of initiatives we've had in county government.

We'd like to see this continue, this initiative, and we applaud everybody in their efforts. Thank you.

MS. BOWLING: Anyone else? Okay. Thank you all for coming out tonight. As you know, we'll be accepting written comments. Please send them to Becca Haines' email or regular mail by 4:00 PM on Monday, March 12th.

If you need her contact information it will be on the Town of Ellery website and we have been publishing all the updates to the draft SEIS documents are on there as well, so if you want to see a copy and you haven't, it's on there.

MR. JOHNSON: Thank you for coming everybody. This concludes the meeting. Have a safe journey home.

(Public Meeting concluded)

APPENDIX D: ESTIMATION OF PHOSPHOROUS RELEASE

The maximum amount of phosphorus potentially released from dying macrophyte biomass into the water column of Chautauqua Lake after a May herbicide treatment was calculated. The calculation was repeated using a June biomass and a maximum biomass of aquatic plants during the growing season. decay of the maximum biomass which would occur in the absence of any treatment. All of the phosphorus release numbers were also compared to the total phosphorus load to the lake.

The following assumptions were included in the analysis of phosphorus release from decaying plants.

1. It was assumed all the plants potentially affected by herbicides would be similar in composition to Eurasian milfoil.
2. The maximum biomass of plants in August (dry weight) was assumed to be 166 g/m^2. Biomass estimates were not available for Chautauqua Lake. This biomass estimate was for Eurasian watermilfoil in Cayuga Lake, NY (Johnson et al 2000).
3. Biomass early in the growing season (May) was assumed to be 30% of the maximum biomass.
4. Biomass in June was assumed to be 50% of the maximum biomass.
5. Because the phosphorus content of milfoil changes during the growing season, a phosphorous content of 0.4% (dry weight) was assumed for May, 0.3% (dry weight) for June and 0.2% (dry weight) for the maximum biomass estimate (Smith and Adams 1986).
6. It was assumed that all the phosphorus in the macrophytes would be released to simulate a worst-case scenario.
7. Loads to each basin from macrophytes were summed depending on which basin the proposed treatment area was on.
8. The entire North basin load was used to calculate the potential maximum load to the North Basin. In addition to the load associated with plant decay in the South basin, a percentage of the load to the North basin (29%) was assumed to be transferred to the South basin as per modeling conducted in support of the phosphorus TMDL (Cadmus 2012).
9. Total annual phosphorus loads to each basin from all sources were taken from (Cadmus 2012).

Results of the assessment of phosphorus release from decaying macrophytes is summarized in Table 1. Herbicide treatment in May would result in a maximum increase in the phosphorus load of 430 lbs in the North Basin and 1,452 lbs in the South Basin. This represents 1.5% and 2.7% of the total loads to these basins respectively. The maximum biomass scenario is roughly analogous to the maximum amount of phosphorus that released with no treatment and natural dieback of the macrophytes in the lake in the fall. This dieback results in a maximum increase in the phosphorus load of 717 lbs in the North Basin and 2,421 lbs in the South Basin. This represents 2.6% and 4.6% of the total phosphorus load to these basins, respectively. As noted in the SEIS, the timing of the nutrient releases may have some effect on the availability of the released phosphorus to fuel algal or further plant growth.

Table 1: Estimated maximum load of phosphorus from decaying macrophytes compared to total load for each basin in Chautauqua Lake.

Basin	**Phosphorus load from TMDL (lbs)**	**Phosphorus load from decaying macrophytes (lbs)**					
		May Treatment		June Treatment		Maximum Biomass	
		lbs	% of basin load	lbs	% of basin load	lbs	% of basin load
North Basin	27,930	430	1.5%	538	1.9%	717	2.6%
South Basin	52,898	1,452	2.7%	1,815	3.4%	2,421	4.6%

References

Cadmus. 2012. Total Maximum Daily Load (TMDL) for Phosphorus in Chautauqua Lake. Prepared for USEPA Region 2 and NYSDEC.

Johnson, R.L., P.J. Van Dusen, J.A. Toner and N.G. Hairston Jr. 2000. Eurasion Watermilfoil Biomass Associated with Insect Herbivores in New York. J. Aquat. Plant Manage. 38:82-88.

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Smith, C.S. and M.S. Adams. 1986, Phosphorus transfer from sediments by Myriophyllum spicatum. Limnol. Oceanogr., 31(6), 1312-1321.

Chautauqua Lake phosphorus release calculations
May Treatment
Herbicides

Maximum biomass of milfoil (dry weight)	166 g/m^2	estimated Johnson et al 2000
Percent of max biomass at time of treatment	30 %	
Biomass at time of proposed treatment	49.8 g/m^2	
Phosphorus content of dry plants in May	0.004	Smith and Adams 1986 (Figure 4)
Maximum phosphorus per unit lake area released from milfoil	0.1992 g/m^2	assumes all phosphorus in milfoil is released to water column
Volume of North Basin (l)	226,577,905,932 liters	calculated from Cadmus 2012
Volume of South Basin (l)	89,802,263,942 liters	calculated from Cadmus 2012

Area	**Basin**	**acres**	**Hectares**	**m^2**	**gP/m^2**	**Total P in decaying vegetation (g)**	**Total P (kg)**	**Total P (lbs)**
Busti/Lakewood	South	289	117.0	1,169,543	0.199	232,973	233.0	514
Stockholm/Greenwood	South	55	22.3	222,577	0.199	44,337	44.3	98
Bemus Bay	North	124	50.2	501,811	0.199	99,961	100.0	220
Burtis Bay	South	277	112.1	1,120,980	0.199	223,299	223.3	492
Stow	South	48	19.4	194,249	0.199	38,694	38.7	85
Warner Bay	North	37	15.0	149,734	0.199	29,827	29.8	66
Bly Bay	South	15	6.1	60,703	0.199	12,092	12.1	27
Bemus Point	South	40	16.2	161,874	0.199	32,245	32.2	71
Sunrise Cove	South	23	9.3	93,078	0.199	18,541	18.5	41
Sunset Bay	North	81	32.8	327,796	0.199	65,297	65.3	144
Total		989	400.2	4,002,345	0.199	797,267	797.3	**1,758**
							Direct Load to North Basin	430
							Direct Load to South basin	1,328

		Total phosphorus load[1] (lbs)	**Phosphorus load from treated macrophytes (lbs)**	**Phosphorus load from treated macrophytes (kg)**	**plant P release % of total P load to Basin**
Total load to each lake basin	North	27,930	**430**	**195**	1.5%
	South[2]	52,898	**1,452**	**659**	2.7%

[1]Load from TMDL (Cadmus 2012)

[2] Phosphorus load to South Basin includes 29% of phosphorus load to North Basin to account for transport to South basin from North as per modeling in Cadmus (2012). The remainder of the load to the North basin is retained in the North basin. Therefore, the phosphorus load from decaying macrophytes to the South Basin includes 29% of phosphorus load from decaying macrophytes in North basin.

References

Cadmus. 2012. Total Maximum Daily Load (TMDL) for Phosphorus in Chautauqua Lake. Prepared for USEPA Region 2 and NYSDEC

Johnson, R.L., P.J. Van Dusen, J.A. Toner and N.G. Hairston Jr. 2000. Eurasion Watermilfoil Biomass Associated with Insect Herbivores in New York. J. Aquat. Plant Manage. 38:82-88

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Smith, C.S. and M.S. Adams. 1986, Phosphorus transfer from sediments by *Myriophyllum spicatum.* Limnol. Oceanogr., 31(6), 1312-1321.

Chautauqua Lake phosphorus release calculations
June Treatment
Herbicides

Maximum biomass of milfoil (dry weight)	166	g/m^2	estimated Johnson et al 2000
Percent of max biomass at time of treatment	50	%	
Biomass at time of proposed treatment	83	g/m^2	
Phosphorus content of dry plants in May	0.003		Smith and Adams 1986 (Figure 4)
Maximum phosphorus per unit lake area released from milfoil	0.249	g/m^2	assumes all phosphorus in milfoil is released to water column
Volume of North Basin (l)	226,577,905,932	liters	calculated from Cadmus 2012
Volume of South Basin (l)	89,802,263,942	liters	calculated from Cadmus 2012

Area	Basin	acres	Hectares	m^2	gP/m^2	Total P in decaying vegetation (g)	Total P (kg)	Total P (lbs)
Busti/Lakewood	South	289	117.0	1,169,543	0.249	291,216	291.2	642
Stockholm/Greenwood	South	55	22.3	222,577	0.249	55,422	55.4	122
Bemus Bay	North	124	50.2	501,811	0.249	124,951	125.0	275
Burtis Bay	South	277	112.1	1,120,980	0.249	279,124	279.1	615
Stow	South	48	19.4	194,249	0.249	48,368	48.4	107
Warner Bay	North	37	15.0	149,734	0.249	37,284	37.3	82
Bly Bay	South	15	6.1	60,703	0.249	15,115	15.1	33
Bemus Point	South	40	16.2	161,874	0.249	40,307	40.3	89
Sunrise Cove	South	23	9.3	93,078	0.249	23,176	23.2	51
Sunset Bay	North	81	32.8	327,796	0.249	81,621	81.6	180
Total		989	400.2	4,002,345	0.249	996,584	996.6	**2,197**
							Direct Load to North Basin	538
							Direct Load to South basin	1,659

		Total phosphorus load[1] (lbs)	Phosphorus load from treated macrophytes (lbs)	Phosphorus load from treated macrophytes (kg)	plant P release % of total P load to Basin
Total load to each lake basin	North	27,930	**538**	**244**	1.9%
	South[2]	52,898	**1,815**	**823**	3.4%

[1]Load from TMDL (Cadmus 2012)

[2] Phosphorus load to South Basin includes 29% of phosphorus load to North Basin to account for transport to South basin from North as per modeling in Cadmus (2012). The remainder of the load to the North basin is retained in the North basin. Therefore, the phosphorus load from decaying macrophytes to the South Basin includes 29% of phosphorus load from decaying macrophytes in North basin.

References

Cadmus. 2012. Total Maximum Daily Load (TMDL) for Phosphorus in Chautauqua Lake. Prepared for USEPA Region 2 and NYSDEC.

Johnson, R.L., P.J. Van Dusen, J.A. Toner and N.G. Hairston Jr. 2000. Eurasion Watermilfoil Biomass Associated with Insect Herbivores in New York. J. Aquat. Plant Manage. 38:82-88

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Chautauqua Lake phosphorus release calculations
Maximum biomass
Natural die-off

Maximum biomass of milfoil (dry weight)	166	g/m^2	estimated Johnson et al 2000
Percent of max biomass at time of dieoff	100	%	
Biomass at time of dieoff	166	g/m^2	
Phosphorus content of dry plants at maximum	0.002		Smith and Adams 1986 (Figure 4)
Maximum phosphorus per unit lake area released from milfoil	0.332	g/m^2	assumes all phosphorus in milfoil is released to water column
Volume of North Basin (l)	226,577,905,932	liters	calculated from Cadmus 2012
Volume of South Basin (l)	89,802,263,942	liters	calculated from Cadmus 2012

Area	Basin	acres	Hectares	m^2	gP/m^2	Total P in decaying vegetation (g)	Total P (kg)	Total P (lbs)
Busti/Lakewood	South	289	117.0	1,169,543	0.332	388,288	388.3	856
Stockholm/Greenwood	South	55	22.3	222,577	0.332	73,896	73.9	163
Bemus Bay	North	124	50.2	501,811	0.332	166,601	166.6	367
Burtis Bay	South	277	112.1	1,120,980	0.332	372,165	372.2	820
Stow	South	48	19.4	194,249	0.332	64,491	64.5	142
Warner Bay	North	37	15.0	149,734	0.332	49,712	49.7	110
Bly Bay	South	15	6.1	60,703	0.332	20,153	20.2	44
Bemus Point	South	40	16.2	161,874	0.332	53,742	53.7	118
Sunrise Cove	South	23	9.3	93,078	0.332	30,902	30.9	68
Sunset Bay	North	81	32.8	327,796	0.332	108,828	108.8	240
Total		989	400.2	4,002,345	0.332	1,328,778	1,328.8	**2,929**
							Direct Load to North Basin	717
							Direct Load to South basin	2,213

		Total phosphorus load[1] (lbs)	Phosphorus load from treated macrophytes (lbs)	Phosphorus load from treated macrophytes (kg)	plant P release % of total P load to Basin
Total load to each lake basin	North	27,930	**717**	**325**	2.6%
	South[2]	52,898	**2,421**	**1,098**	4.6%

[1]Load from TMDL (Cadmus 2012)

[2] Phosphorus load to South Basin includes 29% of phosphorus load to North Basin to account for transport to South basin from North as per modeling in Cadmus (2012). The remainder of the load to the North basin is retained in the North basin. Therefore, the phosphorus load from decaying macrophytes to the South Basin includes 29% of phosphorus load from decaying macrophytes in North basin.

References

Cadmus. 2012. Total Maximum Daily Load (TMDL) for Phosphorus in Chautauqua Lake. Prepared for USEPA Region 2 and NYSDEC.

Johnson, R.L., P.J. Van Dusen, J.A. Toner and N.G. Hairston Jr. 2000. Eurasion Watermilfoil Biomass Associated with Insect Herbivores in New York. J. Aquat. Plant Manage. 38:82-88

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Basin	Phosphorus load from TMDL (lbs)	Phosphorus load from decaying macrophytes (lbs)					
		May Treatment		June Treatment		Maximum Biomass	
		lbs	% of basin load	lbs	% of basin load	lbs	% of basin load
North Basin	27,930	430	1.5%	538	1.9%	717	2.6%
South Basin	52,898	1,452	2.7%	1,815	3.4%	2,421	4.6%

APPENDIX E: COMMENT SUMMARY SPREADSHEET

E1. Involved and Interested Agencies

E2. Interested Parties and Community Organizations

E3. General Public

E1. Involved and Interested Agencies

AGENCY COMMENT	CATEGORY	DATE RECEIVED	SPEAKER AND/OR WRITER
Agency Writer #6 (Village of Celoron)		**23-Feb-18**	**Shirley Sanfilippo (Village of Celoron)**
A. Jones and Gifford Avenue are not in Celoron (City of Jamestown)	DSEIS	**23-Feb-18**	Shirley Sanfilippo (Village of Celoron)
B. Wetlands are not in the Village of Celoron (City of Jamestown)	DSEIS	**23-Feb-18**	Shirley Sanfilippo (Village of Celoron)
C. Lucille Ball Memorial Park	DSEIS	**23-Feb-18**	Shirley Sanfilippo (Village of Celoron)
Agency #1 (Chautauqua Utility District)		**1-Mar-18**	**Chautauqua Utility District (Tom Cherry)**
A. Extreme concern for water intakes	Water Use/Health	**1-Mar-18**	Chautauqua Utility District
B. DSEIS not specific on what herbicides will be used in a specific location and when	Herbicides	**1-Mar-18**	Chautauqua Utility District
C. Cumulative impacts of more than one herbicide being used at once	Herbicides	**1-Mar-18**	Chautauqua Utility District
D. NYS product labels say not to use more than one herbicide at once	Herbicides	**1-Mar-18**	Chautauqua Utility District
E. Wind driven currents	Dispersion	**1-Mar-18**	Chautauqua Utility District
F. Half life of products being used (2, 4-D)	Herbicides	**1-Mar-18**	Chautauqua Utility District
Agency #3 (Chautauqua County Legislature)		**1-Mar-18**	**County Legislature (PJ Wendel)**
A. 16.8 million approved to improve sewer district	Other Alternatives	**1-Mar-18**	County Legislature
B. NYSDEC wants to regulate, not fund	Political	**1-Mar-18**	County Legislature
C. No "silver bullets" exist	Other Alternatives	**1-Mar-18**	County Legislature
Agency Writer #1 (Chautauqua Utility District)		**1-Mar-18**	**Tom Cherry (CUD)**
A. Cumulative effects of using more than one of the herbicides at once in the same area	Herbicides	**1-Mar-18**	Tom Cherry (CUD)
B. Not clear what herbicides will be used in what locations	Herbicides	**1-Mar-18**	Tom Cherry (CUD)
C. Need to understand what the half-life of 2, 4D is in treated areas	Herbicides	**1-Mar-18**	Tom Cherry (CUD)
D. Need to understand wind driven currents	Herbicides	**1-Mar-18**	Tom Cherry (CUD)
E. Application of herbicides will be much closer to the CUD intakes than they were in 2017	Herbicides	**1-Mar-18**	Tom Cherry (CUD)
F. CUD cannot remove herbicides from water	Water Use/Health	**1-Mar-18**	Tom Cherry (CUD)
G. The delay in receiving water test results for herbicide concentrations puts thousands of people at risk	Water Use/Health	**1-Mar-18**	Tom Cherry (CUD)
Agency Writer #2 (NYSDOT)		**1-Mar-18**	**Ed Rutkowski (NYSDOT)**
A. Proposed action will not have a significant impact on State Highway System.	DSEIS	**1-Mar-18**	Ed Rutkowski (NYSDOT)

Agency Writer #4 (NYSOPRHP)		**8-Mar-18**	**Ron Rausch (NYSOPRHP)**
A. RTE species: Kidneyshell Musell and Spiny Softshell Turtle	RTE	**8-Mar-18**	Ron Rausch (NYSOPRHP)
B. Concern with potential for increase of HABS	HABS	**8-Mar-18**	Ron Rausch (NYSOPRHP)
C. Concerned with water use restriction	Water Use/Health	**8-Mar-18**	Ron Rausch (NYSOPRHP)
Agency Writer #5 (NYSDEC)		**8-Mar-18**	**Dave Denk (NYSDEC)**
A. Clarified to address length of time of treatment	Herbicides	**8-Mar-18**	Dave Denk (NYSDEC)
B. Correct Table 3-6	RTE	**8-Mar-18**	Dave Denk (NYSDEC)
C. Treatment near fish spawning	Fishery/Muskie	**8-Mar-18**	Dave Denk (NYSDEC)
D. Treatment near sensitive species	RTE	**8-Mar-18**	Dave Denk (NYSDEC)
E. Phosphorous increase calculation	HABS	**8-Mar-18**	Dave Denk (NYSDEC)
F. Water supply intakes	Water Use/Health	**8-Mar-18**	Dave Denk (NYSDEC)
Agency Writer #3 (Chautauqua County Department of Health and Human Services)		**16-Mar-18**	**William Boria (CCDH/HS)**
A. If permit is granted, agrees with May application timeframe	Herbicides	**16-Mar-18**	William Boria (CCDH/HS)
B. Summary table of product labels with setback/restriction for: potable water intakes, swimming/contact recreation, crop irrigation, livestock/animal water, fishing/fish consumption. Summary table for each treatment area	Herbicides	**16-Mar-18**	William Boria (CCDH/HS)
C. Include discussion of dogs and their potential contact with treated water in summary tables	Herbicides	**16-Mar-18**	William Boria (CCDH/HS)
D. Public water supply raw and finished water be tested for active ingredient in each herbicide, before, during, and after herbicide application. Rapid test results needed.	Water Use/Health	**16-Mar-18**	William Boria (CCDH/HS)
E. Quality Assurance Program plan for water sampling and	Water Use/Health	**16-Mar-18**	William Boria (CCDH/HS)
F. If permit is granted for June or July application, the closest permitted bathing beach to each application area be sampled for active ingredient in each herbicide used.	Water Use/Health	**16-Mar-18**	William Boria (CCDH/HS)
G. CCDHHS requests to be involved in development of communication plan and lake water sampling plan	Process	**16-Mar-18**	William Boria (CCDH/HS)
H. Section 3.1.1, page 21, second paragraph, last sentence - drinking wells graphic (3-1) is not accurate, there are wells surrounding the lake.	Water Use/Health	**16-Mar-18**	William Boria (CCDH/HS)
I. Section 3.7.1, page 61 - Chautauqua Heights Water District is incorrectly named - it is "Chautauqua Water District #2" needs to be fixed throughout document	Water Use/Health	**16-Mar-18**	William Boria (CCDH/HS)
J. Section 3.7.1 Point Chautauqua no longer has potable water intake in the lake	Water Use/Health	**16-Mar-18**	William Boria (CCDH/HS)
K. Table 3-16 does not include all facilities with SPDES	DSEIS	**16-Mar-18**	William Boria (CCDH/HS)

L. Aquathol K label in Appendix L is not most current NYS approved label and does not include Special Local Need labels	Herbicides	**16-Mar-18**	William Boria (CCDH/HS)
M. Section 4.1.1, page 68 - the MCL for endothall is wrong - it should be 0,050 ppm not 0.005 ppm	Herbicides	**16-Mar-18**	William Boria (CCDH/HS)
N. Section 4.2.2, page 74 - the units for the NYS MCL for Triclopyr are missing - should read 0.050 ppm	Herbicides	**16-Mar-18**	William Boria (CCDH/HS)
O. Reiterated that they would like to be involved in communication plan and lake water sampling plan.	Process	**16-Mar-18**	William Boria (CCDH/HS)

E2. Interested Parties and Community Organizations

SPEAKER/WRITER/COMMENT	CATEGORY	DATE RECEIVED	SPEAKER AND/OR WRITER
Party/Organization Writer #1 (Chautauqua County Water Quality Task Force)		**27-Feb-18**	**David Spann (CCWQTF)**
A. Comment period should be extended to 90-days	Process	**27-Feb-18**	David Spann (CCWQTF)
Party/Organization Speaker #1 (Chautauqua Watershed Conservancy)		**1-Mar-18**	**Claire Quadri (CWC)**
A. Habitats owned by CWC will be negatively impacted	Science	**1-Mar-18**	Claire Quadri (CWC)
B. Comment period should be extended	Process	**1-Mar-18**	Claire Quadri (CWC)
C. HABS not sufficiently addressed	HABS	**1-Mar-18**	Claire Quadri (CWC)
D. Natural Heritage Program information not discussed fully	RTE	**1-Mar-18**	Claire Quadri (CWC)
E. Wind driven currents need modelling	Dispersion	**1-Mar-18**	Claire Quadri (CWC)
F. Currents need modelling	Dispersion	**1-Mar-18**	Claire Quadri (CWC)
G. Wetlands impacts not discussed enough	Wetlands	**1-Mar-18**	Claire Quadri (CWC)
E. On-site studies of RTE needed	RTE	**1-Mar-18**	Claire Quadri (CWC)
A. MMS should be consulted	Other Alternatives	**1-Mar-18**	Claire Quadri (CWC)
B. Need to fully explore No Action Alternative	Other Alternatives	**1-Mar-18**	Claire Quadri (CWC)
C. Herbivore use	Other Alternatives	**1-Mar-18**	Claire Quadri (CWC)
Party/Organization Speaker #2 (Chautauqua Lake Association)		**1-Mar-18**	**Doug Conroe (CLA)**
A. Comment period should be extended for 30-days	Process	**1-Mar-18**	Doug Conroe (CLA)
Party/Organization Speaker #3 (Chautauqua Institution)		**1-Mar-18**	**Chautauqua Institution (John Shedd)**
A. Drinking water comes from lake	Water Use/Health	**1-Mar-18**	Chautauqua Institution
B. Beaches are very important	Water Use/Health	**1-Mar-18**	Chautauqua Institution
C. Questions the process	Process	**1-Mar-18**	Chautauqua Institution
D. DSEIS has shallow answers to serious questions	DSEIS	**1-Mar-18**	Chautauqua Institution
E. Comment period should be extended for 30-days	Process	**1-Mar-18**	Chautauqua Institution
F. Need to make sure of no public health impact	Water Use/Health	**1-Mar-18**	Chautauqua Institution

G. Need to focus on nutrient loading issue	Other Alternatives	**1-Mar-18**	Chautauqua Institution
Party/Organization Writer #2 (Chautauqua Lake Association)		**1-Mar-18**	**Doug Conroe (CLA)**
A. Comment period should be extended for 30-days	Process	**1-Mar-18**	Doug Conroe (CLA)
Party/Organization Writer #3 (Chautauqua Watershed Conservancy)		**1-Mar-18**	**Claire Quadri (CWC)**
A. Not enough time, request comment period of 90-days	Process	**1-Mar-18**	Claire Quadri (CWC)
B. Potential for HABS as a result	HABS	**1-Mar-18**	Claire Quadri (CWC)
C. RTE impact review (initial information from Natural Heritage) was far from thorough	RTE	**1-Mar-18**	Claire Quadri (CWC)
D. Wind and gravity current dispersion models needed	Dispersion	**1-Mar-18**	Claire Quadri (CWC)
E. Herbicide treatment areas should fully comply to the MMS	Herbicides	**1-Mar-18**	Claire Quadri (CWC)
F. Need to fully explore "No Action" and herbivore alternatives	Other Alternatives	**1-Mar-18**	Claire Quadri (CWC)
Party/Organization Writer #4 (Chautauqua County Water		**8-Mar-18**	**David Spann (CCWQTF)**
A. Page 69, attorney/client privilege product heading	DSEIS	**8-Mar-18**	David Spann (CCWQTF)
B. Whole lake should be considered, Ellery cannot be Lead Agency	Process	**8-Mar-18**	David Spann (CCWQTF)
C. Who at Town of Ellery is responsible for decisions?	Process	**8-Mar-18**	David Spann (CCWQTF)
D. Chautauqua, Jamestown, and Mayville have shoreline, but are not Involved Agencies	Process	**8-Mar-18**	David Spann (CCWQTF)
E. Guidelines in 1990 SEIS should be paralleled here, no application before July 1st	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
F. 426 acres in 1990, 1,031 acres in 2018	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
G. Multi-year impacts not addressed, this is only for 2018	DSEIS	**8-Mar-18**	David Spann (CCWQTF)
H. Does not follow the MMS: spawning period, ecologically sensitive areas, potential alternative actions of the two identified species	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
I. MMS: What is the benefit of a short-term effective program at a high cost?	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
J. Show a study that shows that herbicides are beneficial to lake ecology	Herbicides	**8-Mar-18**	David Spann (CCWQTF)

K. TMDL is an estimate based on modeling, not calculations (for reduction of phosphorus) - it was removed from the CWA Section 303(d) once TMDL was completed	Other Alternatives	**8-Mar-18**	David Spann (CCWQTF)
L. 2017 Bemus Bay test requires more data collection (next growing season) to determine its success	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
M. 2017 Bemus Bay data should also include 2018 study of impacts to macroinvertebrates and fish of all ages	Fishery/Muskie	**8-Mar-18**	David Spann (CCWQTF)
N. SOLitude does not account for natural die off in drawing conclusions from pas treatments	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
O. Late timing of additional Bay surveys was not done with proper timing	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
P. DSEIS does not address or account for biological control methods	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
Q. Phenology of curlyleaf pondweed and Eurasian watermilfoil need to be included	DSEIS	**8-Mar-18**	David Spann (CCWQTF)
R. New Hampshire's losing battle against milfoil using 2, 4-D	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
S. May result in more HABS	HABS	**8-Mar-18**	David Spann (CCWQTF)
T. Foul odor will not be improved	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
U. Need to cite source for "long-term accumulated mass of nutrients in the sediments may fuel macrophyte growth in the foreseeable future..."	Other Alternatives	**8-Mar-18**	David Spann (CCWQTF)
V. City of Jamestown does not received drinking water from lake, but from Cassadaga and Poland aquifers	Water Use/Health	**8-Mar-18**	David Spann (CCWQTF)
W. Class A waterbody, treatment methods don't remove herbicides	Water Use/Health	**8-Mar-18**	David Spann (CCWQTF)
X. Liability (escrow funds) for impacts to aquifers and public/private wells	Water Use/Health	**8-Mar-18**	David Spann (CCWQTF)
Y. Need to quantify capture zones of near shore wells	Water Use/Health	**8-Mar-18**	David Spann (CCWQTF)
Z. Water intakes, dispersion, dilution - need to show the model used for review	Water Use/Health	**8-Mar-18**	David Spann (CCWQTF)
AA. What about dilution modelling for ecological impacts	Overall Ecology	**8-Mar-18**	David Spann (CCWQTF)
BB. Synergistic Effects of Aquathol K and Navigate (2, 4-D) are unknown, no scientific data to support	Herbicides	**8-Mar-18**	David Spann (CCWQTF)

CC. NYS Species of Greatest Conservation Need (SGCN) need to be addressed	RTE	**8-Mar-18**	David Spann (CCWQTF)
DD. No account for 270 bird species that use lake, what are the effects to them?	RTE	**8-Mar-18**	David Spann (CCWQTF)
EE. No discussion of ACOE wetlands, what if herbicides drift into NYSDEC wetlands	Wetlands	**8-Mar-18**	David Spann (CCWQTF)
FF. Lawn fertilizer reduction not addressed	Other Alternatives	**8-Mar-18**	David Spann (CCWQTF)
GG. 2, 4-D in a aquatic environment reacts differently than on land applications. DSEIS should state this	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
HH. pH of Chautauqua Lake needs to be stated, before conclusion can be made on "ph of 8 or higher may reduce weed control"	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
II. DEC drift/dilution model needs to be correctly utilized and included in the document with inputs and assumptions included	Dispersion	**8-Mar-18**	David Spann (CCWQTF)
JJ. Need to model groundwater and need to identify groundwater and bottom springs	Water Use/Health	**8-Mar-18**	David Spann (CCWQTF)
KK. DSEIS states nutrients released in south basin will be flushed out in less than a year, earlier in the document it says internal loading would be problem for foreseeable future	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
LL. Affect on native shoreline vegetation needs to be addressed in event of high water event	Overall Ecology	**8-Mar-18**	David Spann (CCWQTF)
MM. Table 4-3 lacks scientific basis, looks like from sales company	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
NN.Treatment area map scale is, areas need to be recalculate (in reference to 200 feet off shore or 6 feet of water, whatever comes first)	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
OO. Long term impacts conclusions are not scientifically based, what about HABS	HABS	**8-Mar-18**	David Spann (CCWQTF)
PP. Impacts do not take into account pan fish or young fish in general	Fishery/Muskie	**8-Mar-18**	David Spann (CCWQTF)
QQ. Does not adequately address impacts to all the different types of invertebrates	DSEIS	**8-Mar-18**	David Spann (CCWQTF)

RR. No baseline for invertebrate populations in Bemus Bay prior to 2017 treatment	Herbicides	**8-Mar-18**	David Spann (CCWQTF)
SS. Lake users from both private and public access points must be notified	Process	**8-Mar-18**	David Spann (CCWQTF)
TT.Herbicide treatments are not long term solutions and can lead to re-colonization	Other Alternatives	**8-Mar-18**	David Spann (CCWQTF)
UU. Less acreage and split treatment need to be fully explored as alternatives	Other Alternatives	**8-Mar-18**	David Spann (CCWQTF)
VV. Disagree with conclusion that impacts will be effectively mitigated	DSEIS	**8-Mar-18**	David Spann (CCWQTF)
Party/Organization Writer #9 (Chautauqua Fishing Alliance)		**12-Mar-18**	**J Regis Thompson (CFA)**
A. Fails to provide essential controls necessary to protect a diverse, world class fishery	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
B. Need strict herbicide process controls, shoreline distance and depth limits, and special protections for seasonal spawning and post spawning periods	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
C. Need to achieve a balance between herbicide use and mechanical harvesting	Other Alternatives	**12-Mar-18**	J Regis Thompson (CFA)
D. Failure to address how critical native weeds will be protected	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
E. Removal of certain species could result in even worse species populating the lake (Starry Stonewort)	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
F. Dissolved oxygen levels	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
G. SOLitude does not have experience on a lake of this size	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
H. Fish habitats will be destroyed	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
I. 30-acre, 2017 study does not justify 700-acre 2018 application	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
J. Fails to address implications to fish, wildlife, waterfowl, and habitat in lake and outlet	Overall Ecology	**12-Mar-18**	J Regis Thompson (CFA)
K. Flaws in logic, statistics, methodologies, and misidentified macrophytes	DSEIS	**12-Mar-18**	J Regis Thompson (CFA)
L. Off shore treatment areas are flawed	Herbicides	**12-Mar-18**	J Regis Thompson (CFA)
M. Fish spawning and rearing will be threatened	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)

N. Unknown long term damage to the single most productive spring spawning season musky netting area	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
O. Death of 51-52 trophy musky the "morning after" herbicide treatments	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
P. Mandatory monitoring for DO should be required	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
Q. Pure strain muskies are cool water fish that require high level of dissolved oxygen, request NYSDEC imposed five (5) protections:	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
R. 1. No use of herbicides prior to end of June	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
S. 2,. Restrict herbicide use to near shore areas only	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
T. 3. Mandatory metered monitoring of DO	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
U. 4. No use of herbicides off any undeveloped shoreline and all NYS owned shoreline	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
V. 5. No use of herbicides where density of invasive weeds do not exceed 50%	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
W. Muskie protection areas (those greater than 4' in depth) in south basin and north basin (SEE COMMENT LETTER FOR FULL DESCRIPTION)	Fishery/Muskie	**12-Mar-18**	J Regis Thompson (CFA)
X. Early season treatment period would worsen HABS	HABS	**12-Mar-18**	J Regis Thompson (CFA)
Y. Never seen such disregard for a lake's fishery, spawning grounds, wildlife and critical ecological habitat in any other DSEIS. Serves the interest of only recreational boaters. Represents dangerous environmental threat.	DSEIS	**12-Mar-18**	J Regis Thompson (CFA)
Party/Organization Writer #5 (Chautauqua Watershed Conservancy)		**16-Mar-18**	**Claire Quadri (CWC)**
A. Mapping provided by CWC showing sensitive habitats (from MMS and some owned by CWC) in relation to treatment areas	RTE	**16-Mar-18**	Claire Quadri (CWC)
Party/Organization Writer #6 (Chautauqua Watershed Conservancy)		**16-Mar-18**	**Claire Quadri (CWC)**
A. Provided maps of treatment areas superimposed to existing maps from the MMS to illustrate impacts to RTE and CWC preserves	RTE	**16-Mar-18**	Claire Quadri (CWC)

Party/Organization Writer #7 (Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri)		**16-Mar-18**	**Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri**
A. *Aquatic Macrophyte Control at Bemus Bay, Chautauqua Lake - 2017 Data Collection Report* by SOLitude should not be used as a basis for decision making (Appendix E)	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
B. May application timing, use of herbicide combinations, application in fish spawning/rearing areas, extension of application areas further into lake - all present problems	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
C. Page 6 - questions whether Bemus Bay treatments were effective	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
D. Page 6 - questions that combination of Aquathol K and Navigate had greatest reduction in Eurasian Watermilfoil	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
E. Page 79 - questions early season application and whether it will allow for native species to recolonize treated areas	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
F. Page 103 - questions if return of native macrophytes will improve conditions for native fish	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
G. Page 106 - questions native species rebounded in 2017 treatment areas	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
H. Page 117 - questions extension of treatment zone to >200 into lake would be beneficial	Herbicides	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
I. Statistical Errors - 2017 macrophyte survey methodology by SOLtude was incorrect and all resulting statistical analysis and conclusions in the report should be rendered invalid	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
J. Survey Methodology - 2017 macrophyte survey by SOLitude	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis
K. Results/Discussion - 2017 macrophyte survey by SOLitude vegetation inventory plant identification errors - SOLitude improperly identified plant species	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri

L. Results/Discussion, 2017 macrophyte survey by SOLitude documentation error - Navigate treatment area results lack data to support	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
M. Aquathol K and Navigate Treatment Areas - no location maps, no justification for treatment locations, all conclusions lack supporting data	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
N. Aquathol K and Navigate Treatment Areas - overall plant density decrease unsupported claim	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
O. Aquathol K and Navigate Treatment Areas - claim on Curly Leaf Pondweed is faulty	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
P. Control Areas - not clearly defined, cannot rely on visual assessments	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
Q. Data Collection Assessment - native vegetation is not preserved	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
R. Data Collection Assessment - claiming resurgence of Coontail and Elodea is misleading. Does not report "zero plants: in abundance tables. Herbivore and natural die off not accounted for	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
S. Data Collection Assessment - observable impacts lack validity	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
T. Conclusions - Primary - relative efficacy of each of the four chemical regimes not provided	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
U. Conclusions - Primary - specific site numbers and locations used for each treatment regime not provided	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
V. Conclusions - Primary - rake toss designations were subjective, comparisons of pre and post treatment are invalid	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri

W. Conclusions - Secondary - same sites were used for comparison, because different species of plants were monitored pre- and post- treatment, comparison is flawed	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
X. Conclusions - Tertiary - conclusions based on visual, subjective observations, claims for impacts are vague and not supported	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
Y. Conclusions - Tertiary - conclusions of "no observable impacts to these sites" are vague and lack comparative macrophyte density data	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
Z. Conclusions - Tertiary - statements about drift in open water are speculative and without objective data	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
AA. Recommendations - validity of this report's recommendations is highly questionable	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
BB. Recommendations - lacks recommendations to minimize drift into non-target areas	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
CC. Recommendations - May timing, extending further than 200' from shore, insufficient contact time, and application timing not substantiated with data	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
DD. Recommendations - Use in the Appendices E, F, and H of the DSEIS as a basis for recommendations is flawed	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
EE. SEE COMMENT LETTER	DSEIS	**16-Mar-18**	Collective Comments by Rebecca L Nystrom, Janis Bowman, Joe Galati, Dr. Twan Leenders, Jonathan Townsend, and Claire Quadri
Party/Organization Writer #8 (Chautauqua Lake Association)		16-Mar-18	**Doug Conroe (CLA)**
A. Requested 30-day extension for comment period	Process	**16-Mar-18**	Doug Conroe (CLA)
B. Support a new SEIS, but not in this timeframe	Process	**16-Mar-18**	Doug Conroe (CLA)
C. Racine-Johnson reports contradict opening remarks presented at public hearing	Process	**16-Mar-18**	Doug Conroe (CLA)

D. Failure to address alternative actions that would be less environmentally impactful (see USEPA)	Process	**16-Mar-18**	Doug Conroe (CLA)
E. Does adequately address the impact herbicides will have on HABS	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
F. Failure to address alternative measures such as green infrastructure	Other Alternatives	**16-Mar-18**	Doug Conroe (CLA)
G. Incorrect description of TMDL status	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
H. SPEDES permits must address phosphorus mitigation (in DSEIS	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
I. Incorrect interpretation of Racine-Johnson data	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
J. Should not use SOLitude data for DSEIS	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
K. Fails to address the impact of herbivores on Eurasian watermilfoil	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
L. Fails to address all the macrophyte species in lake (see Racine-Johnson report)	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
M. Document inaccurately describes lake conditions, macrophyte conditions have not worsened over the past 25 years	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
N. DSEIS does not address that curly leaf pondweed dies off before recreational season	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
O. Native plant species not adequately addressed	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
P. Impacts to fish, waterfowl, and mussels are needed	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
Q. Further communication with Natural Heritage (RTE) is needed	RTE	**16-Mar-18**	Doug Conroe (CLA)
R. Section 3.2.2 Racine-Johnson zebra mussel information has been published, Section 4.8.4 statement on mussels	RTE	**16-Mar-18**	Doug Conroe (CLA)
S. Impacts to the fishery, especially muskie, needs to greatly expanded	Fishery/Muskie	**16-Mar-18**	Doug Conroe (CLA)
T. DO level recommendations and implementations need to be discussed	Fishery/Muskie	**16-Mar-18**	Doug Conroe (CLA)
U. Habitats, spawning areas need to be protected	Overall Ecology	**16-Mar-18**	Doug Conroe (CLA)

V. Section 3.2.1 NYSDEC's authorization to allow for herbicide treatment during spawning needs to be provided, along with specific impacts to muskies. Include a listing of permits with related "particulars"	Fishery/Muskie	**16-Mar-18**	Doug Conroe (CLA)
W. No specific water flow data was presented.	Dispersion	**16-Mar-18**	Doug Conroe (CLA)
X. Private potable water users need to be examined more, sub-surface and surface flow models need to be provided	Water Use/Health	**16-Mar-18**	Doug Conroe (CLA)
Y. Need to identify the specific human adversaries (public noticing) that will be utilized	Water Use/Health	**16-Mar-18**	Doug Conroe (CLA)
Z. Missing public parks need to be identified	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
AA. Community names need to be corrected (Maple Springs incorrectly labeled as Sunset Bay)	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
BB. Authors of each section need to be identified	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
CC. Conclusions and assertions need to be cited/sourced	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
DD. Source of funding need to be disclosed	DSEIS	**16-Mar-18**	Doug Conroe (CLA)
Party/Organization Writer #10 Roger Tory Peterson Institute		16-Mar-18	**Twan Leenders (RTPI)**
A. Too little information to adequately assess which species may be affected and to what extent	DSEIS	**16-Mar-18**	Twan Leenders (RTPI)
B. Drastic changes to the lake's biological functioning	Overall Ecology	**16-Mar-18**	Twan Leenders (RTPI)
C. Rushed process	Process	**16-Mar-18**	Twan Leenders (RTPI)
D. Lack of defensible data	DSEIS	**16-Mar-18**	Twan Leenders (RTPI)
E. Fails to address all of the NYS RTE species known to occur on the lake (page 45 and 107)	DSEIS	**16-Mar-18**	Twan Leenders (RTPI)
F. Impacts to Pied-Billed Grebes, Common Loon, Common Tern, Osprey , Red-shouldered Hawk, Common Nighthawk, Piping Plover, and Bald Eagle (page 45? and 107?)	RTE	**16-Mar-18**	Twan Leenders (RTPI)
G. Not sufficiently established direct and indirect effects of herbicide application on resident, breeding, and migrating birds and waterfowl in this IBA	RTE	**16-Mar-18**	Twan Leenders (RTPI)
H. Spiny Soft-Shell Turtle are in treatment area and use SAV for habitat and forage	RTE	**16-Mar-18**	Twan Leenders (RTPI)
I. DO impact to Spiny Soft-Shell Turtle	RTE	**16-Mar-18**	Twan Leenders (RTPI)
J. Impacts to bats	RTE	**16-Mar-18**	Twan Leenders (RTPI)

K. Applicant does not have the overall health of the lake in mind	Overall Ecology	**16-Mar-18**	Twan Leenders (RTPI)
Party/Organization Writer #11 Chautauqua Watershed Conservancy		**16-Mar-18**	**John Jablonski (CWC)**
A. Comment period should be extended for 90-days	Process	**16-Mar-18**	John Jablonski (CWC)
B. Towns and NYSDEC should require the applicant to provide sufficient peer reviewed research on herbicides to determine dosage to ensure non-target beneficial pondweeds and emergent plants will not be killed along with Eurasian watermilfoil	Herbicides	**16-Mar-18**	John Jablonski (CWC)
C. Potential for increase in HABS	HABS	**16-Mar-18**	John Jablonski (CWC)
D. Natural Heritage Program response notes that rare and NYS listed animals, plants, and significant natural communities are documented within treatment zones	RTE	**16-Mar-18**	John Jablonski (CWC)
E. Need to include correspondence with Natural Heritage and documentation of consultation with NYSDEC Division of Wildlife	RTE	**16-Mar-18**	John Jablonski (CWC)
F.Wind driven currents, need dispersion modeling and current flow modeling	Dispersion	**16-Mar-18**	John Jablonski (CWC)
G. Does not consider impacts to lake outlet or proximity to wetlands, greater setbacks from wetlands should be required to protect sensitive habitats	Overall Ecology	**16-Mar-18**	John Jablonski (CWC)
H. Aquathol K will likely kill beneficial Potamogetons along with curly leafed pondweed, opposed to its use at lake outlet/wetlands	Herbicides	**16-Mar-18**	John Jablonski (CWC)
I. Does not follow MMS recommendations	Process	**16-Mar-18**	John Jablonski (CWC)
J. Rational for herbicide type/concentration/areas should be provided	Herbicides	**16-Mar-18**	John Jablonski (CWC)
K. No herbicides should be used in areas where Eurasian watermilfoil is not dominant (>50%), otherwise native plants will be targeted	Herbicides	**16-Mar-18**	John Jablonski (CWC)
L. Request thorough consideration of No Acton Alternative	Other Alternatives	**16-Mar-18**	John Jablonski (CWC)

Party/Organization Writer #12 Racine-Johnson Aquatic Ecologists		**16-Mar-18**	**Robert L. Johnson (Racine-Johnson Aquatic Ecologists)**
A. DSEIS misrepresents my work	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
B. Page 6 - incorrect, there is a baseline for invertebrate population	RTE	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
C. Page 40 - macroinvertebrate statement (on few data points existing) and herbivores (identfication for first time) are both incorrect	RTE	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
D. Page 8 - 25 years after CLA annual herbicide application program ended, increased density of invasive weeds is incorrect.	Herbicides	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
E. Page 30 - 1989 statement of Eurasian watermilfoil making southern quarter of southern basin impassable to boats is incorrect	Water Use/Health	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
F. Page 114 - data collected between 2007 and 2017 reveals an increased density of invasive weeds needs data citation	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
G. References cited in the DSEIS are generally incorrect	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
H. Page 114 - Egregious statistical misstep by not refencing all available data that is credible in making conclusion	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
I. Page 114, last sentence - not supported by the data the DSEIS has cited	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
J. Racine-Johnson data does not support the conlcusion that Eurasian watermilfoil has increased (based on data collect by Racine-Johnson using rake-toss sampling method and then an assessment of density that we assign to the sampled plant masses)	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
K. Pages 8, 30, and 114 - Inference made that Eurasian watermilfoil has increased in density over the last 10 years, provides data to the contrary (SEE COMMENT LETTER)	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
L. Page 107 - Paper Pondshell statement (SEE COMMENT LETTER)	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)

M. Tables on page 41 are cited as being from Racine-Johnson Report, but are not (SEE COMMENT LETTER)	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
N. Page 103, Statement claiming that mussels are found in less than 20% of the proposed treatment areas "has little credibility"	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
O. Aquathol K is a recognized molluscicide	RTE	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
P. Under "Impacts to Invertebrates" there is no mention of aquatic insects	Overall Ecology	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
Q. Pages 41-44, maps incorrectly referenced (SEE COMMENT LETTER)	Overall Ecology	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
R. Paper pondshell mussel found at 24 locations in 2016 report (SEE COMMENT LETTER)	RTE	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
S. Page 107, 108 - impact to Potamogeton hillii by Aquathol K, early treatment period would not mitigate, other natives would be impacted too	RTE	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
T. Page 35, Racine-Johnson identified 12 additional macrophyte species, not 9	Overall Ecology	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
U. Concerned about DSEIS under-reporting native species in occurrence and mass	Overall Ecology	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
V. 2017 study in Bemus Bay by SOLitude (Data Collection Project)was flawed and data collected by Racine-Johnson from Bemus Bay and published in their 2018 report was left out of the DSEIS	Process	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
W. SEE FULL COMMENTS	DSEIS	**16-Mar-18**	Robert L. Johnson (Racine-Johnson Aquatic Ecologists)
Party/Organization Writer #13 (Ramboll Consulting on Behalf		16-Mar-18	**Ramboll Consulting on Behalf of Chautauqua**
A. DSEIS lacks sufficient detail to draw conclusions, fails to satisfy SEQRA requirements	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
B. Estimated concentrations of herbicides in the lake are too general, do not account for concentrations at drinking water intakes or recreational areas	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution

C. Specific discussion of the toxicity of the herbicides needs to be clarified for the native ecological species, spawning areas, RTE, and sensitive areas	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
D. Evaluation of alternatives is limited and biased	Other Alternatives	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
E. Mitigations measures should be expanded upon	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
F. Page 61, private residences who use surface water for drinking - need more information	Water Use/Health	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
G. Pages 74-76, drift calculations are unclear	Dispersion	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
H. Drift analysis, dispersion calculations are unclear	Dispersion	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
I. Page 63, Groundwater discussion/potential for impacts not adequate. Groundwater used as drinking water not adequately expressed	Water Use/Health	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
J. Limitations on fishing and swimming, use of the lake, does not provide calculations for the 3-24 hours for swimming and 24 hours for Navigate	Water Use/Health	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
K. Page 54, "lake is primarily utilized during the summer" not supported by any reference	Water Use/Health	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
L. Section 4.2 and 4.4, Agricultural/Irrigation, if intake locations are unknown, no way to adequately address potential impacts and/or mitigations	Water Use/Health	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
M. Figures 4-1 to 4-10 are inadequate in detail, should display water depth, water intakes, irrigation intakes, public beaches, and sensitive ecological habitats, bays described on 32-35 are now shown	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
N. Fishing spawning areas, RTE, and wetlands not adequately displayed on figures 4-2 to 4-10	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
O. Potential toxicity to the spawning areas within treatment areas in adequately addressed	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution

P. Reliance on product labels and NYSDEC precedent for impacts to fish spawning areas, need to explain/reference the basis of these statements	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
Q. Specific information about Navigate (2,4-D) impact to spawning areas is needed.	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
R. More information on RTE species in treatment areas, specifically mussels and Potamogeton hillii (Hills pondweed)	RTE	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
S. Potential effects of drift on sensitive habitats, to include wetlands	Dispersion	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
T. How will fish be impacted by oxygen depletion caused by decomposing weeds	Fishery/Muskie	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
U. NYSDEC memorandum allowing for 2, 4-D to be used on Eurasian milfoil needs to be included/more detailed explanation of it	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
V. Evaluation of alternatives is inadequate: 1. No action, 2. Combo of herbicides and harvesting in RTE and spawning areas	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
W. Nutrient loading, green infrastructure, and other alternatives are working and should not be "summarily dismissed" - provided graphics/figures to show	Other Alternatives	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
X. Nutrient loading/contamination is primary driver, need to explain why it will "take decades" to fully implement nutrient reduction strategies	Other Alternatives	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
Y. Need to quantitatively discuss stormwater improvements, living buffers, residential lawn improvements/education	Other Alternatives	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
Z. Mitigations section needs to be fully explained: coordination with NYSDEC for muskie collection/eggs, will navigate be applied in buffer strips (which will reduce its impact), discussion of mixed alternatives/potential for reduction to impact to sensitive areas	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
AA. Further documentation for potential impacts to human health and human use and ecological resources	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution

BB. Concentrations of herbicides expected to be present in water need to be estimated for human use areas and ecologically sensitive areas	Herbicides	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
CC. Need to document conclusions, others cannot be sure of minimal impacts	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution
DD. Further explanation of evaluation of alternatives	DSEIS	**16-Mar-18**	Ramboll Consulting on Behalf of Chautauqua Institution

E3. General Public

SPEAKER/WRITER/COMMENT	CATEGORY	DATE RECEIVED	SPEAKER AND/OR WRITER
Writer #1		**21-Feb-18**	**Keith Clelland**
A. Past summer worst in memory (lived on lake for over 55 years)	Overall Ecology	**21-Feb-18**	Keith Clelland
B. Supports use of herbicides	Herbicides	**21-Feb-18**	Keith Clelland
Writer #2		**22-Feb-18**	**Giff and Jane Lawrence**
A. Grew up on lake, moved back for retirement for recreational opportunities - support controlled use of herbicides	Water Use/Health	**22-Feb-18**	Giff and Jane Lawrence
Writer #3		**23-Feb-18**	**Ron Nelson**
A. Thrilled with DSEIS, fully endorses use of herbicides to control weeds	Herbicides	**23-Feb-18**	Ron Nelson
Writer #4		**23-Feb-18**	**Ruth Wahl**
A. Appalled by the use of herbicides	Herbicides	**23-Feb-18**	Ruth Wahl
B. Drinking water impacts	Water Use/Health	**23-Feb-18**	Ruth Wahl
C. Dead plant material will exacerbate the problem in the future	Herbicides	**23-Feb-18**	Ruth Wahl
D. Don't fully understand what effects will be to ecosystem. Too many unknowns.	Overall Ecology	**23-Feb-18**	Ruth Wahl
E. Many of use try to eat organics and avoid exposure to pesticides and herbicides. Using herbicides is unconscionable.	Water Use/Health	**23-Feb-18**	Ruth Wahl
F. Must use alternatives, reduce nutrients, stormwater management plant.	Other Alternatives	**23-Feb-18**	Ruth Wahl
Writer #5		**23-Feb-18**	**David Wasik**
A. Nutrient loading is primary issue	Other Alternatives	**23-Feb-18**	David Wasik
B. Herbicides only mask the problem	Herbicides	**23-Feb-18**	David Wasik
C. Will be more difficult to control HABS	HABS	**23-Feb-18**	David Wasik
D. Fishery negatively impacted	Fishery/Muskie	**23-Feb-18**	David Wasik
E. Progress has been made w/o herbicides	Other Alternatives	**23-Feb-18**	David Wasik
F. Need more time for marine biologists to conduct research on programs	Other Alternatives	**23-Feb-18**	David Wasik
Writer #6		**28-Feb-18**	Beth Peyton
A. Opposed to Ellery as Lead Agency	Process	**28-Feb-18**	Beth Peyton

B. Impacts to health and well being of grandchildren, lake users	Water Use/Health	**28-Feb-18**	Beth Peyton
C. Impacts to eagles and raptors and swans (2, 4-D)	RTE	**28-Feb-18**	Beth Peyton
D. DSEIS should cover the whole lake	Process	**28-Feb-18**	Beth Peyton
E. CLWC and CLA should be leading effort on HABS and invasives	Process	**28-Feb-18**	Beth Peyton
F. Wait for HABS summit to be completed prior to moving forward	Process	**28-Feb-18**	Beth Peyton
G. Identify authors of DSEIS, there should be no conflict of interest	DSEIS	**28-Feb-18**	Beth Peyton
H. Need to further evaluate long-term impacts of proposed treatment	Overall Ecology	**28-Feb-18**	Beth Peyton
I. Doesn't agree with national policy shifts towards the environment, "sickened" if also happening at local level (Chautauqua Lake)	Political	**28-Feb-18**	Beth Peyton
Writer #17		**28-Feb-18**	**Rachel Brown**
A. Herbicides will not only kill targeted invasives, but other plants too	Herbicides	**28-Feb-18**	Rachel Brown
B. Navigate (2, 4-D) was a component of Agent Orange and poses a health risk	Herbicides	**28-Feb-18**	Rachel Brown
C. Nutrient loading and long term solutions should be sought	Other Alternatives	**28-Feb-18**	Rachel Brown
D. Research conducted by University of Wisconsin and sources on Wikipedia	Herbicides	**28-Feb-18**	Rachel Brown
Speaker #1		**1-Mar-18**	**Doug Champ**
A. Shelf life of herbicides	Herbicides	**1-Mar-18**	Doug Champ
B. Muskie spawning impacts	Fishery/Muskie	**1-Mar-18**	Doug Champ
C. Muskie food chain/bait fish impacts	Fishery/Muskie	**1-Mar-18**	Doug Champ
D. Drinking water impacts	Water Use/Health	**1-Mar-18**	Doug Champ
E. Natural impacts	Overall Ecology	**1-Mar-18**	Doug Champ
Speaker #2		**1-Mar-18**	**Andy Ohl**
A. Negative impacts to fishery and fishing industry	Fishery/Muskie	**1-Mar-18**	Andy Ohl
B. Young fish use weed cover for habitat	Fishery/Muskie	**1-Mar-18**	Andy Ohl
C. Dissolved oxygen from dead weeds leads to HABS	HABS	**1-Mar-18**	Andy Ohl
D. 50% of invasives present prior to treatment	Herbicides	**1-Mar-18**	Andy Ohl

Speaker #3		**1-Mar-18**	**Bob Johnson**
A. Use both herbicides	Herbicides	**1-Mar-18**	Bob Johnson
B. Continue weed cutting	Other Alternatives	**1-Mar-18**	Bob Johnson
C. Herbicides previously used and no negative health impacts for lake users	Water Use/Health	**1-Mar-18**	Bob Johnson
D. Need EIS for weed cutting	Other Alternatives	**1-Mar-18**	Bob Johnson
E. Stop blaming farmers for nutrient loading, need more data to confirm correlation	Other Alternatives	**1-Mar-18**	Bob Johnson
F. Assessments will be lowered if nothing done	Economy/Tourism	**1-Mar-18**	Bob Johnson
Speaker #4		**1-Mar-18**	**Jim Paige**
A. Ecosystem is deteriorating/worst it has been	Overall Ecology	**1-Mar-18**	Jim Paige
B. Herbicides are better today, can be quite targeted	Herbicides	**1-Mar-18**	Jim Paige
C. CLP are all volunteer, no special interest, genuine concern for health of the lake	Overall Ecology	**1-Mar-18**	Jim Paige
D. Must do something	Economy/Tourism	**1-Mar-18**	Jim Paige
Speaker #5		**1-Mar-18**	**Randy Present**
A. Science on both sides of the issue (herbicides)	Herbicides	**1-Mar-18**	Randy Present
B. Supports use of herbicides	Herbicides	**1-Mar-18**	Randy Present
C. Will move if lake does not improve	Economy/Tourism	**1-Mar-18**	Randy Present
D. Get something done	Economy/Tourism Y	**1-Mar-18**	Randy Present
Speaker #6		**1-Mar-18**	**Bruce Erickson**
A. Ecosystem is not deteriorating/worst it has been	Overall Ecology	**1-Mar-18**	Bruce Erickson
B. DSEIS missing critical information	DSEIS	**1-Mar-18**	Bruce Erickson
C. Testing done without quarantine in place	Water Use/Health	**1-Mar-18**	Bruce Erickson
D. Must address quarantine issue	Water Use/Health	**1-Mar-18**	Bruce Erickson
E. Removing too many weeds results in HABS	HABS	**1-Mar-18**	Bruce Erickson
Speaker #7		**1-Mar-18**	**John Durkee**
A. Tourism is needed to drive the local/regional economy	Economy/Tourism	**1-Mar-18**	John Durkee
B. Weeds are ruining experience on lake	Recreation	**1-Mar-18**	John Durkee
C. Considering selling house at loss because of weeds	Economy/Tourism	**1-Mar-18**	John Durkee
D. Lack of urgency, political dysfunction is apparent	Political	**1-Mar-18**	John Durkee
E. Why is Chautauqua Lake treated differently than other NYS lakes?	Political	**1-Mar-18**	John Durkee
Speaker #8		**1-Mar-18**	**Becky Nystrom**

A. Comment period should be extended	Process	**1-Mar-18**	Becky Nystrom
B. Science community believes project is being "steamrolled"	Process	**1-Mar-18**	Becky Nystrom
C. Data collection from last summer done improperly	DSEIS	**1-Mar-18**	Becky Nystrom
D. Conflict of interest for scientists completing data collection last summer	Process	**1-Mar-18**	Becky Nystrom
E. No herbicides prior July 1st	Treatment Timing	**1-Mar-18**	Becky Nystrom
F. 50% of invasives present prior to treatment	Treatment Areas	**1-Mar-18**	Becky Nystrom
G. Claims that native macrophytes will come back are inaccurate	DSEIS	**1-Mar-18**	Becky Nystrom
H. Impacts to RTE (pond weed)	RTE	**1-Mar-18**	Becky Nystrom
I. Wind driven currents needed modelling	Dispersion	**1-Mar-18**	Becky Nystrom
J. Currents need modelling	Dispersion	**1-Mar-18**	Becky Nystrom
K. HABS and cyanobacteria will be more prevalent once weeds killed	HABS	**1-Mar-18**	Becky Nystrom
L. Not entitled to clean lake	Overall Ecology	**1-Mar-18**	Becky Nystrom
Speaker #9		**1-Mar-18**	**Jennifer McDowell**
A. Smell is really bad, cosmetics are bad	Overall Ecology	**1-Mar-18**	Jennifer McDowell
B. DSEIS hard to understand, hard to read	DSEIS	**1-Mar-18**	Jennifer McDowell
C. DSEIS does not take into account environmental impact to the lake	DSEIS	**1-Mar-18**	Jennifer McDowell
Speaker #10		**1-Mar-18**	**Jan Bowman**
A. Ecosystem is not deteriorating/worst it has been	Overall Ecology	**1-Mar-18**	Jan Bowman
B. Process for this DSEIS is too accelerated	Process	**1-Mar-18**	Jan Bowman
C. Herbicides are not "silver bullet" solution	Herbicides	**1-Mar-18**	Jan Bowman
D. No quick fix, nutrient loading is main issue	Other Alternatives	**1-Mar-18**	Jan Bowman
E. No weeds will result in less fish	Fishery/Muskie	**1-Mar-18**	Jan Bowman
F. All scientists on the lake agree, this could be catastrophic	Herbicides	**1-Mar-18**	Jan Bowman
G. The lake changes, new studies are continually needed	DSEIS	**1-Mar-18**	Jan Bowman
H. Article referenced by speaker: "Anti-cyanobacterial fatty acids released from Mryiophyllum spicatum"	HABS	**1-Mar-18**	Jan Bowman
Speaker #11		**1-Mar-18**	**Jane Conroe**
A. DSEIS is lacking	DSEIS	**1-Mar-18**	Jane Conroe
B. Class A drinking water	Water Use/Health	**1-Mar-18**	Jane Conroe
C. DEC fish hatchery	Fishery/Muskie	**1-Mar-18**	Jane Conroe

D. Muskie fishing	Muskie	**1-Mar-18**	Jane Conroe
E. Loons are on the lake and breeding	RTE	**1-Mar-18**	Jane Conroe
F. Species information from NYSDEC Nature Explorer was off	RTE	**1-Mar-18**	Jane Conroe
G. Town of Ellery should not be Lead Agency	Process	**1-Mar-18**	Jane Conroe
H. Who is reviewing the document at Town of Ellery	Process	**1-Mar-18**	Jane Conroe
I. Authors of each section and appendices should be identified	DSEIS	**1-Mar-18**	Jane Conroe
Speaker #12		**1-Mar-18**	**Rudy Mueller**
A. Would not live here without lake	Overall Ecology	**1-Mar-18**	Rudy Mueller
B. HABS are big concern	HABS	**1-Mar-18**	Rudy Mueller
C. Drinking water impacts to public health	Water Use/Health	**1-Mar-18**	Rudy Mueller
D. Fish impact to public health	Water Use/Health	**1-Mar-18**	Rudy Mueller
E. Political infighting is problematic for working towards solution	Political	**1-Mar-18**	Rudy Mueller
Speaker #13		**1-Mar-18**	**John Conley**
A. Ecosystem is dynamic	Overall Ecology	**1-Mar-18**	John Conley
B. Weed growths change location from year to year	Herbicides	**1-Mar-18**	John Conley
C. Fishing is a major economic driver	Fishery/Muskie	**1-Mar-18**	John Conley
Speaker #14		**1-Mar-18**	**Kathleen McCarthy**
A. Sewer system should be extended	Other Alternatives	**1-Mar-18**	Kathleen McCarthy
B. Comment period should be extended	Process	**1-Mar-18**	Kathleen McCarthy
C. Most people in Maple Springs are not year round residents/not aware of the DSEIS	Process	**1-Mar-18**	Kathleen McCarthy
D. HABS are a major concern	HABS	**1-Mar-18**	Kathleen McCarthy
E. Herbicides may cause more HABS	HABS	**1-Mar-18**	Kathleen McCarthy
Speaker #15		**1-Mar-18**	**Bob Wooler**
A. Town of Ellery should not be Lead Agency	Process	**1-Mar-18**	Bob Wooler
B. Concerned that Town is interested in this particular project	Political	**1-Mar-18**	Bob Wooler
Speaker #16		**1-Mar-18**	**Hillary Hornyak**
A. Tourism is economically important to community	Economy/Tourism	**1-Mar-18**	Hillary Hornyak
B. Public health and environmental health interwoven	Water Use/Health	**1-Mar-18**	Hillary Hornyak
C. DSEIS failed to take into account numerous alternatives	Other Alternatives	**1-Mar-18**	Hillary Hornyak
D. Buffer areas, no fertilizers, rinse stations	Other Alternatives	**1-Mar-18**	Hillary Hornyak
E. Endothall is of serious concern	Herbicides	**1-Mar-18**	Hillary Hornyak
Speaker #17		**1-Mar-18**	**Julia McMahon**

A. Economy, tourism, homebuyers negatively impacted by	Economy/Tourism	**1-Mar-18**	Julia McMahon
B. Potential homebuyers turn away due to weeds	Economy/Tourism	**1-Mar-18**	Julia McMahon
C. Something must be done	Economy/Tourism	**1-Mar-18**	Julia McMahon
D. Natural shorelines and buffers will not solve the problem alone	Other Alternatives	**1-Mar-18**	Julia McMahon
E. If nothing done, lake will continue to deteriorate	Overall Ecology	**1-Mar-18**	Julia McMahon
F. Only reason people come is become of the lake	Economy/Tourism	**1-Mar-18**	Julia McMahon
Speaker #18		**1-Mar-18**	**Karen Rine**
A. Herbicides previously used and no negative health impacts	Water Use/Health	**1-Mar-18**	Karen Rine
B. Been working towards EIS for decades	Process	**1-Mar-18**	Karen Rine
C. Something must be done	Economy/Tourism	**1-Mar-18**	Karen Rine
Writer #8		**1-Mar-18**	**Edward Crum**
A. SOLitude lacks experience on lakes of this size	Herbicides	**1-Mar-18**	Edward Crum
B. SOLitude lacks experience on lakes with this species of muskie	Fishery/Muskie	**1-Mar-18**	Edward Crum
C. One quarter of the fish spawning/rearing areas in the lake will be treated, causing adverse impacts due to dissolved oxygen	Fishery/Muskie	**1-Mar-18**	Edward Crum
D. Specific examples of NYSDEC approvals of herbicide treatments conducted during spawning season should be provided, noting if any such examples included waters with pure strain Esox maskinonge.	Fishery/Muskie	**1-Mar-18**	Edward Crum
E. Application of herbicides while fish are in spawning areas is a problem b/c muskies are biologically programmed to stay in the same area during spawning season, they will not leave for deeper waters during herbicide application. There is potential for damaging or killing a significant number of muskie.	Fishery/Muskie	**1-Mar-18**	Edward Crum
F. The risks presented by herbicide application to muskies are	Fishery/Muskie	**1-Mar-18**	Edward Crum
G. No herbicides at known spawning areas or undeveloped shoreline	Fishery/Muskie	**1-Mar-18**	Edward Crum
H. Herbicides should be applied after July 1st (completion of spawning season)	Fishery/Muskie	**1-Mar-18**	Edward Crum
I. If there is a drop below 6.0 ppm of dissolved oxygen, suspend herbicide program	Herbicides	**1-Mar-18**	Edward Crum

J. No application >200 ft. from shore or in water depth >4 ft. (exception for the Stow narrows)	Herbicides	**1-Mar-18**	Edward Crum
K. Treatments areas on Figures 4.1 to 4.10 should be defined, shaded areas need explanation (does it denote where herbicide will be applied or expected "killing" area?). Show expected "killing" area.	Herbicides	**1-Mar-18**	Edward Crum
L. Curlyleaf pondweed provide habitat to the fish	Fishery/Muskie	**1-Mar-18**	Edward Crum
M. Earlier HABS would be a huge negative for all users of the	HABS	**1-Mar-18**	Edward Crum
N. Many of the macrophyte problems could be addressed with spot applications in the littoral zone/close to shore	Herbicides	**1-Mar-18**	Edward Crum
O. Page 99 statements on boating, skiing issues need to be cited or removed b/c they are generalizations	Water Use/Health	**1-Mar-18**	Edward Crum
P. The majority of lake users are not represented by elected officials - who is the "community," whose goals and expectations are being represented? (pages 117)?	Process	**1-Mar-18**	Edward Crum
Q. Drift and dispersion of herbicides to areas outside of treatment areas is a concern	Dispersion	**1-Mar-18**	Edward Crum
R. Drinking water impacts is a concern and health impacts are a concern	Water Use/Health	**1-Mar-18**	Edward Crum
S. Claims on opinion survey from MMS, referenced on page 99 (declining health of lake and use herbicides) were mis-represented and do not represent all users of the lake	Process	**1-Mar-18**	Edward Crum
T. SOLitude treatment areas have no baseline, baseline should be established prior treatment. Statements that predict certainty of outcome ("not expected to be," "likely to be better," "no long term environmental impacts are expected")should be avoided (see 4.8 page 102).		**1-Mar-18**	Edward Crum
U. Many lake users would be negatively impacted by the treatments, they have rights too	Process	**1-Mar-18**	Edward Crum
V. References the following article: "Decline in Lake Arthur muskellunge fishing has anglers, state trolling for answers" Pittsburgh Post-Gazette, 2011	Fishery/Muskie	**1-Mar-18**	Edward Crum
W. References the following article: "A lesson learned at Webster Lake" 2012	Fishery/Muskie	**1-Mar-18**	Edward Crum

X. References the following article: "DNR stocks larger muskies in Lake Webster" 2016	Fishery/Muskie	**1-Mar-18**	Edward Crum
Writer #9		**1-Mar-18**	**Pat and Brad Zimmer**
A. 71 years old, sprayed herbicides when younger - no adverse affect to human health	Water Use/Health	**1-Mar-18**	Pat and Brad Zimmer
B. Time to stop studying and start taking action: save the lake, the tourist trade, and lake income	Economy/Tourism	**1-Mar-18**	Pat and Brad Zimmer
C. Leaving Holiday Harbor requires two stops to clean weeds off prior to deep water	Water Use/Health	**1-Mar-18**	Pat and Brad Zimmer
D. Other NYS lakes use herbicides	Herbicides	**1-Mar-18**	Pat and Brad Zimmer
E. Don't wait another decade to do something	DSEIS	**1-Mar-18**	Pat and Brad Zimmer
Writer #10		**3-Mar-18**	**Robert Lannon**
A. References MSU article: http://msue.anr.msu.edu/news/be_careful_what_you_wish_for_when_managing_aquatic_weeds	HABS	**3-Mar-18**	Robert Lannon
B. No discussion of next year's impact or potential for even bigger macrophyte problem	DSEIS	**3-Mar-18**	Robert Lannon
C. Should followed Chautauqua Lake Management Plan alternatives (naturalized shoreline, road ditch management, rain gardens, collection of dead weeds)	Other Alternatives	**3-Mar-18**	Robert Lannon
Writer #11		**6-Mar-18**	**Robert Wooler**
A. Concerned about Ellery's liability relative to proposed action	Process	**6-Mar-18**	Robert Wooler
B. Drinking water impacts	Water Use/Health	**6-Mar-18**	Robert Wooler
C. Fishery impacts	Fishery/Muskie	**6-Mar-18**	Robert Wooler
D. Notification and quarantine procedures	Water Use/Health	**6-Mar-18**	Robert Wooler
E. All towns/communities around the lake should be actively involved in health/safety plan	Water Use/Health	**6-Mar-18**	Robert Wooler
F. Concerned that Town is interested in this particular project	Process	**6-Mar-18**	Robert Wooler
Writer #12		**8-Mar-18**	**Kathleen McCarthy**
A. Migratory bird population who use bays on/near Maple Springs will be negatively impacted	RTE	**8-Mar-18**	Kathleen McCarthy
B. Common Loon has been on the lake since 2005 (page 45)	RTE	**8-Mar-18**	Kathleen McCarthy

C. Food chain impacts (fish who use macrophytes and macrophytes (pondweed) will negatively impact birds/waterfowl	RTE	**8-Mar-18**	Kathleen McCarthy
D. Comment period should be extended 30 days	Process	**8-Mar-18**	Kathleen McCarthy
Writer #13		**8-Mar-18**	**Becky Nystrom**
A. Article at Supervisor's request: http://msue.anr.msu.edu/news/be_careful_what_you_wish_for_when_managing_aquatic_weeds	HABS	**8-Mar-18**	Becky Nystrom
Writer #14		**8-Mar-18**	**Mary Glatt**
A. Supports use of herbicides on the lake, conditions are worse now than 1990s	Herbicides	**8-Mar-18**	Mary Glatt
B. Cannot use dock, cannot swim	Water Use/Health	**8-Mar-18**	Mary Glatt
C. 25 years of doing nothing, time to try something new. Herbicides are much safer and targeted than before.	Herbicides	**8-Mar-18**	Mary Glatt
Writer #15		**9-Mar-18**	**Unknown**
A. Wetlands and nearshore fish and wildlife habitats will be	Herbicides	**9-Mar-18**	Unknown
B. Ellery should not be lead agency	Process	**9-Mar-18**	Unknown
C. All actions and decisions should be consistent with MMS (no	Process	**9-Mar-18**	Unknown
D. Treatments areas should be restricted to 200 feet offshore or 6 feet of depth, whichever comes first	Herbicides	**9-Mar-18**	Unknown
E. No action alternative needs fleshing out (herbivores, cost savings, etc.)	DSEIS	**9-Mar-18**	Unknown
F. Multi chemical approach will kill beneficial pondweeds, negatively impact fish habitat and spawning areas	Herbicides	**9-Mar-18**	Unknown
Writer #16		**9-Mar-18**	**Jay Kuntz**
A. Needs broad input from citizens and scientists, process needs to be slowed down	Process	**9-Mar-18**	Jay Kuntz
B. Environmentally sensitive areas have been selected for treatment, can they be avoided?	Herbicides	**9-Mar-18**	Jay Kuntz
C. Concerned about HABS	HABS	**9-Mar-18**	Jay Kuntz
D. Found roughly 12 dead carp about week after 2017 herbicide test conducted, wasn't sure who to report it to	Herbicides	**9-Mar-18**	Jay Kuntz
E. Is Ellery legally liable for secondary impacts of herbicides	Process	**9-Mar-18**	Jay Kuntz
F. Nutrient loading should be examined, no quick fixes	Other Alternatives	**9-Mar-18**	Jay Kuntz

G. Every community around the lake should be heard, seasonal property owners should be included	Process	**9-Mar-18**	Jay Kuntz
H. Opposed to herbicides until all issues are addressed	Process	**9-Mar-18**	Jay Kuntz
Writer #17		**11-Mar-18**	**Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)**
A. Muskies are extremely vulnerable during 8-21 day egg development stage, 10-14 day sac-fry stage	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
B. 88% of Chautauqua Lake's naturally reared muskies die in first year, must protect each fry	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
C. Naturally reared are more vulnerable than hatchery reared	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
D. Reduction in zooplanktons (Daphnia) will hurt muskie food stocks	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
E. Young muskie rely on weed cover for camouflage	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
F. Wild celery and coontail are preferred by muskie, Aquathol K will kill coontail	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
G. Oxygen depletion will be a "artificially introduced chemical stressor."	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
H. If herbicides cause a die-off results could be catastrophic - loss of an entire year class of muskie	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
I. Studies on the affect of herbicide to walleye, small mouth, large mouth, but not to muskie	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
J. The impact of the herbicides on Daphnia (primary food stock for young muskie)	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
K. Cumulative effects of using the three herbicides at once	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
L. Toxicity tables included on page 80 and page 83 don't indicate age of fish	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
M. Toxicity tables on page 80 and 83 are not comparable to muskie, because of how muskie breed	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
N. Waneta Lake application of Renovate and Sonar resulted in lower numbers of muskie	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)

O. Trap net population data is inaccurate, b/c it tends to target older muskie	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
P. 2, 4-D's impact on insects (not harmful to "beneficial" insects) is unclear, fish eat all insects not just "beneficial" ones	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
Q. Additional studies at egg and fry life stages are needed (Cornell and DEC) prior to proceeding	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
R. Drinking water impacts is a concern and health impacts are a concern	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
S. DEC collects eggs outside of first week in may depending on a number of variables	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
T. Permit should be tied to lake temperature	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
U. NYSDEC Fisheries should conduct study in spring 2018 relative to effects on muskie and zooplankton (Daphnia)	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
V. Walleye and bass are most popular eating fish	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
W. Largemouth and smallmouth are the most popular sport fishing now	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
X. Muskie sport fishing is a million dollar industry for the region	Economy/Tourism	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
Y. Highest muskie take in 2014 since the 1970s	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
Z. Wisconsin DNR recommends not using Endothall and Aquathol at same time due to risk of depleting oxygen levels	Herbicides	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
AA. Cornell found that Endothall can take 3-4 weeks to remove plants from water column	Herbicides	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
BB. Total application timeframe could be 12 weeks	Herbicides	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
CC. Concerned that treatment could lead to more HABS	HABS	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
DD. Harvested weeds will not longer be able to be used as compost for organic farmers	Economy/Tourism	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
EE. Timing of application is bad b/c it is during fish spawning season	Fishery/Muskie	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)

FF. Must incorporate a study of mechanical harvesting vs. herbicides	Herbicides	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
GG. Study of impact to invertebrate animals not included, should be	DSEIS	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
HH. Impact to groundwater receptors (private wells information is totally incorrect, should be removed from document), wells should be sampled prior to treatment	DSEIS	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
II. It is likely that repeat applications will be needed. In each instance, water wells should be tested each time	DSEIS	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
JJ. Paddlefish were successfully reintroduced to Chautauqua Lake (correct table 3-3, Section 3.2.2)	DSEIS	**11-Mar-18**	Fletcher Ward (Author, "Saving Chautauqua's Muskies," Ward, 2013)
Writer #18		**12-Mar-18**	**Unknown**
A. Northern basin residents don't understand severity of the problem in the southern basin/outlet	DSEIS	**12-Mar-18**	Unknown
B. The studies have been going on for many years, from only "natural" view	DSEIS	**12-Mar-18**	Unknown
C. Weed cutting/harvesting makes problem worse	DSEIS	**12-Mar-18**	Unknown
D. Is the weed/algal problem better or worse than cutting was first started?	DSEIS	**12-Mar-18**	Unknown
E. How is experimental Bemus Bay area doing from last year's test?	DSEIS	**12-Mar-18**	Unknown
F. Does Chautauqua's Institution's water filtration (or anyone's) remove toxins from algal blooms?	HABS	**12-Mar-18**	Unknown
G. Do sewer and water plants check for algal toxins?	HABS	**12-Mar-18**	Unknown
H. Do the weeds trap algal toxins?	HABS	**12-Mar-18**	Unknown
I. Algal life cycle and reproduction cycles - how do they work?	HABS	**12-Mar-18**	Unknown
J. Communication problem	Political	**12-Mar-18**	Unknown
K.Is lake useable/swimmable again within 24-hours?	Water Use/Health	**12-Mar-18**	Unknown
Writer #19		**12-Mar-18**	**Brian and Cheryl Eckwahl**
A. Long time resident, things were no better when herbicides were used previously	Herbicides	**12-Mar-18**	Brian and Cheryl Eckwahl
B. HABS may increase as a result	HABS	**12-Mar-18**	Brian and Cheryl Eckwahl

C. Page 6 SOLitude data collection project, did native macrophytes come back/should study if there was carryover in May/June 2018	Herbicides	**12-Mar-18**	Brian and Cheryl Eckwahl
D. What are the cumulative impacts of using more than one herbicide at once? Page 104 answer is inadequate.	Herbicides	**12-Mar-18**	Brian and Cheryl Eckwahl
E. Once weeds are killed, no cover for fry to hide from predators.	Fishery/Muskie	**12-Mar-18**	Brian and Cheryl Eckwahl
F. Herbicides impact to small fish (fry), 2, 4-D impact to "harm fish" - stated on page 81.	Fishery/Muskie	**12-Mar-18**	Brian and Cheryl Eckwahl
G. Page 84, spawning areas will be destroyed for pan fish species, page 84	Fishery/Muskie	**12-Mar-18**	Brian and Cheryl Eckwahl
H. Document portrays that all muskie are hatchery raised "not to care" if spawning beds are destroyed	Fishery/Muskie	**12-Mar-18**	Brian and Cheryl Eckwahl
Writer #20		**12-Mar-18**	**John F. Dilley**
A. Section 4.2: Dilution calculation is off, wind driven currents not adequately addressed	Dispersion	**12-Mar-18**	John F. Dilley
B. Wind driven currents in the lake, current/waves is much less	Dispersion	**12-Mar-18**	John F. Dilley
C. Proximity to Chautauqua Institution's water intakes is much closer this year than last, needs to be taken into account	Water Use/Health	**12-Mar-18**	John F. Dilley
Writer #21		**15-Mar-18**	**Dustin Nelson**
A. Chautauqua County has failed to take action over many decades	Political	**15-Mar-18**	Dustin Nelson
B. Needed broader outreach to involve everyone	DSEIS	**15-Mar-18**	Dustin Nelson
C. Lakewide assessment and downstream impacts	DSEIS	**15-Mar-18**	Dustin Nelson
D. Water movement and drinking water impacts	Water Use/Health	**15-Mar-18**	Dustin Nelson
E. Impact on Algal Blooms	HABS	**15-Mar-18**	Dustin Nelson
F. Impacts to fish	Fishery/Muskie	**15-Mar-18**	Dustin Nelson
G. Remove "conjecture" from Section 4.5 (hindering, harvesting not sufficient, positive socioeconomic impacts, jet-skis, etc.)	Water Use/Health	**15-Mar-18**	Dustin Nelson
H. Section 4.9 products will dissipate - no studies confirm this	Dispersion	**15-Mar-18**	Dustin Nelson
I. Section 4.3 no negative effects from synergistic interactions - needs studies to confirm	Herbicides	**15-Mar-18**	Dustin Nelson
J. No herbicides in any fish spawning area	Fishery/Muskie	**15-Mar-18**	Dustin Nelson

K. Dispersion not adequately addressed	Dispersion	**15-Mar-18**	Dustin Nelson
L. Not enough lake users notified/seasonal users not contacted	Process	**15-Mar-18**	Dustin Nelson
Writer #22		**15-Mar-18**	**Edward Crum**
A. Page 103, impacts to herbivores (weevils, moths, and caddis) need to be addressed	Herbicides	**14-Mar-18**	Edward Crum
B. Page 40, does not address how herbivores have been used to combat milfoil growth	Herbicides	**14-Mar-18**	Edward Crum
C. Page 90, Burtis Bay treatment should be modified - navigation lane is not necessary and could be harmful (fish spawning/rearing)	Water Use/Health	**14-Mar-18**	Edward Crum
D. Page 90, Burtis Bay is a popular fishing area, herbicides will destroy the habitat	Fishery/Muskie	**14-Mar-18**	Edward Crum
E. Page 92, the necessity to treat Warner Bar should be stated, will harm fish spawning/rearing area	Fishery/Muskie	**14-Mar-18**	Edward Crum
F. Page 78, included Sunset Bay as a treatment area without previously having conducted a survey (2017), questions need/validity of survey process	Herbicides	**14-Mar-18**	Edward Crum
Writer #23		**14-Mar-18**	**James Reynolds**
A. Most famous and renowned musky lake in the northeast	Fishery/Muskie	**14-Mar-18**	James Reynolds
B. NYSDEC fish hatchery	Fishery/Muskie	**14-Mar-18**	James Reynolds
C. Weeds were put here by Mother Nature for a reason	Fishery/Muskie	**14-Mar-18**	James Reynolds
D. Look at other lakes, once the targeted weeds are gone others move in. It is a never ending cycle.	Herbicides	**14-Mar-18**	James Reynolds
E. Look at SOLitude's work on Waneta Lake, water chestnuts were not there beforehand and now they are.	Herbicides	**14-Mar-18**	James Reynolds
F. Waneta Lake correlation between herbicide application and HABS	HABS	**14-Mar-18**	James Reynolds
G. No one really knows the cumulative impact these herbicides will have over long term to the fishery	Fishery/Muskie	**14-Mar-18**	James Reynolds
Writer #24		**14-Mar-18**	**Jan Bowman**
A. Sent article for consideration: from Ecological Engineering, "The influence of aquatic macrophytes on *Microcystis aeruginosa* growth" by Chen, Zhang, Han, Ye, and Liu	HABS	**15-Mar-18**	Jan Bowman

B. Sent article for consideration: from Pergamon, "Mryiophyllum spicatum-released allelopathic polyphenols inhibiting growth of blue green algae Microstysis aeruginosa" by Nakai, Inoue, Hosomi, and Murakami	HABS	**15-Mar-18**	Jan Bowman
C. Comment period is still too short	Process	**15-Mar-18**	Jan Bowman
Writer #25		**15-Mar-18**	**Cheryl Eckwahl**
A. Sent article for consideration: by Claire Quadri (CWC): *Algae, Nutrients & Aquatic Plants - A Delicate Balance*	HABS	**15-Mar-18**	Cheryl Eckwahl
Writer #26		**15-Mar-18**	**Barbara Blanchard**
A. If you are going to use herbicide, do it in the smallest area possible for the shortest period of time	Herbicides	**15-Mar-18**	Barbara Blanchard
B. Concerned about health effects	Water Use/Health	**15-Mar-18**	Barbara Blanchard
C. One of the proposed herbicides is "broad spectrum" (doesn't support removal of native macrophytes) and one is "toxic" to fish	Herbicides	**15-Mar-18**	Barbara Blanchard
D. Navigate is "toxic" to fish, not realistic that fish will simply swim away	Fishery/Muskie	**15-Mar-18**	Barbara Blanchard
E. Fish spawning areas will be damaged, bad timing	Fishery/Muskie	**15-Mar-18**	Barbara Blanchard
F. Weed locations change from year to year, herbicides might not be necessary	Herbicides	**15-Mar-18**	Barbara Blanchard
G. Concerned about HABS	HABS	**15-Mar-18**	Barbara Blanchard
H. Concerned that this will lead to annual applications of herbicides	Herbicides	**15-Mar-18**	Barbara Blanchard
I. Concerned about Town of Ellery's budget, will they pay for it?	Process	**15-Mar-18**	Barbara Blanchard
J. Need to look at long term solutions	Other Alternatives	**15-Mar-18**	Barbara Blanchard
K. SOLitude is a major conflict of interest	Herbicides	**15-Mar-18**	Barbara Blanchard
Writer #27		**16-Mar-18**	**Jonathan Townsend**
A. Don't adequately address impacts to bats, lack of data does not constitute lack of harm	RTE	**16-Mar-18**	Jonathan Townsend
B. Don't adequately address impacts to the full spectrum of species that use the lake	RTE	**16-Mar-18**	Jonathan Townsend
C. Need more current literature, citing a 1981 source is not sufficient (bats)	RTE	**16-Mar-18**	Jonathan Townsend

D. Impact to food sources of bats not adequately addressed	RTE	**16-Mar-18**	Jonathan Townsend
E. Bats are in trouble worldwide, including Chautauqua County. NYS "Species of Greatest Conservation Need"	RTE	**16-Mar-18**	Jonathan Townsend
F. A third party must be utilized to evaluate whether herbicides will impact not targeted species	Herbicides	**16-Mar-18**	Jonathan Townsend
G. Cites NYSDEC guidance (6 NYCRR Part 327.3) document on herbicide applications to fish bearing waters of NYS	DSEIS	**16-Mar-18**	Jonathan Townsend
H. Need to do downstream dispersion model (in full accordance with NYSDEC) for Chadakoin River	Dispersion	**16-Mar-18**	Jonathan Townsend
I. Did address any of the issues in his January 2018 letter on bats (from scoping, included January 2018 letter for reference)	DSEIS	**16-Mar-18**	Jonathan Townsend
Writer #28		**16-Mar-18**	**Daniel Bowman**
A. No application prior to July 1st to protect fish spawning	Fishery/Muskie	**16-Mar-18**	Daniel Bowman
B. Need to understand the synergistic effects of the combination of herbicides	Herbicides	**16-Mar-18**	Daniel Bowman
C. Application methods witnessed in Bemus Bay (2017) were not sound	Herbicides	**16-Mar-18**	Daniel Bowman
D. Need to understand how herbicides affect biological controls (weevils, moths, and caddisflies)	Herbicides	**16-Mar-18**	Daniel Bowman
E. Must protect world class fishery	Economy/Tourism	**16-Mar-18**	Daniel Bowman
Writer #29		**16-Mar-18**	**Jane Conroe**
A. Page 1, Section 2.2, Paragraph 2 - recommendations should be for all possible areas of the lake	DSEIS	**16-Mar-18**	Jane Conroe
B. Page 2, Section 1.2, Paragraph 3 - density reference to invasives should be removed, not substantiated	DSEIS	**16-Mar-18**	Jane Conroe
C. Page 6, Paragraph 1 - opinions not substantiated, must remove	DSEIS	**16-Mar-18**	Jane Conroe
D. Page 6, Paragraph 3 - increasing levels of milfoil and pondweed, not substantiated, remove	DSEIS	**16-Mar-18**	Jane Conroe
E. Page 6, Paragraph 4 - December 2017 report by SOLitude is flawed, Should not be used.	DSEIS	**16-Mar-18**	Jane Conroe
F. Page 6, Paragraph 4 - must look at impacts to invertebrates	Herbicides	**16-Mar-18**	Jane Conroe
G. Page 8, use most recent CSLAP data from 2016	DSEIS	**16-Mar-18**	Jane Conroe

H. Page 8, Paragraph 3 - paragraph should be removed, incorrect about MMS	DSEIS	**16-Mar-18**	Jane Conroe
I. Page 8, Paragraph 4 - increased density, recreation use - language should be removed	DSEIS	**16-Mar-18**	Jane Conroe
J. Page 9, Paragraph 1 - newspaper notation should be removed	DSEIS	**16-Mar-18**	Jane Conroe
K. Page 9, Section 1.3, Paragraph 1 - purpose of document is to recommend conditions/standards to be followed no matter where the herbicide is applied	DSEIS	**16-Mar-18**	Jane Conroe
L. Page 10, Paragraph 1 - SOLitude December 2017 report is flawed, cannot say that herbicides can be used to reduce EWM	DSEIS	**16-Mar-18**	Jane Conroe
M. Page 10, Paragraph 2 - SOLitude December 2017 report is flawed	DSEIS	**16-Mar-18**	Jane Conroe
N. Page 10, Paragraph 3 - 2018 herbicide application is presumptuous. Survey in the fall, followed by Spring treatment should not be recommendation in SEIS	Herbicides	**16-Mar-18**	Jane Conroe
O. Surveys should be explained (long-term) and should follow Cornell ACOE methods	Herbicides	**16-Mar-18**	Jane Conroe
P, 50% density prior to treatment, distance and depth requirements should be established	Herbicides	**16-Mar-18**	Jane Conroe
Q. Statement regarding users of the lake and "noxious weed" should be removed	DSEIS	**16-Mar-18**	Jane Conroe
R. Page 10, Section 1.4 - must prove that herbicides improve ecology. Put recreational users above all other users.	DSEIS	**16-Mar-18**	Jane Conroe
S. Page 11, Paragraph 2 - Macrophytes provide positive impacts to lake's ecosystem	DSEIS	**16-Mar-18**	Jane Conroe
T. Page 11, Paragraph 3 - "SEIS seeks to address the negative impacts of excessive invasive macrophyte growth" is incorrect. Should match language on Page 12, Section 2.1	DSEIS	**16-Mar-18**	Jane Conroe
U. Page 17, Step 7 - language is incorrect, should match Page 12, Section 2.1 to avoid lowering requirements for DSEIS	DSEIS	**16-Mar-18**	Jane Conroe
V. Page 17, Step 10 - who at the Town of Ellery will evaluate the DSEIS, include their professional qualifications	Process	**16-Mar-18**	Jane Conroe

W. Page 18, Paragraph 2 - who at the Town of Ellery will write findings, include professional qualifications	Process	**16-Mar-18**	Jane Conroe
X. Page 21, Paragraph 2 - aquifer at southern end of lake does not service Jamestown	DSEIS	**16-Mar-18**	Jane Conroe
Y. Page 22 - remove this page, inaccurate. Must include discussion of near shore water well affected by lake level must be included	DSEIS	**16-Mar-18**	Jane Conroe
Z. Page 23 - incorrect, two monitoring wells in Panama and Falconer do not assess the groundwater in Chautauqua County.	DSEIS	**16-Mar-18**	Jane Conroe
AA. Page 24, Paragraph 2 - incorrect definition for all wells around the lake. Must include discussion of near shore wells affected by lake level and must map users who acquire drinking water directly from the lake	DSEIS	**16-Mar-18**	Jane Conroe
BB. Page 24, Paragraph 4 - the 2016 CSLAP covers both north and south basins	DSEIS	**16-Mar-18**	Jane Conroe
CC. Page 27, Paragraph 1 - "might explain a partial disconnect" must be removed	DSEIS	**16-Mar-18**	Jane Conroe
DD. Page 27, Section 3.2.1 Algal blooms information from Appendix F has not been peer reviewed, should be corrected or removed	DSEIS	**16-Mar-18**	Jane Conroe
EE. Page 28, Paragraph 1 - The paragraph is biased and inaccurate and does not accurately explain development of CLWMP	DSEIS	**16-Mar-18**	Jane Conroe
FF. Page 29 - entire section does not discuss native macrophytes in water column or in wetlands.	DSEIS	**16-Mar-18**	Jane Conroe
GG. Page 29, Paragraph 3 - should add that curlyleaf pondweed naturally dies off by early July	DSEIS	**16-Mar-18**	Jane Conroe
HH. Page 30, must discuss herbivores/milfoil relationship and relationship of milfoil and HABS relationship	DSEIS	**16-Mar-18**	Jane Conroe
II. Page 31, Paragraph 1 - herbicides resulting in less HABS is speculative and must be supported or removed	DSEIS	**16-Mar-18**	Jane Conroe

JJ. Page 31, Last Line - greater density in the spring is a presumption, Racine-Johnson note that variations in year to year and/or season to season are common in "living ecosystems"	DSEIS	**16-Mar-18**	Jane Conroe
KK. Page 31-35, SOLitude's December 2017 report is based on poor methodology, don't properly use Cornell ACOE method	DSEIS	**16-Mar-18**	Jane Conroe
LL. Page 36, Paragraph 3 - need more research on naturally spawned muskies in the lake	DSEIS	**16-Mar-18**	Jane Conroe
MM. Page 38, 1990 DSEIS fish list needs to be updated, Polyodon spathula is in the lake.	DSEIS	**16-Mar-18**	Jane Conroe
NN. Page 40 - Birds information, including migrating and wintering waterfowl is insufficient. Should match scoping document language.	RTE	**16-Mar-18**	Jane Conroe
OO. Page 40 - Invertebrates - lack of sufficient data to make conclusions is not acceptable - discuss generic role of zooplankton	Herbicides	**16-Mar-18**	Jane Conroe
PP. Page 45 - Failed to follow Natural Heritage program instructions for field surveys, need to do more RTE surveys for this type of project	RTE	**16-Mar-18**	Jane Conroe
QQ. Page 45, Paragraph 1, Table 3-6 - Loon is on CL (2017)	RTE	**16-Mar-18**	Jane Conroe
RR. Page 45, Paragraph 4 - need to look at information from Racine-Johnson on P. hillii (pondweed) and confirm	RTE	**16-Mar-18**	Jane Conroe
SS. Page 46, Paragraph 2 - provide complete written report of information provided to Natural Heritage Program	RTE	**16-Mar-18**	Jane Conroe
TT. Page 46, Figure 3-9 - Wetland map is insufficient and must be enhanced	Wetlands	**16-Mar-18**	Jane Conroe
UU. Page 47, Table 3-8 - Wetland drift (where did 500 feet come from?), clarify location of State Route 395	Wetlands	**16-Mar-18**	Jane Conroe
VV. Page 51, Section 3.4 - clearly explain jurisdictional boundaries water/municipalities	DSEIS	**16-Mar-18**	Jane Conroe
WW. Page 55, Paragraph 3 - "proliferation...communities.." is biased opinion	DSEIS	**16-Mar-18**	Jane Conroe
XX. Page 56 - Map is incomplete and inaccurate, not all parks shown	DSEIS	**16-Mar-18**	Jane Conroe

YY. Page 67, Section 4.0 - Use and impacts of Clearcast (final scoping document), SEIS should cover all herbicides	DSEIS	**16-Mar-18**	Jane Conroe
ZZ. Page 68 - need half life of Endothall	Herbicides	**16-Mar-18**	Jane Conroe
AAA. Page 71, last sentence - Two treatments may be necessary language should be removed or explained in great detail	Herbicides	**16-Mar-18**	Jane Conroe
BBB. Page 72, Paragraph 1 - If treatments must be applied later in the season language should be removed, speculation	Herbicides	**16-Mar-18**	Jane Conroe
CCC. Page 72, Paragraph 2 - CSLAP report = pH of 8.0 in NB and pH of 8.2 in SB	DSEIS	**16-Mar-18**	Jane Conroe
DDD. Page 72, Paragraph 3 - Anthony Manno's 2017 language should be removed, 2,4-D is for emergent plants only	DSEIS	**16-Mar-18**	Jane Conroe
EEE. Page 73, Section 4.2.1, Paragraph 2 - paragraph is speculative and has not references, May application/fish spawning impacts must be explained	Fishery/Muskie	**16-Mar-18**	Jane Conroe
FFF. Page 73, last paragraph (to 74) - 4.2.1 lacks clarity and references, implies only non-treated macrophytes will release nutrients	Herbicides	**16-Mar-18**	Jane Conroe
GGG. Page 75, Section 4.2.2 - No drift research has been completed for this project	Dispersion	**16-Mar-18**	Jane Conroe
HHH. Page 75, Paragraph 1, Appendix K - no certification from NYS certified lab, no QAQC completed	Herbicides	**16-Mar-18**	Jane Conroe
III. Page 76, Paragraph 3 - require that all water samples be done by NYS certified lab, and QAQC chain of custody paperwork required	Herbicides	**16-Mar-18**	Jane Conroe
JJJ. Page 77, Section 4.2.3 - must address near shore water wells and liability of treatment	Herbicides	**16-Mar-18**	Jane Conroe
LLL. Page 79, Paragraph 1 - encourage native plant assemblage language must be removed	Herbicides	**16-Mar-18**	Jane Conroe
MMM. Page 79, Paragraph 2 - language on native plans returning must be removed	Herbicides	**16-Mar-18**	Jane Conroe
NNN. Page 79, Section 4.3.2 - must include an explanation of all permitting requirements and timelines	Herbicides	**16-Mar-18**	Jane Conroe

OOO. Page 81, Paragraph 1 - do not address mitigations for 2,4-D toxicity to certain fish	Fishery/Muskie	**16-Mar-18**	Jane Conroe
PPP. Page 84-86 - Appendix E had flawed conclusions as basis for this section, treatment areas/overlapping fish spawning zones unacceptable	Fishery/Muskie	**16-Mar-18**	Jane Conroe
QQQ. Page 84, Paragraph 4 - Four reasons for May treatment timeline, not substantiated	Herbicides	**16-Mar-18**	Jane Conroe
RRR. Page 85-86, Table 4-6 - this table disregards MMS fish spawning recommendations	Fishery/Muskie	**16-Mar-18**	Jane Conroe
SSS. Page 87-96, distance from shore violates General Conditions of 1981 EIS that this is supplementing	Herbicides	**16-Mar-18**	Jane Conroe
TTT. Page 97, Section 4.3.3 - Wetlands impacts should require Article 24 permit	Herbicides	**16-Mar-18**	Jane Conroe
UUU. Page 98, Section 4.4 - farms will no longer be able to use decomposing weeds harvested from lake, what is the mitigation for this?	Other Alternatives	**16-Mar-18**	Jane Conroe
VVV. Page 99, Paragraph 1 - Harvested has, in fact, helped control invasive weeds, must remove language that says otherwise	Other Alternatives	**16-Mar-18**	Jane Conroe
WWW. Page 99, Paragraph 3 - recreational pursuits language is speculative and must be removed	DSEIS	**16-Mar-18**	Jane Conroe
XXX. Page 100, Paragraph 4 - fisher industry impacts not addressed	Fishery/Muskie	**16-Mar-18**	Jane Conroe
YYY. Page 100, Section 4.6 - fails to adequately address impacts to historic/cultural resources (reduction in tourism to CI)	Economy/Tourism	**16-Mar-18**	Jane Conroe
ZZZ. Page 101, Last Paragraph - all shoreline and lake area residents should be notified	Process	**16-Mar-18**	Jane Conroe
AAAA. Page 102, Section 4.8 - entire section of the document must be removed - "no long term environmental impacts are expected" is biased and unresearched	DSEIS	**16-Mar-18**	Jane Conroe
BBBB. Page 102, Section 4.8.1 - mitigation of impacts to water column must be included. Need to substantiate early treatment.	Herbicides	**16-Mar-18**	Jane Conroe

CCCC. Page 102, Section 4.8.2 - Potamogeton must be accounted for as native and mitigation given, it is RTE	RTE	**16-Mar-18**	Jane Conroe
DDDD. Page 102-103, Section 4.8.3 - native plant reemergence is speculative. Mitigation for fish must be included.	Fishery/Muskie	**16-Mar-18**	Jane Conroe
EEEE. Page 103, Section 4.8.4 - Mitigations for mussels (especially RTE) should be included.	RTE	**16-Mar-18**	Jane Conroe
FFFF. Page 105, Paragraph 3 - treatment early in the year is not a mitigation	Herbicides	**16-Mar-18**	Jane Conroe
GGGG. Page 106, Section 5.1.1 - herbicides are not selective, not a mitigation	Herbicides	**16-Mar-18**	Jane Conroe
HHHH. Page 106, Section 5.1.2 - most near shore water wells don't get water from aquifers, but the near lake water table. Effective mitigation for private wells must be included	Water Use/Health	**16-Mar-18**	Jane Conroe
IIII. Page 106, Section 5.2.1 - native macrophyte "rebound" is invalid conclusion, must account for mitigation for native macrophytes	Herbicides	**16-Mar-18**	Jane Conroe
JJJJ. Page 107 - Impacts to bird habitats in treatment areas and migrating waterfowl must be included	Herbicides	**16-Mar-18**	Jane Conroe
LLLL. Page 107 - must include mitigation for paper pond shell mussel	RTE	**16-Mar-18**	Jane Conroe
MMMM. Page 107, Section 5.2.2 - mitigation for RTE must included, should include known locations of eagle nests	RTE	**16-Mar-18**	Jane Conroe
NNNN. Page 108, Paragraph 3 - explanation of impact to Hill's pondweed is unacceptable, need to provide mitigation for pondweed	RTE	**16-Mar-18**	Jane Conroe
OOOO. Page 108, Section 5.2.3 - need research to support mitigation through staged treatment and/or staggered locations	Fishery/Muskie	**16-Mar-18**	Jane Conroe
PPPP. Page 108, Section 5.2.3 - suggestion that fish may move when application occurs is nonsensical	Fishery/Muskie	**16-Mar-18**	Jane Conroe
QQQQ. Page 109 - fish spawning area information contradicts information provide on page 85 and 86. Mitigation for all such areas is required	Fishery/Muskie	**16-Mar-18**	Jane Conroe

RRRR. Page 109, Section 5.2.4 - wetlands mitigations needed	Wetlands	**16-Mar-18**	Jane Conroe
SSSS. Page 110, Section 5.4 - All areas of the lake should be posted/noticed	Process	**16-Mar-18**	Jane Conroe
TTTT. Page 111 - Lake recreation, all public access points AND all private access points	Water Use/Health	**16-Mar-18**	Jane Conroe
UUUU. Page 113, Section 6 - need a section that compares all of the pros and cons of all the available plant management practices	Other Alternatives	**16-Mar-18**	Jane Conroe
VVVV. Page 113, Section 6.1 - failure to evaluate all of the other alternatives	Other Alternatives	**16-Mar-18**	Jane Conroe
WWWW. Page 114, Section 6.2.1 - "status quo" shows bias	DSEIS	**16-Mar-18**	Jane Conroe
XXXX. Page 114, Paragraph 3 - need substantiate that densities of invasive weeds have increased over last 10 years	DSEIS	**16-Mar-18**	Jane Conroe
YYYY. Appendix F - incorrect measurements for plant abundance, cannot base conclusion on it. Not substantiated by Racine-Johnson work.	DSEIS	**16-Mar-18**	Jane Conroe
ZZZZ. Page 115 - language on studies of mechanical harvesting is unsubstantiated. Language from *Diet for a Small Lake* is biased	DSEIS	**16-Mar-18**	Jane Conroe
AAAAA. Page 117, Section 6.4.1 - clarification of the recommended concentration for Renovate must occur (contradicts information on page 79)	Herbicides	**16-Mar-18**	Jane Conroe
BBBBB. Page 117, Section 6.4.2 - conclusions from Appendices E and H are invalid.	Herbicides	**16-Mar-18**	Jane Conroe
CCCCC. Page 118, Section 6.4.3 - discusses single application and split treatment scenarios, must provide clarification	Herbicides	**16-Mar-18**	Jane Conroe
DDDDD. Page 121, Section 9 - conclusion that proposed application of herbicides will be mitigated is not accurate.	DSEIS	**16-Mar-18**	Jane Conroe
Writer #30		**16-Mar-18**	**Becky Nystrom**
A. Flawed document in need of revisions	DSEIS	**16-Mar-18**	Becky Nystrom
B. Accelerate process precludes sufficient public review	Process	**16-Mar-18**	Becky Nystrom
C. SOLitude 2017 Bemus Bay reports (Appendix E and Appendix H) were flawed	DSEIS	**16-Mar-18**	Becky Nystrom

D. Clear conflict of interest for SOLitude (entire project). Disingenuous language Section 1.2, page 6 - who applied herbicides	DSEIS	**16-Mar-18**	Becky Nystrom
E. Section 1.2, anecdotal subjective observations on the effectiveness of Aquathol and Navigate by SOLitude and NYSDEC staff are not sufficient	DSEIS	**16-Mar-18**	Becky Nystrom
F. Visual observation of macrophyte density is insufficient	DSEIS	**16-Mar-18**	Becky Nystrom
G. SOLitude June and December 2017 (Appendix E) has questionable macrophyte sampling methodologies and no independent, scientific vetting	DSEIS	**16-Mar-18**	Becky Nystrom
H. Claims throughout document about macrophytes inhibiting recreation use and/or movement through the lake is impeded - are generally untrue, need to review Racine-Johnson reports for accurate information	DSEIS	**16-Mar-18**	Becky Nystrom
I. Treatment maps should include overlays with ecologically important areas, RTE locations, unique plant communities, and fish spawning/rearing areas as delineated in 2017 MMS	DSEIS	**16-Mar-18**	Becky Nystrom
J. Need to modify treatment zones based on current/flow modeling and dispersion	Dispersion	**16-Mar-18**	Becky Nystrom
K. Navigate (2,4-D) should be removed, per NYSDEC (DFWMR) it is only for emergent aquatic plants	Herbicides	**16-Mar-18**	Becky Nystrom
L. No herbicides before July 1st to protect fish spawning/rearing areas	Herbicides	**16-Mar-18**	Becky Nystrom
M. Only apply herbicides within 200 feet of shore or 6' of depth whichever comes first, further than that is a violation of 1981 EIS general conditions and increases liability	Herbicides	**16-Mar-18**	Becky Nystrom
N. 50% or more density prior to treatment allowed (using Cornell/ACOE methodology for measurement)	Herbicides	**16-Mar-18**	Becky Nystrom
O. Facilitating re-establishment of native macrophytes language should be removed. Need to understand synergistic effects.	Herbicides	**16-Mar-18**	Becky Nystrom
P. How will Aquathol K avoid killing native macrophytes?	Herbicides	**16-Mar-18**	Becky Nystrom

Q. Language saying that the goal of herbicide treatment is to enhance recreation use of the lake and improve its ecological health language must be scientifically justified	Herbicides	**16-Mar-18**	Becky Nystrom
R. Section 3.2.1 fails to describe key native algal groups, fails to distinguish between true algae and cyanobacteria	HABS	**16-Mar-18**	Becky Nystrom
S. References MSUE article: "Be Careful What You Wish for When Managing Aquatic Weeds"	HABS	**16-Mar-18**	Becky Nystrom
T. General Aquatic Ecology of Macrophytes section focuses on two invasives, but lacks detail on native species	DSEIS	**16-Mar-18**	Becky Nystrom
U. Should acknowledge that Curly Leaf Pondweed and others complete their life cycles by early July	DSEIS	**16-Mar-18**	Becky Nystrom
V. SOLitude's sampling methodologies preclude confidence in conclusions regarding percentage of each species found	DSEIS	**16-Mar-18**	Becky Nystrom
W. Pages 31-35 - SOLitude's survey methodolgy was wrong, should remove sections that rely on it	DSEIS	**16-Mar-18**	Becky Nystrom
X. DSEIS fails to address the value of aquatic herbivorous insects	DSEIS	**16-Mar-18**	Becky Nystrom
Y. Potential impacts to shoreland/littoral zone habitats for macroinvertebrates needs to be considered	RTE	**16-Mar-18**	Becky Nystrom
Z. Need to study synergistic effects of herbicides	Herbicides	**16-Mar-18**	Becky Nystrom
AA. Need to study risk of establishment of other invasive species where Eurasian watermilfoil has been chemically removed	Herbicides	**16-Mar-18**	Becky Nystrom
BB. Need to study long term ecosystem impacts (bioaccumulation, degradation times, potential for soil mobility, dispersion, etc.)	Overall Ecology	**16-Mar-18**	Becky Nystrom
CC. Need to study biological oxygen demand (BOD), impacts of dissolved oxygen levels on species	Overall Ecology	**16-Mar-18**	Becky Nystrom
DD. Need to study whether or not proposed action will impact HABS	HABS	**16-Mar-18**	Becky Nystrom
EE. It is possible that the project may positively impact economic vitality of the area, it is also possible that the opposite is true	Economy/Tourism	**16-Mar-18**	Becky Nystrom
FF. Potential negative impact to world class fishery	Fishery/Muskie	**16-Mar-18**	Becky Nystrom

GG. HABS also result in foul odor and appearance	HABS	**16-Mar-18**	Becky Nystrom
HH. Entire lake area (and downstream areas) should be notified through public information campaign about proposed project and during any potential treatments	Process	**16-Mar-18**	Becky Nystrom
II. Not enough time to review document	Process	**16-Mar-18**	Becky Nystrom
JJ. Section 5 - Mitigation Measures - is incomplete	DSEIS	**16-Mar-18**	Becky Nystrom
KK. Does not adquately identify impacts to the environment	DSEIS	**16-Mar-18**	Becky Nystrom
Writer #31		**16-Mar-18**	**Deborah Moore**
A. DSEIS lacks scientific research on impacts and alternatives	DSEIS	**16-Mar-18**	Deborah Moore
B. Lack of public involvement is disappointing	Process	**16-Mar-18**	Deborah Moore
C. Not enough time to review this document	Process	**16-Mar-18**	Deborah Moore
D. Scoping concerns not addressed	Process	**16-Mar-18**	Deborah Moore
E. Should notifiy all properties between the lake and Routes 430 and 394 and properties along the outlet	Process	**16-Mar-18**	Deborah Moore
F. SEIS should be a lake-wide assessment and address downstream impact	DSEIS	**16-Mar-18**	Deborah Moore
G. HABS need to be considered	HABS	**16-Mar-18**	Deborah Moore
H. Affects of herbicides to fish, crustaceans, benthic macroinvertebrates, and other not adequately addressed	Herbicides	**16-Mar-18**	Deborah Moore
I. Section 1.2 - typographical correction - CLA participates in CSLAP	DSEIS	**16-Mar-18**	Deborah Moore
J. Section 1.2 - typographical correction - 2016 CLSAP also covers the south basin of the lake	DSEIS	**16-Mar-18**	Deborah Moore
K. Section 4.5 - disagrees with "Densities of macrophytes on the lake are hindering..."	DSEIS	**16-Mar-18**	Deborah Moore
L. Section 4.5 - disagrees with "Harvesting has not been sufficient..."	DSEIS	**16-Mar-18**	Deborah Moore
M. Section 4.5 - disagrees with "Overall impact of the herbicide application on the socioeconomic...is projected to be positive"	DSEIS	**16-Mar-18**	Deborah Moore
N. Section 4.5 - disagrees with "forces individuals to tow their jet ski..."	DSEIS	**16-Mar-18**	Deborah Moore
O. Section 4.5 - disagrees with "herbicides will assist the socio-economics."	DSEIS	**16-Mar-18**	Deborah Moore

S. Section 4.9 - "once applied, the products will dissipate" needs research for drift	Dispersion	**16-Mar-18**	Deborah Moore
T. Section 4.9 - "no negative effects from any synergistic interactions" needs research data to support	Herbicides	**16-Mar-18**	Deborah Moore
U. Section 4.9 - "no negative effects were observed." statement appears to be based on SOLitude's flawed research (Appendix E)	DSEIS	**16-Mar-18**	Deborah Moore
V. Section 5.2.3 - "fish are free to move" mitigation during application is not acceptable as a mitigation	Fishery/Muskie	**16-Mar-18**	Deborah Moore
W. Section 5.2.3 - "the proposed treatment areas cover about 25% or less of fish spawning/rearing areas" - no herbicides in fish spawning/rearing areas	Fishery/Muskie	**16-Mar-18**	Deborah Moore
X. Section 5.4 - public notice of herbicide application - all residents surrounding the lake should be notified	Process	**16-Mar-18**	Deborah Moore
Y. Section5.4 - swimming and intake restrictions need to be clear and every lake user should be notified	Process	**16-Mar-18**	Deborah Moore
Z. Must reach all lake users via direct mail	Process	**16-Mar-18**	Deborah Moore
Writer #32		**16-Mar-18**	**Peter Beeson**
A. Need scientific evidence that action will not increase HABS	HABS	**16-Mar-18**	Peter Beeson
B. Need scientific evidence that action will not pollute drinkingwater	Water Use/Health	**16-Mar-18**	Peter Beeson
C. Need scientific evidence that action will not affect fish, bird, or invertebrate populations	RTE	**16-Mar-18**	Peter Beeson
D. Need scientific evidence that action will not disperse to areas outstide of treatment zones	Dispersion	**16-Mar-18**	Peter Beeson
E. Need scientific evidence that action will not harm overall health of lake nad will improve aesthetics	Overall Ecology	**16-Mar-18**	Peter Beeson
F. SEE COMMENT LETTER - Vague and speculative comments need to be confirmed page 62, page 73, page 84, page 98, page 101, page 102, page 103, page 108, page 119, page 121	DSEIS	**16-Mar-18**	Peter Beeson
G Authors downplay effectiveness of mechanical harvesting	Other Alternatives	**16-Mar-18**	Peter Beeson
H. Lakeshore property owners should physically remove the weeds until more research is completed	Other Alternatives	**16-Mar-18**	Peter Beeson

I. Need to study/research: nutrient sources, dispersion, water budget/surface and groundwater, accounting for water users/usage, wildlife surveys, HABS, and enforcement of nutrient reductions.	DSEIS	**16-Mar-18**	Peter Beeson
J. Lakes in NH and OH have been negatively impacted by herbicides	Herbicides	**16-Mar-18**	Peter Beeson
K. Should not pass the problem downstreatm to Gulf of Mexico	Herbicides	**16-Mar-18**	Peter Beeson
L. SEE COMMENT LETTER (FULL TEXT OF DSEIS WITH COMMENTS)	DSEIS	**16-Mar-18**	Peter Beeson
Writer #33		**16-Mar-18**	**Francis Trenkamp**
A. Page 102 - Unavoidable Adverse Environmental Impacts - lake is amorphic, negative change in habitat to RTE, native plants and fish could lead to unforeseen problems	Overall Ecology	**16-Mar-18**	Francis Trenkamp
B. Notice during treatment should be ALL property owners, well in advance	Water Use/Health	**16-Mar-18**	Francis Trenkamp
Writer #34		**16-Mar-18**	**Jan Bowman**
A. Would have like more time to provide comments, "disturbed by rushed approach"	Process	**16-Mar-18**	Jan Bowman
B. Suggests that the Town of Ellery not accept the document	Process	**16-Mar-18**	Jan Bowman
C. Opinion editorials should be removed	DSEIS	**16-Mar-18**	Jan Bowman
D. SEIS challenges "what scientists have carefully determined" in MMS	DSEIS	**16-Mar-18**	Jan Bowman
E. Reference to MMS on page 8 is unclear (herbicide weed management tool)	DSEIS	**16-Mar-18**	Jan Bowman
F. Negative synergistic effects of the herbicides not studies or explained	Herbicides	**16-Mar-18**	Jan Bowman
G. Lack of documented impacts to fish	Fishery/Muskie	**16-Mar-18**	Jan Bowman
H. Drift not measured	Dispersion	**16-Mar-18**	Jan Bowman
I. Wetlands impacts not measured	Overall Ecology	**16-Mar-18**	Jan Bowman
J. Drinking water impacts not measured	Water Use/Health	**16-Mar-18**	Jan Bowman
K. Fish reproduction not measured	Fishery/Muskie	**16-Mar-18**	Jan Bowman
L. Macroinvertebrate density and population density not addressed	Overall Ecology	**16-Mar-18**	Jan Bowman

M. Page 2 statement on "built into" mitigations for impacts not adequately explained	DSEIS	**16-Mar-18**	Jan Bowman
N. Page 2, Section 1.2 - should not treat lake as two distinct bodies of water	Dispersion	**16-Mar-18**	Jan Bowman
O. Statements regarding decline in lake health need to be backed up with data	DSEIS	**16-Mar-18**	Jan Bowman
P. Basing herbicide treatment on results form a study involving one bay not sound	DSEIS	**16-Mar-18**	Jan Bowman
Q. Page 9, should not reference editorials from newspapers in document such as a SEIS	DSEIS	**16-Mar-18**	Jan Bowman
R. Poor scientific design and misrepresentation of data from Bemus Bay study	DSEIS	**16-Mar-18**	Jan Bowman
S. Fish spawning/rearing areas should not have herbicide treatments	Fishery/Muskie	**16-Mar-18**	Jan Bowman
T. Macroinvertebrate data DOES exist and baselines should be established prior to treatment	Overall Ecology	**16-Mar-18**	Jan Bowman
U. Page 7, paragraph 4 - "not actively addressed" statement on internal loading is not true	Overall Ecology	**16-Mar-18**	Jan Bowman
V. Herbicides could result in more internal loading and more HABS	HABS	**16-Mar-18**	Jan Bowman
W. Page 8, last paragraph - statement on increase of invasives since herbicide treatments stopped 25- years ago is not true	Herbicides	**16-Mar-18**	Jan Bowman
X. No herbicide treatment prior to July 1st	Herbicides	**16-Mar-18**	Jan Bowman
Y. Author recommends methodology for conducting herbicide treatments if warranted	Herbicides	**16-Mar-18**	Jan Bowman
Z. SOLitude report should serve as a basis of information	DSEIS	**16-Mar-18**	Jan Bowman
AA. Scientific names should be italicized, proper scientific format should be used	DSEIS	**16-Mar-18**	Jan Bowman
BB. Cyanobacteria/HABS are dynamic, Worst year was 2017, same year in which Bemus Bay was treated with herbicides	HABS	**16-Mar-18**	Jan Bowman
CC. Native plants will not be encouraged to repopulate once invasives are removed	Overall Ecology	**16-Mar-18**	Jan Bowman
DD. Identify the authors of the document	DSEIS	**16-Mar-18**	Jan Bowman
EE. Paddlefish are in the lake (page 38)	DSEIS	**16-Mar-18**	Jan Bowman

Writer #35		**16-Mar-18**	**Thomas Arnn**
A. Concerned about drinking water and lake recreation	Water Use/Health	**16-Mar-18**	Thomas Arnn
B. Author recommended Suffolk County (Long Island) as an example, where County purchases farmland to stop developments	Other Alternatives	**16-Mar-18**	Thomas Arnn
C. Don't spend money on herbicides, provide financial incentives to homeowners and municipalities to invest in infrastructure to stop nutrient loading	Other Alternatives	**16-Mar-18**	Thomas Arnn
D. Must control source of nutrients that fuel weeds and algae	Other Alternatives	**16-Mar-18**	Thomas Arnn
Writer #36		**16-Mar-18**	**John F. Dilley**
A. Throughout document lack of technical understanding of limnology (currents, waves, temperature profiles, resulting vertical stability)	DSEIS	**16-Mar-18**	John F. Dilley
B. What is the impact of these chemcials to living organisms like fish, dogs, children, and adults who are exposed in the water or drink the water	Water Use/Health	**16-Mar-18**	John F. Dilley
C. Ellery should not be lead agency	Process	**16-Mar-18**	John F. Dilley
D. Drinking water impacts, concerned about dispersion to Chautauqua Institution	Water Use/Health	**16-Mar-18**	John F. Dilley
E. Need dispersion analysis	Dispersion	**16-Mar-18**	John F. Dilley
F. Analysis of dispersion characteristics of the lake should be required	Dispersion	**16-Mar-18**	John F. Dilley
G. No herbicide treatments until transport and dispersion data is analyzed and presented	Dispersion	**16-Mar-18**	John F. Dilley
H. Section 1.2 - document does little to minimize or treat adverse impacts	Dispersion	**16-Mar-18**	John F. Dilley
I. Section 1.3 - high concentrations, from multiple sources represents a large increase compared with Bemus Bay last summer - synergistic impact needs to be analyzed	Herbicides	**16-Mar-18**	John F. Dilley
J. Section 3.1.1 Private well near lake/groundwater concerns. Wells should be tested	Water Use/Health	**16-Mar-18**	John F. Dilley
K. Section 1.3 Treatment areas are clsoer to Chautauqua Institution than before, south wind will generate northerly current towards the Chautauqua Institution intake	Water Use/Health	**16-Mar-18**	John F. Dilley

L. Section 3.1.2 Wind driven currents must be accounted for	Dispersion	**16-Mar-18**	John F. Dilley
M. Section 3.1.3 Should address why adding toxic chemicals to drinking water will be safe	Water Use/Health	**16-Mar-18**	John F. Dilley
N. Section 4.2 Wind driven currents need to be accounted for throughout document	Dispersion	**16-Mar-18**	John F. Dilley
O. Section 4.7.1 Need a dispersion study to ensure safety of water supply	Dispersion	**16-Mar-18**	John F. Dilley
P. Chatuaqua Utility District intake information needs a dispersiion modeling to demonstrate that water will not be contaminated	Dispersion	**16-Mar-18**	John F. Dilley
Q. Section 4.8.3 Navigate is toxic to fish. Submitted photographs of dead fish in Bemus Bay last year.	Fishery/Muskie	**16-Mar-18**	John F. Dilley
R. Section 5.5.1 Information about other two water systems on the lake is based on false premises (north south current and full lake dilution - need dispersion model)	Dispersion	**16-Mar-18**	John F. Dilley
Writer #37		**16-Mar-18**	**Mary D. Laumer**
A. CWC owneed waterfront nature preserves will be negatively impacted by proposed action	Overall Ecology	**16-Mar-18**	Mary D. Laumer
B. Ellery should not be lead agency	Process	**16-Mar-18**	Mary D. Laumer
C. All actions should be consistent with MMS. MMS restricts application of herbicides to after June 20th to protect fish spawning/rearing areas	Process	**16-Mar-18**	Mary D. Laumer
D. Herbicide treatments should be 200' from shore or 6' of water whichever comes first	Herbicides	**16-Mar-18**	Mary D. Laumer
E. Need to fully explore no action alternative	DSEIS	**16-Mar-18**	Mary D. Laumer
F. Multi chemical approach will kill beneficial pondweeds, negatively impact fish habitat and spawning areas	Herbicides	**16-Mar-18**	Mary D. Laumer
G. Negatively impact fish habitat and spawning areas	Herbicides	**16-Mar-18**	Mary D. Laumer
H. Will kill valuable near shore vegetation	Herbicides	**16-Mar-18**	Mary D. Laumer

APPENDIX F: MAPPING

F1. 2018 Chautauqua Lake Treatment Plan

F2. 2018 Chautauqua Lake Treatment Areas

F3. NYSDEC Muskellunge Trap Net and Treatment Areas Comparison

F4. MMS: Spawning and Rearing Areas, Treatment Areas Comparison

F5. MMS: Developed Areas, Treatment Areas Comparison

F1. 2018 Chautauqua Lake Treatment Plan

2018 CHAUTAUQUA LAKE HERBICIDE TREATMENT PLAN

SOLITUDE LAKE MANAGEMENT

Chautauqua Lake
[Chautauqua County]
42.194°, -79.426°

0 0.4 0.8 1.6 Miles

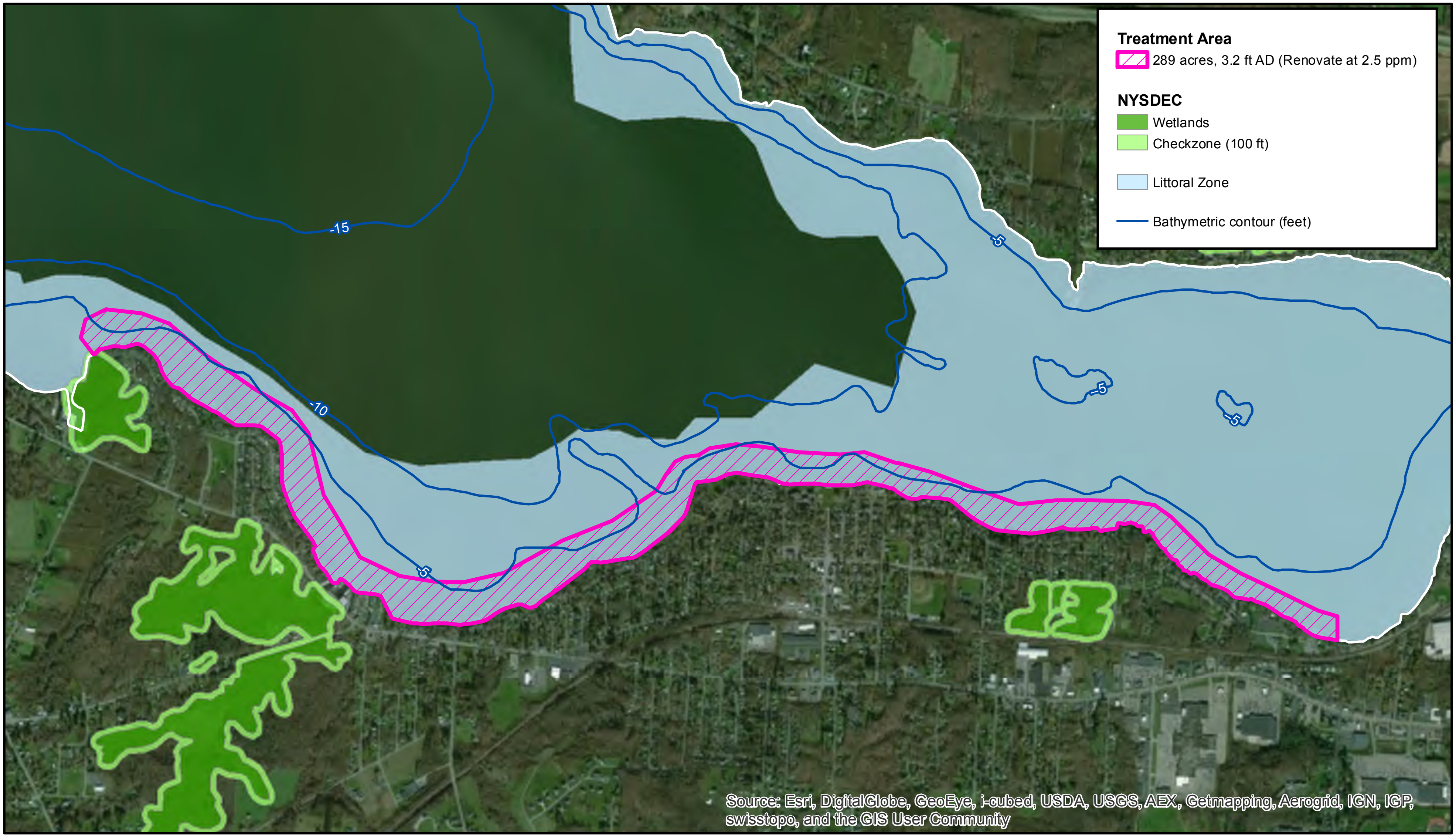
CHAUTAUQUA LAKE

Map Date: 3/27/2018
File: Chaut_Poster_TA
Prepared by: KM
Office: Washington, NJ

F2. 2018 Chautauqua Lake Treatment Areas

FIGURE 1: 2018 BUSTI/LAKEWOOD TREATMENT PLAN

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Busti/Lakewood
Chautauqua Lake
[Chautauqua County]
42.104°, -79.338°

CHAUTAUQUA LAKE

1:27,705

0 1,000 2,000 4,000 Feet

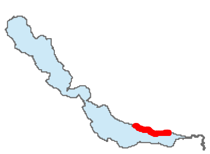
N

Map Date: 2/5/2018
File: Chaut_BustiLakewood_TA_2018_Fig1
Prepared by: KM
Office: Washington, NJ

FIGURE 2: 2018 STOCKHOLM/GREENHURST TREATMENT PLAN

SŌLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Stockholm/Greenhurst
Chautauqua Lake
[Chautauqua County]
42.119°, -79.317°



CHAUTAUQUA LAKE

1:21,209

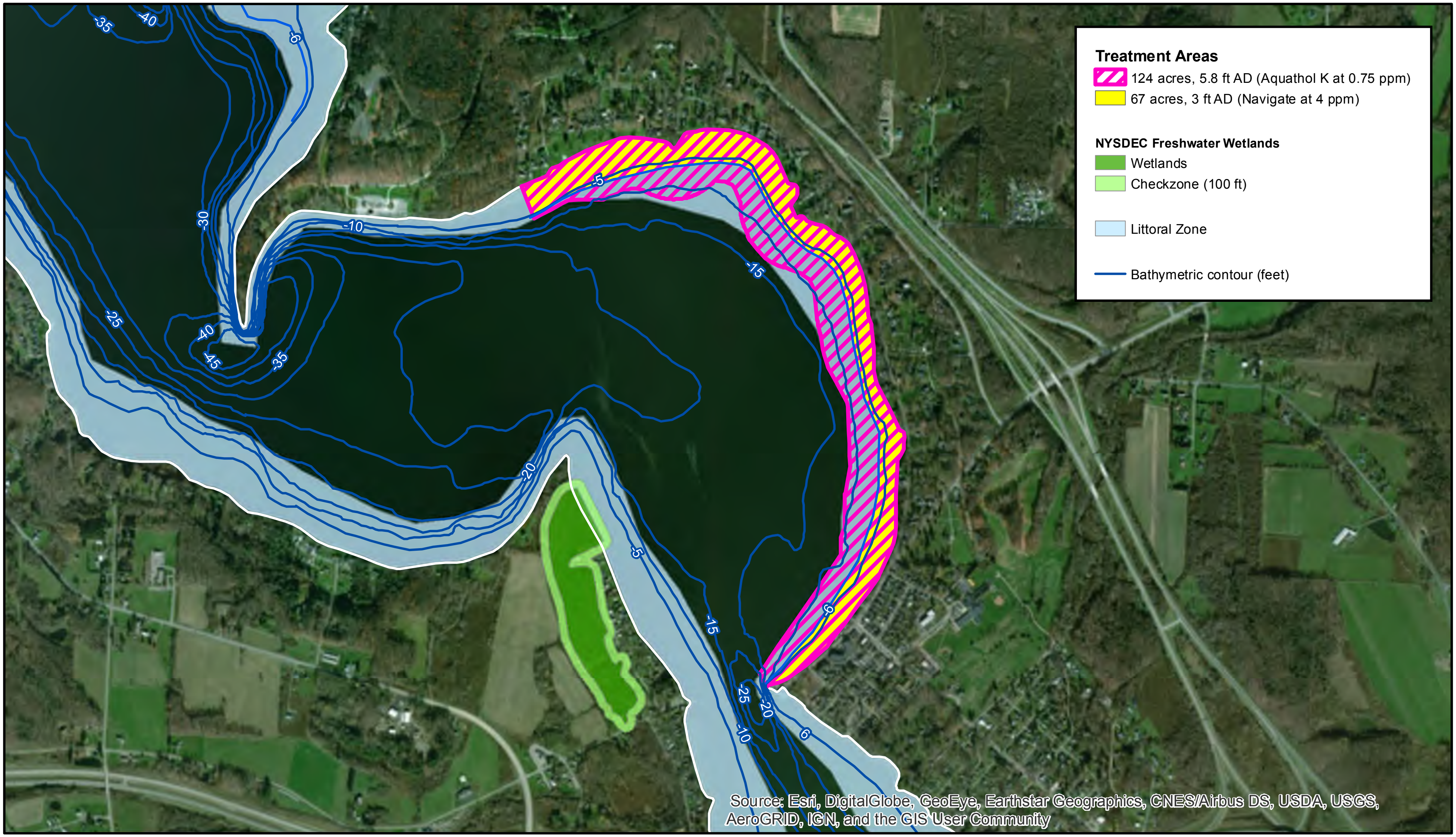
0 750 1,500 3,000 Feet

N

Map Date: 2/5/2018
File: Chaut_StockGreen_TA_2018_Fig2
Prepared by: KM
Office: Washington, NJ

FIGURE 3: 2018 BEMUS BAY TREATMENT PLAN

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Bemus Bay
Chautauqua Lake
[Chautauqua County]
42.175°, -79.403°

CHAUTAUQUA LAKE

1:20,000

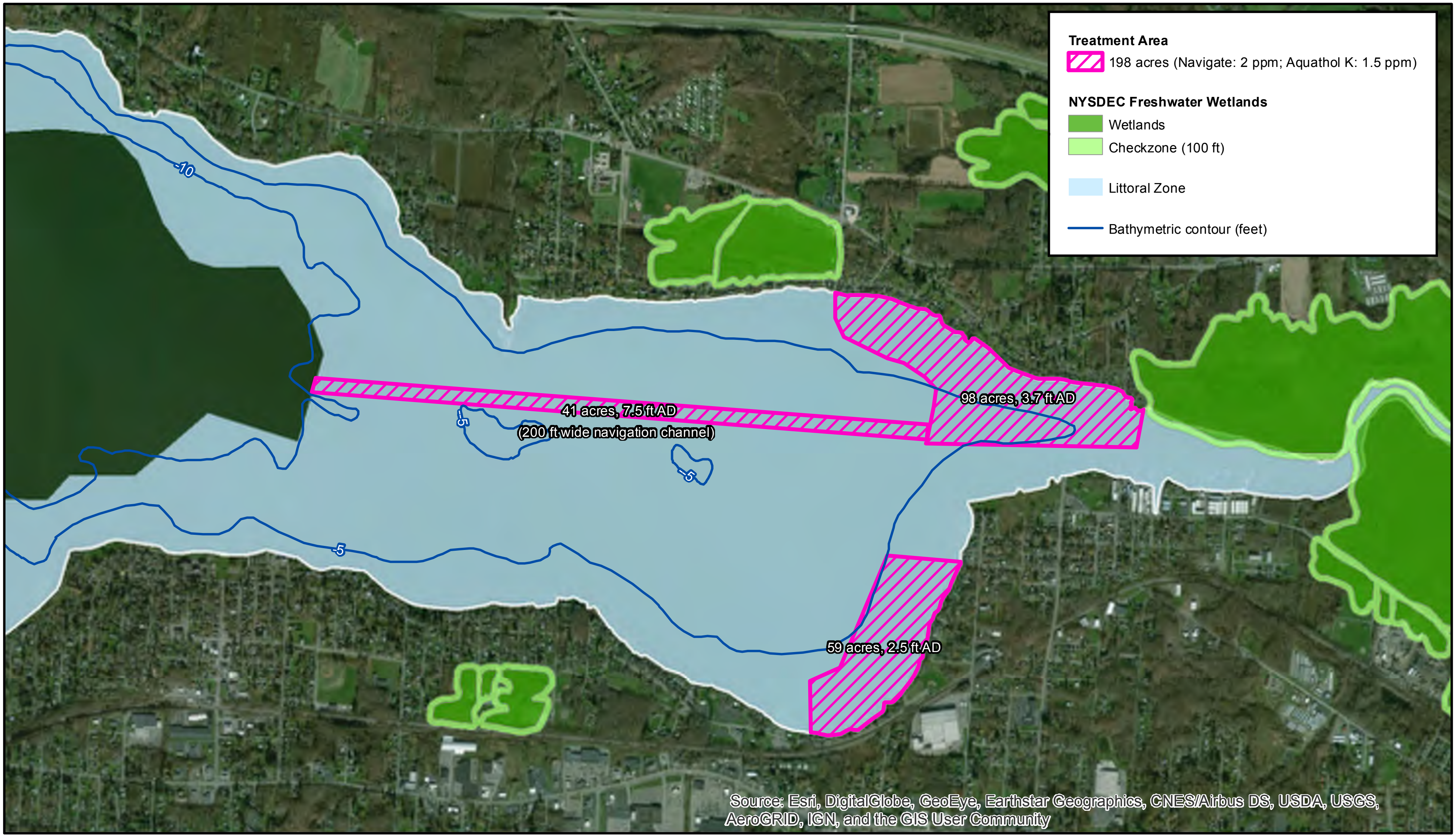
0 700 1,400 2,800 Feet

N

Map Date: 2/13/2018
File: Chaut_BemusBay_TA_2018_Fig3
Prepared by: KM
Office: Washington, NJ

FIGURE 4A: 2018 BURTIS BAY - TOWN OF ELLICOTT TREATMENT PLAN

SŌLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Burtis Bay- Town of Ellicott
Chautauqua Lake
[Chautauqua County]
42.108°, -79.289°

CHAUTAUQUA LAKE

1:24,000

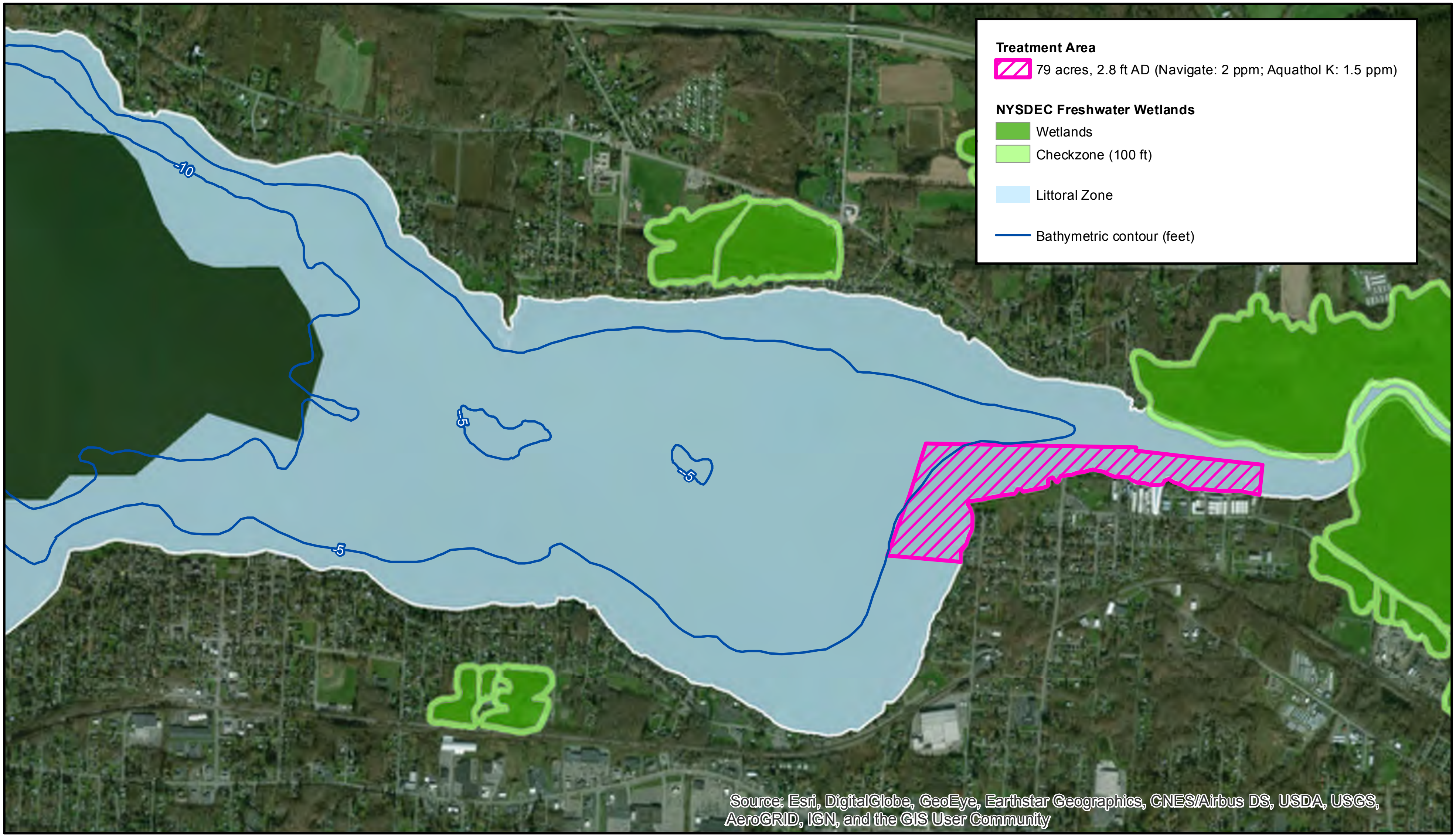
0 875 1,750 3,500 Feet

N

Map Date: 2/27/2018
File: Chaut_BurtisBay_TA_2018_Fig4A_Ellicott
Prepared by: KM
Office: Washington, NJ

FIGURE 4B: 2018 BURTIS BAY - VILLAGE OF CELORON TREATMENT PLAN

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Burtis Bay- Village of Celoron
Chautauqua Lake
[Chautauqua County]
42.108°, -79.289°

CHAUTAUQUA LAKE

1:24,000

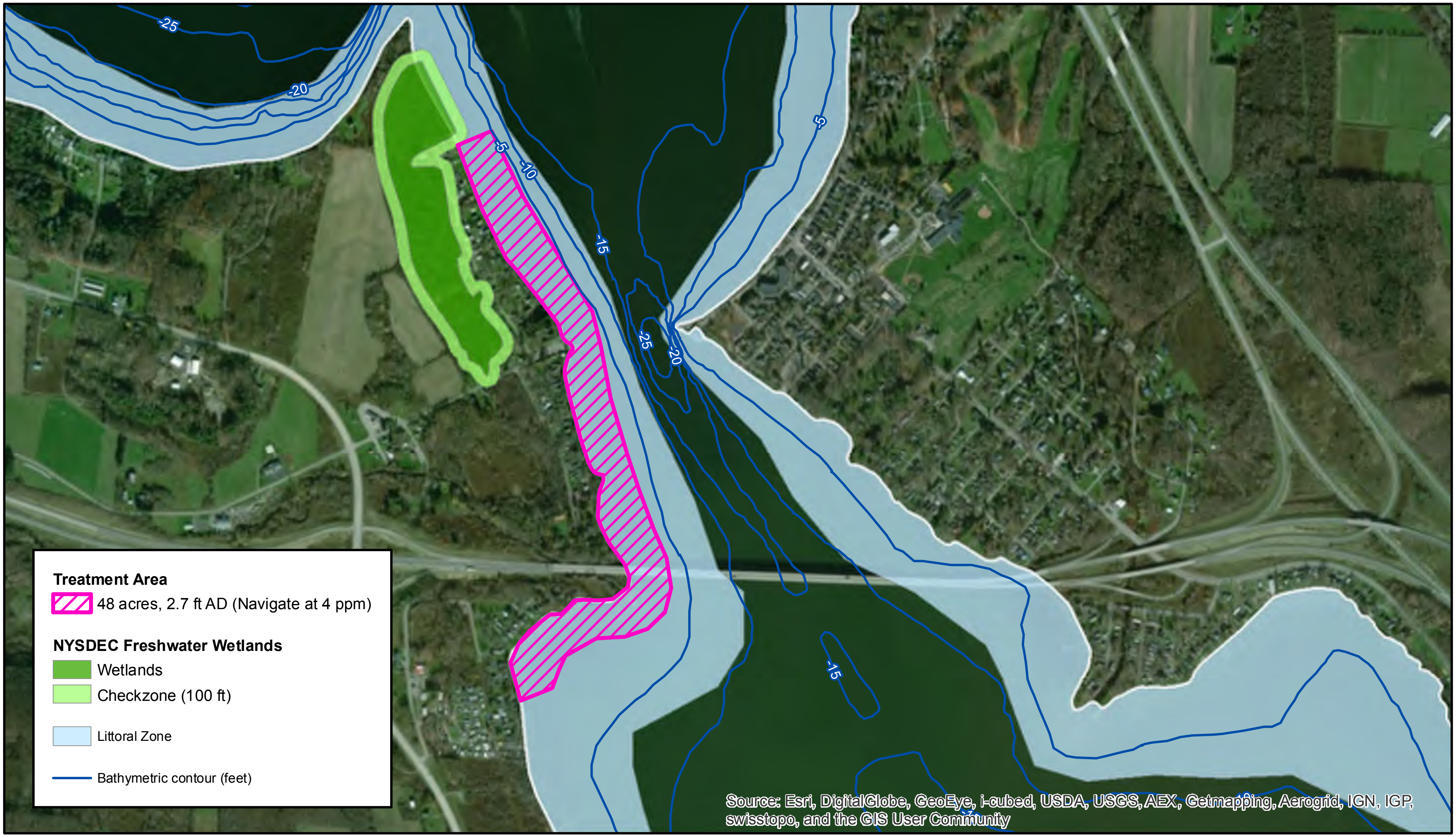
0 875 1,750 3,500 Feet

N

Map Date: 2/27/2018
File: Chaut_BurtisBay_TA_2018_Fig4B_Celoron
Prepared by: KM
Office: Washington, NJ

FIGURE 5: 2018 STOW TREATMENT PLAN

SŌLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Stow
Chautauqua Lake
[Chautauqua County]
42.158°, -79.401°

CHAUTAUQUA LAKE

1:15,000

0 550 1,100 2,200 Feet

N

Map Date: 2/5/2018
File: Chaut_Stow_TA_2018_Fig5
Prepared by: KM
Office: Washington, NJ

FIGURE 6: 2018 WARNER BAY TREATMENT PLAN

SOLITUDE LAKE MANAGEMENT
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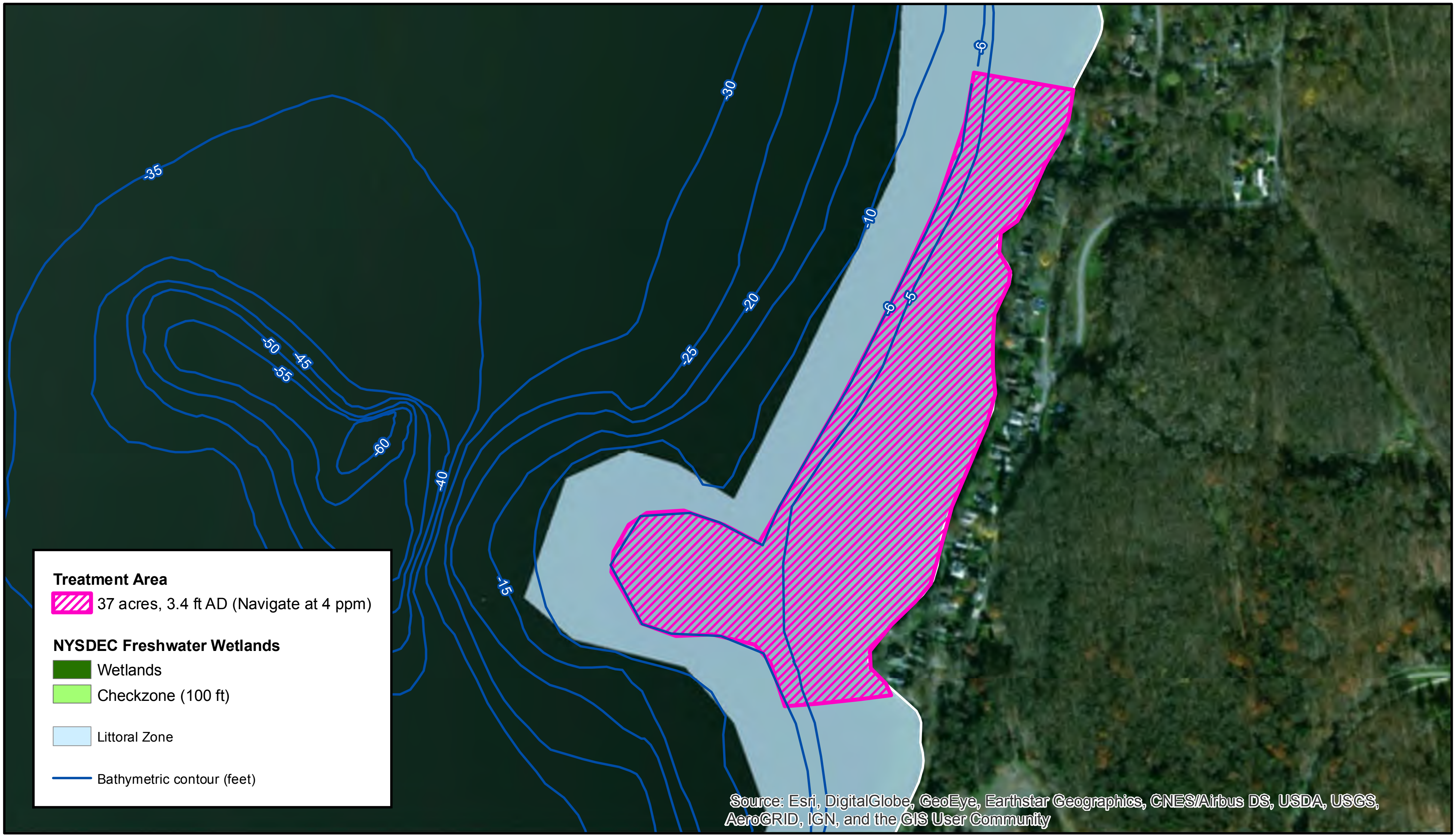
solitudelakemanagement.com



Warner Bay
Chautauqua Lake
[Chautauqua County]
42.181°, -79.417°

CHAUTAUQUA LAKE

1:7,000

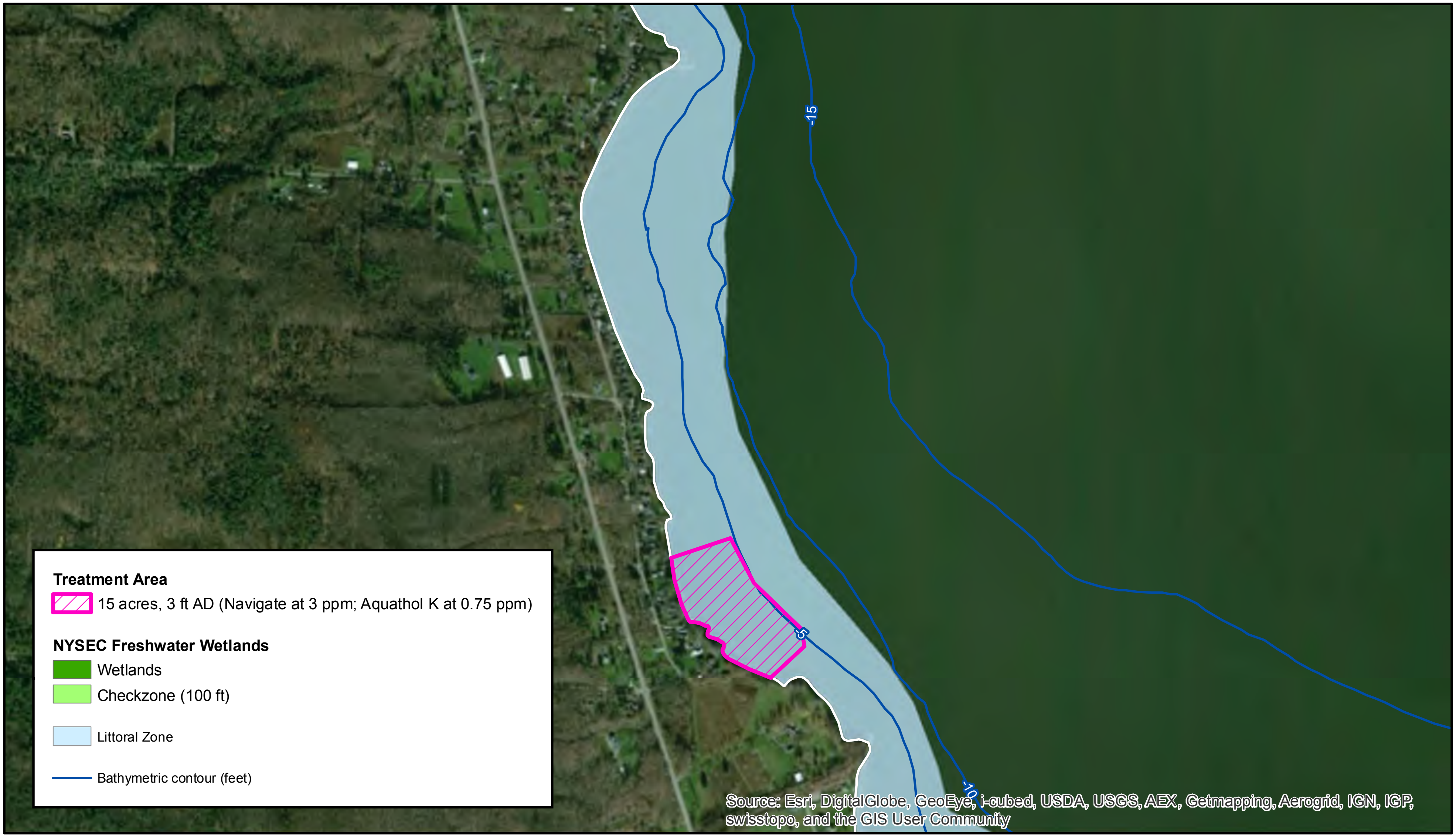
0 260 520 1,040 Feet

N

Map Date: 2/13/2018
File: Chaut_WarnerBay_TA_2018_Fig6
Prepared by: KM
Office: Washington, NJ

FIGURE 7: 2018 BLY BAY TREATMENT PLAN

SOLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Bly Bay
Chautauqua Lake
[Chautauqua County]
42.123°, -79.389°

CHAUTAUQUA LAKE

1:13,698

0 500 1,000 2,000 Feet

N

Map Date: 2/5/2018
File: Chaut_BlyBay_TA_2018_Fig7
Prepared by: KM
Office: Washington, NJ

FIGURE 8: 2018 BEMUS POINT TREATMENT PLAN

SOLITUDE LAKE MANAGEMENT
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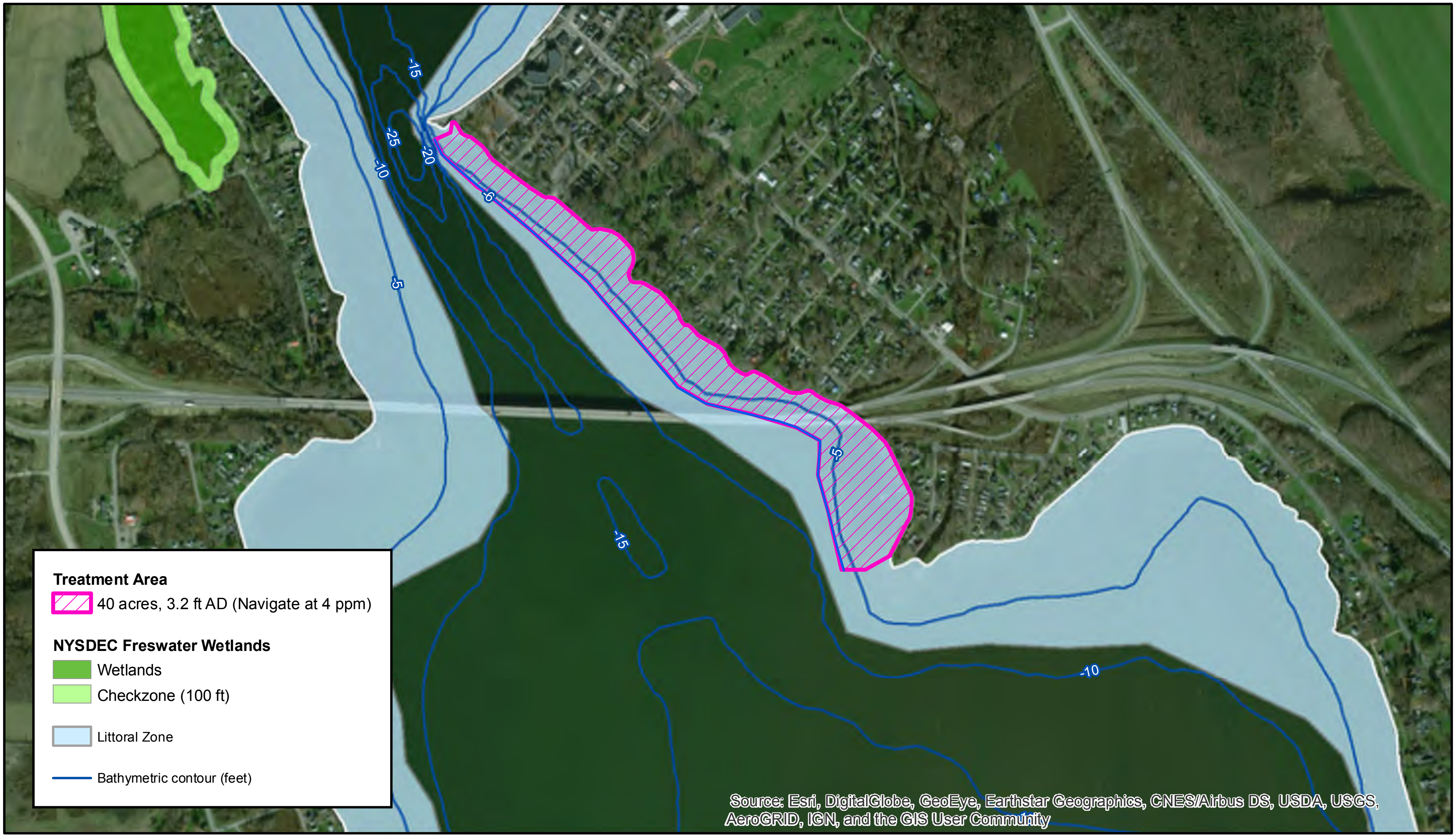
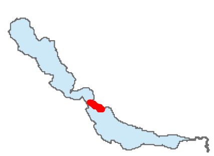


Bemus Point
Chautauqua Lake
[Chautauqua County]
42.154°, -79.389°



CHAUTAUQUA LAKE

1:12,867

0 475 950 1,900 Feet

N

Map Date: 2/13/2018
File: Chaut_BemusPt_TA_2018_Fig8
Prepared by: KM
Office: Washington, NJ

FIGURE 9: 2018 SUNRISE COVE TREATMENT PLAN

SOLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Sunrise Cove
Chautauqua Lake
[Chautauqua County]
42.113°, -79.376°

CHAUTAUQUA LAKE

1:10,000

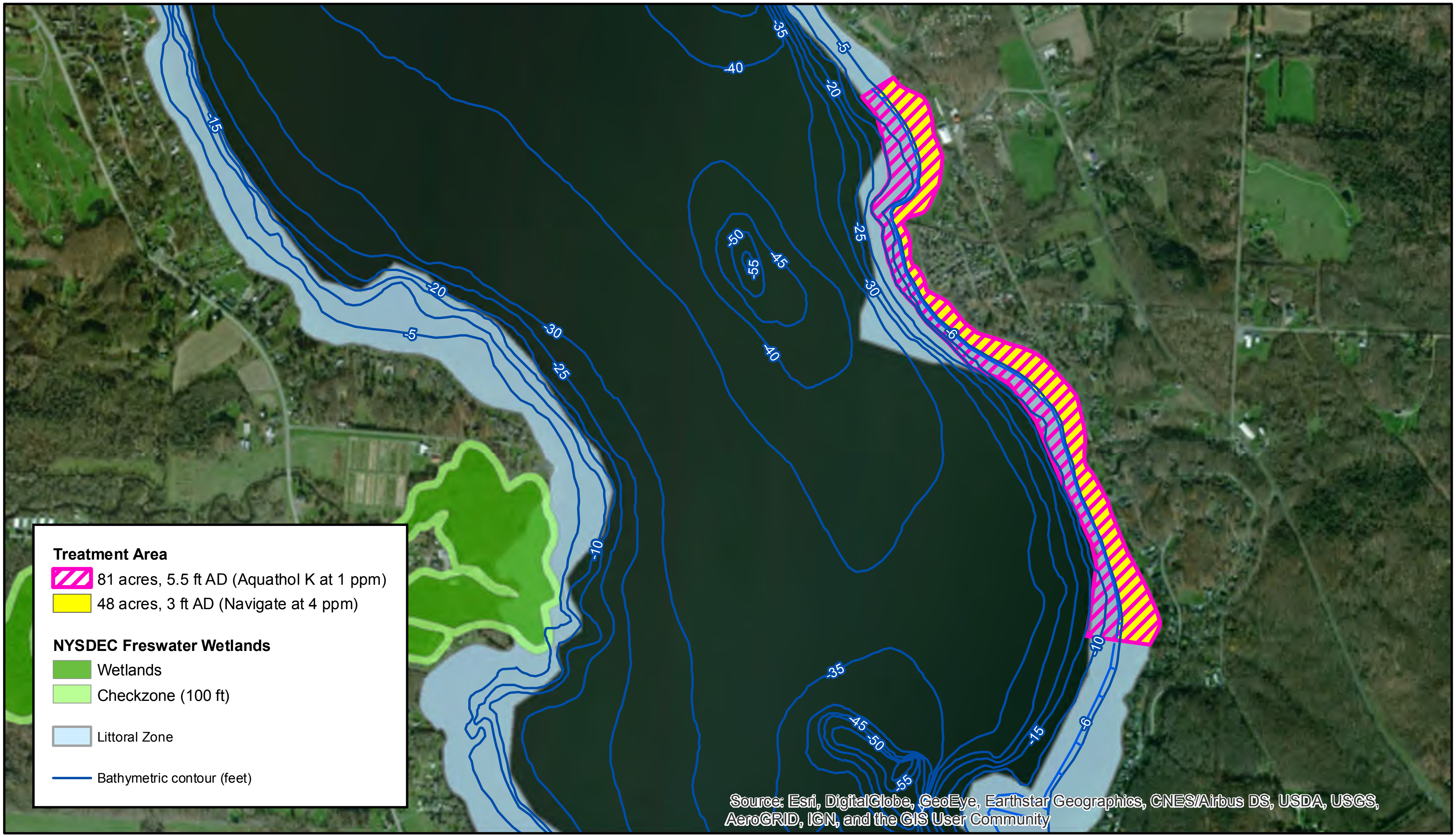
0 370 740 1,480 Feet

N

Map Date: 2/5/2018
File: Chaut_SunriseCove_TA_2018_Fig9
Prepared by: KM
Office: Washington, NJ

FIGURE 10: 2018 SUNSET BAY TREATMENT PLAN

SŌLITUDE
LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Sunset Bay
Chautauqua Lake
[Chautauqua County]
42.194°, -79.426°

CHAUTAUQUA LAKE

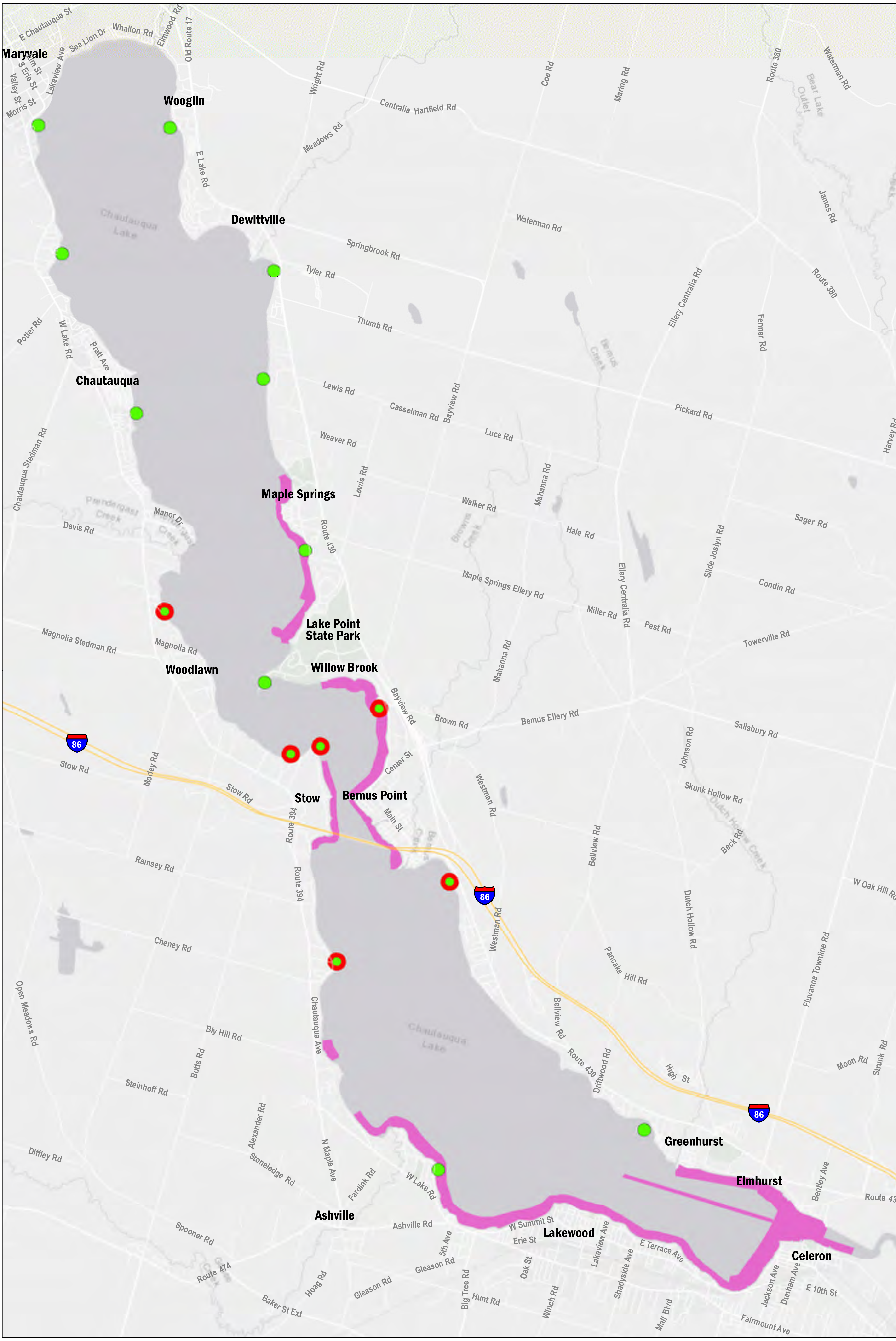
1:20,000

0 700 1,400 2,800 Feet

N

Map Date: 2/13/2018
File: Chaut_SunsetBay_TA_2018_Fig10
Prepared by: KM
Office: Washington, NJ

F3. NYSDEC Muskellunge Trap Net and Treatment Areas Comparison



NYSDEC Trap Net and Treatment Area Comparison

CLP Herbicide Treatment SEIS
Chautauqua County, New York

LEGEND

Chautauqua Treatment Areas (from Solitude Lake Management)

Muskellunge Trap Net & Egg Collection Sites (from NYSDEC)

Site currently being used

Alternate and/or historic netting site

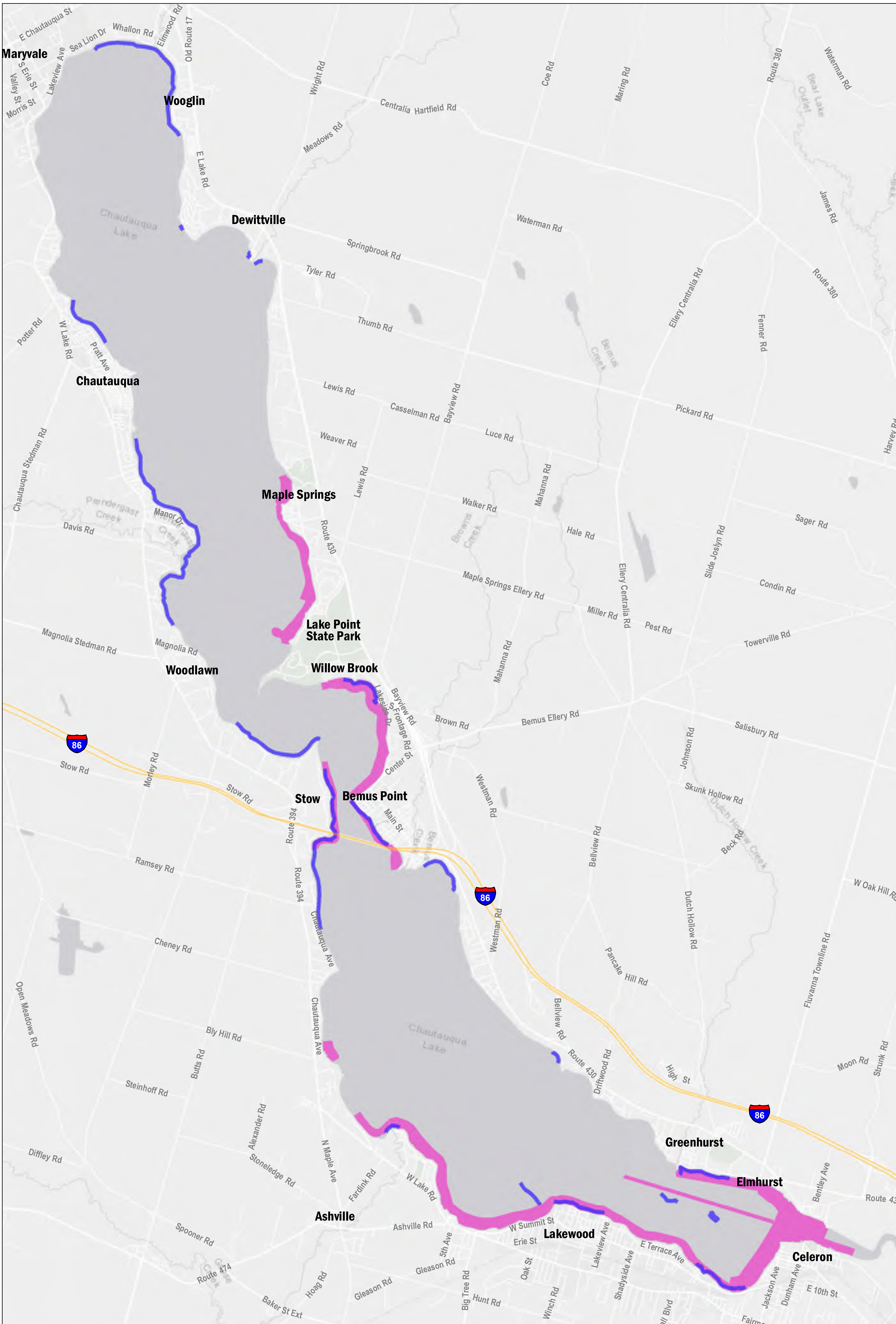
0 0.25 0.5 1 Miles

N

wendel

WD Project # 484104
Map Created: March, 2018

F4. MMS: Spawning and Rearing Areas, Treatment Areas Comparison



Fisheries: Spawning & Rearing, Treatment Area Comparison

CLP Herbicide Treatment SEIS
Chautauqua County, New York

LEGEND

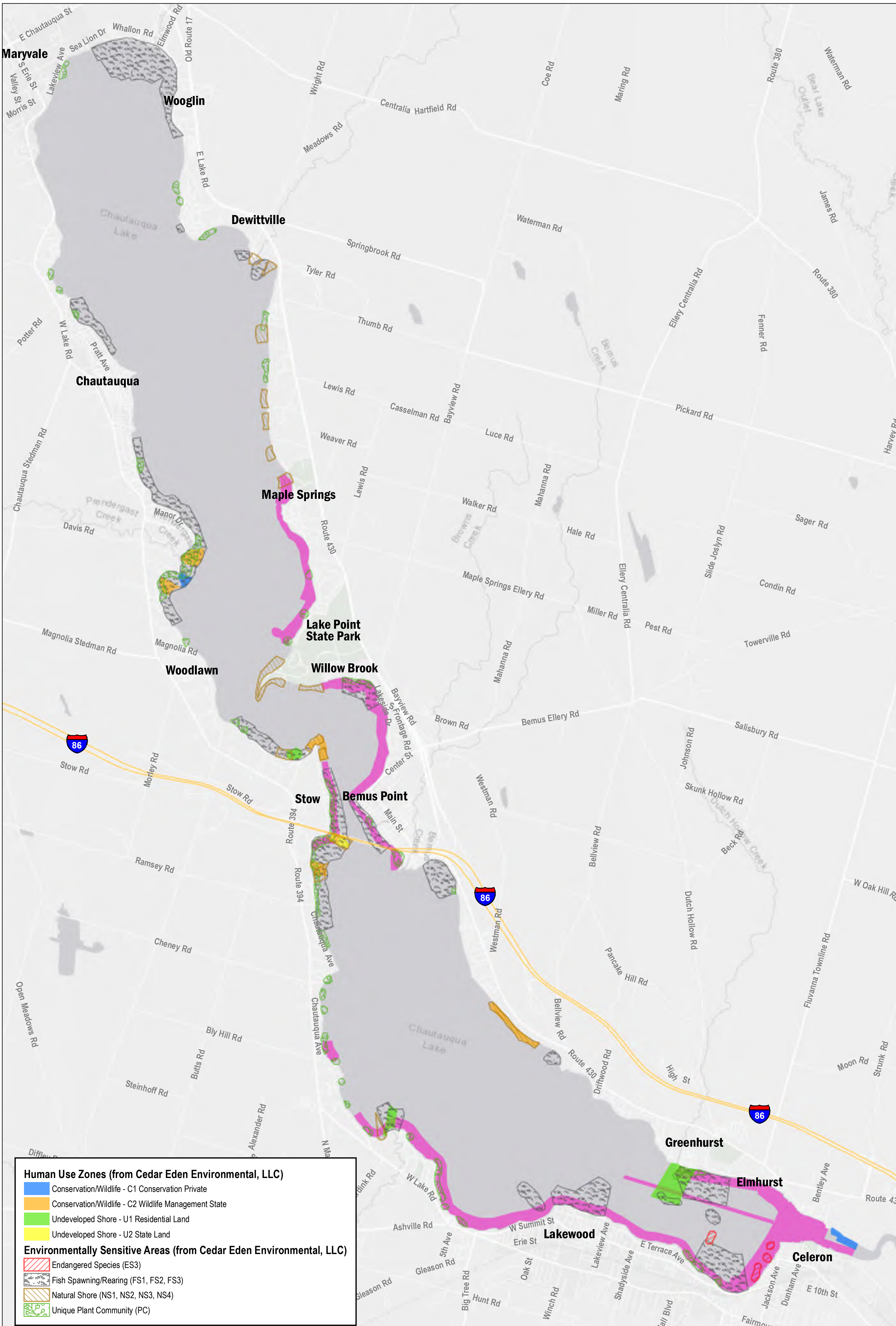
- Fisheries: Spawning & Rearing (from Cedar Eden Environmental, LLC)
- Chautauqua Treatment Areas (from Solitude Lake Management)

0 0.25 0.5 1 Miles

N

wendel
WD Project # 484104
Map Created: March, 2018

F5. MMS: Developed Areas, Treatment Areas Comparison



MMS; Developed Areas and Treatment Areas Comparison

CLP Herbicide Treatment SEIS
Chautauqua County, New York

LEGEND

Chautauqua Treatment Areas (from Solitude Lake Management)

0 0.25 0.5 1 Miles

wendel
WD Project # 484104
Map Created: March, 2018