AQUATIC NUISANCE CONTROL PERMIT APPLICATION - HERBICIDE

Lake Fairlee

Fairlee, West Fairlee, Thetford, Vermont

March 2021

APPLICANT:
Lake Fairlee Association
c/o Ben McLaughlin
Fairlee, VT 05045

APPLICATOR:
SŌLitude Lake Management
590 Lake Street
Shrewsbury, MA 01545

SŌLITUDE
LAKE MANAGEMENT

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Application for use of **Pesticides**
under an **Aquatic Nuisance Control Permit**
Per 10 V.S.A. Chapter 50, § 1455

For Aquatic Nuisance Control Permit Program Use Only
Application Number: 3382-ANC-C

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Submission of this application constitutes notice that the entities listed below intend to use pesticides in waters of the State to control aquatic nuisance plants, insects, or other aquatic life; and that the entities below have demonstrated that (1) there is no reasonable nonchemical alternative available; (2) there is acceptable risk to the nontarget environment; (3) there is negligible risk to public health; (4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and (5) there is a public benefit to be achieved from the application of a pesticide or, in the case of a pond located entirely on a landowner's property, no undue adverse effect upon the public good. Submit a permit review fee of $75 for a private pond or $500 for all other waterbodies, made payable to the State of Vermont. All information required on this form must be provided, and the requisite fees must be submitted to be deemed complete.

A. Applicant Information

1. Entity's Name: Lake Fairlee Association c/o Ben McLaughlin

2a. Mailing Address: PO Box 102

2b. Municipality: Fairlee	2c. State: VT	2d. Zip: 05045

3. Phone: 781-941-0030	4. Email: ben@fesone.com

B. Pesticide Applicator Information (Check box if same as above in Section A: ☐)

1. Entity's Name: SOLitude Lake Management

2a. Mailing Address: 590 Lake Street

2b. Municipality: Shrewsbury	2c. State: MA	2d. Zip: 01545

3. Phone: 508-865-1000	4. Email: ksliwoski@solitudelake.com; MBellaud@solitudelake.com

C. Application Preparer Information (Check box if same as above: Section A ☐ and/or B ■)

1. Preparer's Name:

2a. Mailing Address:

2b. Municipality:	2c. State:	2d. Zip:

3. Phone:	4. Email:

D. Waterbody Information

1. Name of waterbody: Fairlee Lake - Thetford 2. Thetford - Orange

3. Are there wetlands associated with the waterbody? ■ Yes ☐ No
Contact the Vermont Wetland Program: (802) 828-1535 for additional information.

4. Are there rare, threatened or endangered species associated with the waterbody? ■ Yes ☐ No
Contact the Vermont Fish & Wildlife Natural Heritage Inventory: (802) 241-3700 for additional information.

5a. Is this waterbody a private pond (per 10 V.S.A. 5210)? ☐ Yes ■ No If No, skip to Question D6.

5b. Is this private pond totally contained on landowner's property? ☐ Yes ☐ No

5c. Does the private pond have an outlet? ☐ Yes ☐ No
If yes, what is the name of the receiving water from this outlet?

5d. Is the flow from this outlet controlled? ☐ Yes ☐ No
If yes, how and for how long?

6. List the uses of the waterbody – check all that apply:
☐ Water supply ■ Irrigation ■ Boating ■ Swimming ■ Fishing ☐ Other:

E. Treatment Information

1a. Proposed start date: June 2021

1b. Proposed end date (if known): June 2026

2. Aquatic nuisance(s) to be controlled:
Plant/Algae/Animal: Eurasian watermilfoil (Myriophyllum spicatum)
Submit additional information as needed.

3. Pesticide(s) to be used[1]:
Trade Name: ProcellaCOR EC (florpyrauxifen-benzyl)
EPA Registration #: 67690-80
Submit a copy of the Product Label & Material Safety Data Sheet.

4. Provide a map of control activity area.
Provide location of (each) treatment area in waterbody.

5. Application rate (ppm): up to 4 PDU/ac-ft; up to 7
Explain the above application rate & provide calculations.

6. Attach a narrative description of the proposed project to include the following items:
a) Reason(s) to control the aquatic nuisance;
b) Brief history of the aquatic nuisance in the waterbody;
c) Reason why no reasonable nonchemical alternatives are available; and,
d) Description of the proposed control activity.

7. If you answered "no" to D5b above, then a Long-range Management Plan[2] (LMP) is required:
a) Describe how control of the nuisance species will be conducted for the duration of the permit (must be at least a 5 year time span and incorporate a schedule of pesticide minimization); and,
b) Explain how the LMP will be financed; include a budget and funding sources for each year.

F. Adjoining Property Owner Certification

(For additional information, please see the APO Notification Guidance)

KS *I certify, by initialing to the left, that I have notified adjoining property owners of the proposed project using the DEC Adjoiner Form template letter that was sent by U.S. Mail.*

G. Applicant/Applicator Certification

As APPLICANT, I hereby certify that the statements presented on this application are true and accurate; guarantee to hold the State of Vermont harmless from all suits, claims, or causes of action that arise from the permitted activity; and recognize that by signing this application, I agree to complete all aspects of the project as authorized. I understand that failure to comply with the foregoing may result in violation of the 10 VSA Chapter 50, § 1455, and the Vermont Agency of Natural Resources may bring an enforcement action for violations of the Act pursuant to 10 V.S.A. chapter 201.

Applicant/Applicator Signature: _____ Date: 3/16/21

H. Application Preparer Certification (if applicable)

As APPLICATION PREPARER, I hereby certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Application Preparer Signature: _____ Digitally signed by Kara Sliwoski DN: cn=Kara Sliwoski, o=SOLitude Lake Management, ou, email=ksliwoski@solitudelake.com, c=US Date: 2021.03.18 11:05:20 -04'00' Date: _____

I. Application Fees

Refund Policy:
Permit Review Fees are non-refundable unless an application is withdrawn prior to administrative review.

Print Form

Submit this form and the $75 or $500 fee to:

Vermont Department of Environmental Conservation
Watershed Management Division
Aquatic Nuisance Control Permit Program
1 National Life Drive, Davis 3
Montpelier, VT 05620-3522

Municipalities are exempt and do not need to submit fee.

Direct all correspondence or questions to the Aquatic Nuisance Control Permit Program at: ANR.WSMDShoreland@vermont.gov
For additional information visit: https://dec.vermont.gov/

1 The application fee for the aquatic pesticide Aquashade® and copper compounds used as algaecides is $50 per application.

2 Any landowner applying to use a pesticide for aquatic nuisance control on a pond located *entirely* on the landowner's property is exempt from the Long-range Management Plan requirement, as per 10 VSA §1455(e)

APPENDIX A

- **Detailed Project Description**
- **2020 Aquatic Plant Management Annual Report**
- **Aquatic Plant Species List**
- **Fish Species List**
- **Lake Score Card**

EXECUTIVE SUMMARY

Non-native and invasive Eurasian watermilfoil has infested Lake Fairlee for over 25 years. Since 1995, non-chemical control options have been utilized. After a comprehensive survey effort in 2009, an integrated milfoil management program was initiated to include the use of aquatic herbicides. Since then, both non-chemical control and herbicide treatment efforts have been performed, to try and keep Eurasian watermilfoil below nuisance densities. The comprehensive annual survey performed in September 2020 identified approximately 25 acres that support milfoil in sufficient densities to warrant herbicide treatment. A program targeting treatment of up to a maximum of 24.6 acres, or 15.5% of the littoral zone, during the 2021 season is proposed.

ProcellaCOR™ EC received its full aquatic registration from EPA in February 2018 and is registered for use in Vermont. This new herbicide technology was classified as a reduced-risk pesticide by EPA, it has use rates 200-400 times lower than older chemistries, has a systemic mode of action that targets the whole plant including the roots, has rapid uptake by susceptible plants facilitating spot or partial-lake treatments, and carries no drinking water, swimming or fishing restrictions on the EPA label. ProcellaCOR is the new herbicide for choice for control of Eurasian watermilfoil at Lake Fairlee.

INTRODUCTION

Lake Fairlee is a 461-acre waterbody located in Fairlee, West Fairlee and Thetford, Vermont. Presence of the invasive aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*) was first confirmed in the lake in 1995. Eurasian watermilfoil control efforts employed include a Renovate (triclopyr) herbicide treatments in 2010, 2015, 2018, suction and hand harvesting, and the use of benthic barriers. Eurasian watermilfoil has fluctuated in levels where non-chemical control strategies cannot maintain desired open-water conditions. In an effort to maintain control of Eurasian watermilfoil growth before it continues to expand, this perfect application serves to continue herbicide management efforts from ANC Permit 2015-C03.

During the comprehensive aquatic plant survey conducted by SŌLitude Lake Management in September 2020, Eurasian watermilfoil was the most common plant found in the lake, being present at 22% of the survey data points. Eurasian watermilfoil growth was characterized as being trace to sparse (at survey points) with areas of more moderate growth between survey points, with the most significant beds found along west of the boat launch and various smaller, scattered areas along the shoreline. Beds and large patches of Eurasian watermilfoil growth were georeferenced using a GPS unit and approximately 25 acres of the lake appeared to support Eurasian watermilfoil at densities sufficient to warrant herbicide treatment. This represents approximately 5% of the waterbody and 15.5% of the littoral zone.

Excellent selectivity and minimal impact to non-target species has been demonstrated with ProcellaCOR treatments that have been performed in Vermont and the Northeast to date. Of the other species reported in Lake Fairlee by SŌLitude in 2020, the species that may show some sublethal impact following treatment are coontail (*Ceratophyllum demersum*), watershield (*Brasenia schreberi*), yellow waterlily (*Nuphar variegata*), and white waterlily (*Nymphaea*

odorata). Coontail is typically not impacted by ProcellaCOR treatments except when using rates of 4+ PDUs/ac-ft; while the waterlily species and watershield may show some discoloration and twisting, depending on their proximity to the treatment area(s), before outgrowing the symptoms.

Based on historical treatment events at Lake Fairlee, the 2021 treatment is anticipated to be approximately 25 acres, based on the fall 2020 survey results, which is much less than the 40% threshold of the littoral zone that is anticipated to be permitted by VT DEC based on other ProcellaCOR permits issued.

EXISITING CONDITIONS

Eurasian watermilfoil (EWM) is widely distributed in Lake Fairlee with trace to moderate growth through the littoral area. SŌLitude found EWM at 22% of the 120 sample points that were surveyed in 2020. The greatest concentrations of EWM were found along found along west of the boat launch and various smaller, scattered areas along the shoreline. All of these areas have not been managed with herbicides since 2018.

Lake Fairlee continues to support a large and robust population of native aquatic plants. SŌLitude documented 30 aquatic plant species in 2020. Common native plants included: *Vallisneria americana* 41%, *Potamogeton amplifolius* 38%, and *Elodea nuttalli* 36%. All other species had frequency of occurrence values between 26% and 1%.

OBJECTIVES/GOALS

Principal objectives of the five-year integrated management plan being proposed for Lake Fairlee are:

1. Effectively control invasive Eurasian watermilfoil growth to promote a diverse native plant community, to improve fish and wildlife habitat, and to support recreational use of the lake.

2. Achieve multiple-year Eurasian watermilfoil control in treatment areas in order to reduce the scope, frequency and cost of follow-up treatments in subsequent years.

3. Use a combination of techniques – treatment with systemic-acting ProcellaCOR™ EC herbicide, follow-up spot-treatments, suction harvesting and hand-harvesting – to achieve the desired level of Eurasian watermilfoil control in the most cost-effective fashion.

4. Prevent the introduction and establishment of any other aquatic nuisance species in Lake Fairlee.

PROCELLACOR™ EC HERBICIDE TREATMENT PLAN

After receiving its full aquatic registration from the EPA in February 2018, ProcellaCOR was used in numerous locations throughout the country for control of milfoil and other susceptible invasive aquatic plants. Since 2018, SOLitude has conducted over 100 ProcellaCOR applications throughout New England and New York. Results of all treatments performed to date have been extremely positive, achieving nearly complete control of targeted milfoil growth with little or no impact to non-target native plants. Documentation from use in 2019 and 2020 on the selectivity of ProcellaCOR at Vermont projects has been provided to VT DEC, and it remains to be even more

selective for EWM control in Vermont lakes than has been achieved using Renovate (triclopyr) herbicide in recent years.

The treatment program being proposed at Lake Fairlee involves the treatment of approximately 25 acres of EWM growth that was documented during surveys in September 2020 as shown in the attached map. In subsequent years, the maximum treatment area acreage will not exceed 40% of the littoral area acreage, or 63.2 acres.

The treatment program is expected to follow the below timeline and protocol:

Date	Task
March	Submission of permit application for 2021 treatment
May	Early season survey to develop final treatment map. Submission of map and specific treatment plants to DEC for review and approval. Perform required pre-treatment notifications.
June	Schedule and conduct ProcellaCOR herbicide treatment
July – September	Surveys / inspections and sampling
November	Submission of annual report identifying preliminary plans for upcoming year
December	Project review and meeting with DEC, as necessary

Based on the recent treatment experiences with ProcellaCOR herbicide at other New England lakes, and input from SePRO Corporation, the following protocols are recommended for the proposed ProcellaCOR treatment at Lake Fairlee in 2021 and future years:

1. Formulation – Utilize ProcellaCOR™ EC herbicide. This is a concentrated liquid formulation.

2. Application – A solution of ProcellaCOR diluted with lake water would be prepared in a mixing tank onboard the treatment boat and the solution will be evenly injected throughout the designated treatment areas using trailing drop hoses and a calibrated pumping system.

3. Timing – Treatment would be scheduled for anytime between early June and early September (temperature dependent) period when there is sufficient EWM growth to maximize herbicide uptake.

4. Rate – The recommended application rate (dose) is based on the percentage of the waterbody being treated and the susceptibility of the target plant. EWM has proven to be especially susceptible to ProcellaCOR allowing for low application rates to be used. The EPA label allows for application of 25 Prescription Dose Units (PDUs) per acre-foot of water being treated. Based on the high susceptibility of EWM, the recommended application rate for Lake Fairlee is up to 4 PDUs per acre-foot. The 4 PDU application rate is only 16% of the maximum allowable application rate listed on the product label. Approval is being requested for treatment using 4 PDUs per acre-foot, to facilitate effective treatment of the beds of EWM. The higher end of this rate range for this application is to

effectively target the EWM beds when a small percentage of the waterbody is being treated, which is illustrated on the ProcellaCOR label.

Herbicide	**ProcellaCOR™ EC** Liquid formulation EPA Reg. No.: 67690-80 Active Ingredient: florpyrauxifen-benzyl 2.7% 1 PDU is equal to 3.2 fl. oz.
Application Rate	Up to 4 PDU per acre-foot
Treatment Area	Up to 63.2 acres (maximum), approx. 24.6 acres anticipated – see attached map
Total Amount to be Applied	466.5 PDUs (11.66 gals) maximum ** Actual quantity to be applied may be reduced following pre-treatment inspection to finalize treatment areas in May 2021*
Target Concentration	1 PDU of ProcellaCOR EC (3.2 fl. oz) achieves 1.93 ppb/acre foot The proposed application rate of 4 PDU/ac-ft will result in concentrations of 7.72 ppb within the treated areas. Treating 24.6 acres at 4 PDU will yield a theoretical maximum lake-wide concentration of 0.08 ppb
Treatment Timing	Between early June and early September 2021, likely mid-June Delay treatment until there is sufficient active EWM growth to maximize herbicide uptake.
Method of Application	The concentrated liquid formulation will be diluted with lake water and evenly applied throughout the designated treatment areas using a calibrated pumping system and trailing drop hoses. GPS systems with WAAS or differential accuracy will be used to provide real-time navigation and to ensure that the herbicide is evenly applied throughout the designated treatment areas.

IMPACTS TO NATIVE PLANT COMMUNITY

Significant adverse impacts to the native plant community are not expected from the proposed ProcellaCOR herbicide treatment at Lake Fairlee. Data gathered by SePRO Corporation during the product registration process and actual results documented during uses since 2018 have shown that EWM is highly susceptible to low rates of ProcellaCOR. Few, if any, adverse impacts are expended on most non-target native plants at the rate anticipated for use at Lake Fairlee. At treatments performed by SŌLitude, the only temporary impacts seen were slight stem twisting and leaf curling on watershield (*Brasenia screberi*), white waterlily (*Nymphaea odorata*) and yellow waterlily (*Nuphar variegata*), but the plants grew out of the effects after a period of several weeks. Although coontail (*Ceratophyllum demersum*) is on the ProcellaCOR label as a potentially impacted species, it has been observed that only application rates at or above 4 PDUs/ac-ft have any observable impacts on coontail. Based on the list of species documented in Lake Fairlee by

SŌLitude in 2020, coontail, watershield, and both waterlily species may be impacted. A complete list of plant species found in Lake Fairlee can be found in SŌLitude's 2020 annual management report, which is included in this application.

Although not explicitly mentioned on the ProcellaCOR herbicide label, spineless/prickly hornwort (*Ceratophyllum echinatum*) is closely related to coontail and may be subject to impacts from ProcellaCOR if used at a higher PDU rate within an area of its growth. However, no significant impact to State protected plant species is anticipated following treatment with ProcellaCOR herbicide. Of the State listed species previously observed in Lake Fairlee according to the VT DEC Lake Score Card, all are not anticipated to be adversely impacted by a ProcellaCOR herbicide treatment.

WATER USE RESTRICTIONS AND NOTIFICATIONS

Water Use Restrictions – The only water use restrictions listed on the current ProcellaCOR™ EC label are all centered around the use of ProcellaCOR treated water for irrigation purposes. There are no restrictions on using ProcellaCOR treated water for drinking water, swimming or fishing.

Irrigation restrictions vary depending on what is being irrigated. Turf may be irrigated immediately after treatment without restriction. Irrigation of landscape vegetation and other non-agricultural plants can occur once ProcellaCOR concentrations are determined to be less than 2 ppb or by following a waiting period that is 7 days for the use rates being proposed.

Written Notification – Written plans of treatment by direct mailing to all abutting and downstream property owners will be provided as required by the permit. Copies of notifications will be provided on SOLitude's specific Vermont webpage.

Posting – In accordance with DEC permit requirements, the affected shorelines and access points to the lake will be posted with signs that warn of the pending herbicide application and water use restrictions to be imposed. The LFA and SŌLitude will continue to work closely with DEC to develop posters/signs that will be the most effective for this purpose. The signs will be the source of information for the specific treatment areas and water use restrictions. Copies of poster(s) will be provided on SOLitude's specific Vermont webpage.

SURVEYS AND MONITORING

Consistent with prior Five-Year Integrated Management Plans for Lake Fairlee and previous ANC permits, the LFA proposes to continue the comprehensive late season aquatic plant survey performed by SŌLitude (or another vendor) as conditioned in the permit.

NON-CHEMICAL CONTROL PROGRAM

In continuation of historical efforts outside of tentative treatment areas, the LFA will remain committed to continuing with non-chemical controls as part of this integrated EWM management program. Non-chemical techniques to be considered and used as required include the following:

- Suction harvesting
- Scuba diver hand-harvesting

- Snorkel hand-pulling (volunteer)
- Volunteer monitoring
- Education outreach efforts
- Boat ramp monitor/greeter programs

The LFA also remains committed to responsible and practical watershed management protection measures.

Use of herbicides are intended to supplement the LFA's proposed EWM management program that involves diver suction harvesting and hand-pulling, in addition to diligent monitoring efforts. Herbicide treatments will be used to target areas of more abundant EWM growth, while the non-chemical techniques will be utilized on smaller and more widely scattered patches. The program objective is to reduce the distribution and abundance of EWM to minimize herbicide use.

FIVE-YEAR EURASIAN WATERMILFOIL MANAGEMENT PROGRAM BUDGET ESTIMATES

Project cost estimates for the Five-Year Eurasian Watermilfoil Management Program being proposed at Lake Fairlee is provided in the following table. Please note that these are estimates and are subject to the availability of funds and any changes in costs.

Estimated Program Costs – 2021 dollars	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Description	2021	2022	2023	2024	2025
Herbicide treatment	$ 30,000	$ 15,000	$ 0	$ 10,000	$ 15,000
Suction harvesting	$ 0	$ 10,000	$ 20,000	$ 10,000	$ 10,000
Permitting	$ 2,500	$ 0	$ 0	$ 0	$ 0
Monitoring	$ 6,000	$ 6,500	$ 6,500	$ 6,500	$ 7,000
Notification (mailings, signs, etc.)	$ 1,500	$ 1,000	$ 1,000	$ 1,000	$ 1,000
LFA projected expenses for various tasks (e.g., salaries, taxes, supplies, equipment, storage)	$ TBD	$ TBD	$ TBD	$ TBD	$ TBD
Totals	**$ 40,000**	**$ 32,500**	**$ 27,500**	**$ 27,500**	**$ 33,000**

LAKE FAIRLEE

Aquatic Vegetation Management Program

2020 Annual Report

November 2020

PREPARED FOR:
Lake Fairlee Association
c/o Ben McLaughlin
ben@fesone.com

PREPARED BY:
SŌLitude Lake Management
590 Lake Street
Shrewsbury, MA 01545

SŌLITUDE
LAKE MANAGEMENT

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Attachments

Maps

Figure 1: Survey Points and Depths
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Figure 4: Potential 2021 Eurasian Watermilfoil Management Areas
Figure 5.1-5.5: Fall 2020 Native Vegetation Distribution

Appendices

Appendix A: Comprehensive Aquatic Vegetation Survey Information

1.0 Introduction

A comprehensive Eurasian watermilfoil (*Myriophyllum spicatum*) management program has been conducted at Lake Fairlee since 2009. Lake Fairlee is a 457-acre lake located in Fairlee, West Fairlee and Thetford, Vermont, with reported maximum and average water depths of 50 and 23 feet, respectively. Through the years, milfoil has been distributed in varying densities throughout the littoral zone. Management efforts have included Renovate (triclopyr) herbicide treatments, hand-pulling, diver assisted suction-harvesting (DASH) and benthic barrier installation.

The following report summarizes the late season comprehensive aquatic plant survey that has been performed annually to document the late-season vegetation composition within the lake and allows for quantitative comparison to survey results from prior years. Reports documenting the survey and management activity results for Lake Fairlee have been annually prepared and submitted to the Lake Fairlee Association and VT DEC.

2.0 Management Summary 2010-2020

Table 1. Management activities, 2010-2020 seasons

Year	Management
2010	- 128 acres treated with Renovate OTF - Hand-pulling performed
2011	- No treatment performed - Hand-pulling performed - Installed benthic barriers in Middlebrook
2012	- No treatment performed - Hand-pulling performed
2013	- 30 acres treated with Renovate OTF
2014	- No treatment performed
2015	- 60 acres treated with Renovate OTF
2016	- No treatment performed
2017	- No treatment performed - 12 days of DASH performed
2018	- 79 acres treated with Renovate OTF
2019	- No treatment performed
2020	- No treatment performed

3.0 Late Season Aquatic Vegetation Survey

3.1 Methods

The late season comprehensive aquatic vegetation survey was conducted on September 22, 2020. A point-intercept survey was completed and survey methodology from past years was replicated (Appendix A). A total of 120 data points, based on an 80-meter grid throughout the littoral zone, were surveyed (Figure 1).

In addition to the point-intercept survey, a visual qualitative survey of the lake's littoral zone was also conducted. This survey helps to identify areas of EWM growth that may be outside the boundaries of the data points, while providing a more representative spatial distribution of EWM. All occurrences of EWM were marked with a GPS unit.

Recorded at each data point was the following information: aquatic plants present, dominant species, plant biomass, percent total plant cover and percent EWM cover. Water depths that were verified using a high-resolution depth finder. The plant community was assessed through visual inspection, use of a throw-rake and when necessary, with an Aqua-Vu underwater camera system. Locations where EWM plants were observed were recorded with a GPS unit. Plants were identified to genus and species level when possible. Plant cover was given a percentage rank based on the areal coverage of plants within an approximate 400 square foot area assessed at each data point. Generally, in areas with 100% cover, bottom sediments could not be seen through the vegetation; percentages less than 100% indicated the amount of bottom area covered by plant growth. The percentage of EWM was also recorded at each data point. In addition to cover percentage, a plant biomass index was assigned at each data point to document the amount of plant growth vertically through the water column. Plant biomass was estimated on a scale of 0-4, as follows:

0 No biomass; plants generally absent
1 Low biomass; plants growing only as a low layer on the sediment
2 Moderate biomass; plants protruding well into the water column but generally not reaching the water surface
3 High biomass; plants filling enough of the water column and/or covering enough of the water surface to be considered a possible recreational nuisance or habitat impairment
4 Extremely high biomass; water column filled and/or surface completely covered, obvious nuisance conditions and habitat impairment severe

Field data and the location for each data point is provided in Appendix A.

3.2 Point-Intercept Survey Results

Twenty-nine (29) native species and one (1) invasive species were identified during the survey. This is an increase of six species in comparison to last year, (Table 2). Forty-six (46) of the 120 survey points did not support any aquatic vegetation growth, which is a decrease from last year's fifty-three; however, growth was present out to depths of approximately 18 feet, which is consistent with prior years.

Average species richness was almost three and a half species per data point, up slightly from 2019 (Table 2). Overall, this year's average species richness was continuing to trend higher than all prior years'. Years with higher number of species observed typically also have higher average species richness, which is accurate for this season's survey results

.

Table 2. Annual Number of Species Observed and Average Species Richness

Year	Number of Species Observed	Average Species Richness (per survey point)
2009	11	-
2010	14	1.3
2011	15	1.4
2012	16	1.7
2013	16	1.5
2014	18	1.0
2015	27	3.0
2016	22	2.8
2017	18	2.0
2018	24	3.1
2019	24	3.2
2020	30	3.4

'-' indicates data was unavailable for that year

Observed at 44% of the survey points, *Potamogeton robbinsii* was again the most commonly encountered species in Lake Fairlee. The next most abundant species observed, in decreasing order of abundance, were: *Vallisneria americana* 41%, *Potamogeton amplifolius* 38%, and *Elodea nuttalli* 36%. All other species had frequency of occurrence values between 26% and 1%, all of which is similar to survey results of recent years.

EWM growth was beginning to increase, being observed at 22% of survey points, which is an increase from last year's 9%. While its average cover at survey points was 2.9%, which is an increase from 1.6% in 2019. Additionally, EWM was not the dominant species at the 26 survey points where it was observed; this is similar to 2019, however it was observed at 15 more survey points this season. All observations of EWM were at trace or sparse abundances, which is the same as 2019 as well.

The table below highlights the species identified and their frequency of occurrence for annual surveys 2009-2020.

Table 3. Aquatic plant species frequency of occurrence and comparison, 2009-2020

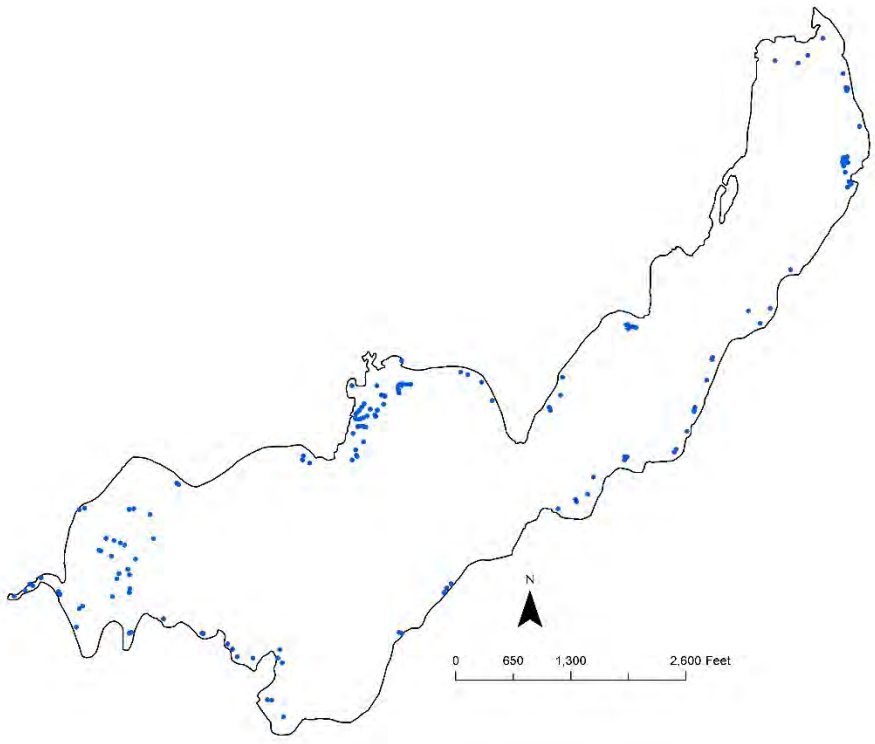
Species (Common Name / Scientific Name)	Frequency of Occurrence (%)												
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018	2019	2020
Water marigold *Bidens beckii*	30	18	7	8	16	13	7	19	11	24	24	18	19
Watershield *Brasenia schreberi*	2	1	0	1	1	2	2	3	1	5	5	6	3
Coontail *Ceratophyllum demersum*	1	0	0	1	0	4	0	0	0	3	3	0	<1
Spineless hornwort *Ceratophyllum echinatum*										2	2	2	<1
Muskgrass / Stonewort *Chara / Nitella* sp.										45	45	18	26
Spikerush *Eleocharis asicularia*													2
Common waterweed *Elodea canadensis*	23	3	11	26	22	19	12	24	18	0	0	0	<1
Western waterweed *Elodea nuttalli*							12	5	3	38	38	41	36
Pipewort *Eriocaulon* sp.										3	3	0	3
Quillwort *Isoëtes* spp.	2	3	0	2	2	0	0	0	1	0	0	0	<1
Water lobelia *Lobelia dortmanna*												<1	0
Eurasian watermilfoil *Myriophyllum spicatum*	30	0	1	20	15	29	8	39	38	4	4	9	22
Slender naiad *Najas flexilis*	0	4	5	2	4	5	4	5	3	6	6	17	10
Brittle naiad *Najas minor*												2	0
Yellow waterlily *Nuphar variegata*	0	0	2	0	1	0	1	2	0	7	7	4	3
White waterlily *Nymphaea odorata*	6	1	3	5	4	6	4	5	3	12	12	7	11
Largeleaf pondweed *Potamogeton amplifolius*	21	19	24	22	26	26	9	33	20	41	41	39	38
Berchtold's pondweed *Potamogeton berchtoldi*												10	0
Ribbonleaf pondweed *Potamogeton epihydrus*	0	3	0	0	0	0	0	0	0	0	0	0	0
Thinleaf pondweed *Potamogeton foliosus*										8	8	0	0
Variable leaf pondweed *Potamogeton gramineus*	0	0	1	0	2	9	3	8	2	4	4	8	11
Illinois pondweed *Potamogeton illinoensis*										2	2	6	3
Floating leaf pondweed *Potamogeton natans*	0	0	1	0	0	0	1	2	1	3	3	2	3
Clasping leaf pondweed *Potamogeton perfoliatus*	3	2	8	8	8	8	3	14	5	15	15	17	20
Whitestem pondweed *Potamogeton praelongus*							5	8	5	4	4	13	19
Thinleaf pondweed *Potamogeton pusillus*	2	1	1	6	5	3	0	2	2	0	0	0	13
Richardson's pondweed *Potamogeton richardsonii*							2	8	2	0	0	0	0
Robbins' pondweed *Potamogeton robbinsii*	33	25	18	18	19	28	10	43	30	45	45	45	44
Spiral pondweed *Potamogeton spirilus*							0	2	0	0	0	0	<1

Vasey's pondweed *Potamogeton vaseyi*												8	0
Flatstem pondweed *Potamogeton zosteriformis*	0	5	5	1	3	2	0	0	0	0	0	0	0
Sago pondweed *Stuckenia pectinata*												<1	<1
Burreed *Sparganium* sp.										1	1	0	3
Humped bladderwort *Utricularia gibba*	0	1	1	2	0	2	0.3	0	0	1	1	0	<1
Flat leaf bladderwort *Utricularia intermedia*													<1
Common bladderwort *Utricularia vulgaris*										3	3	2	<1
Tapegrass *Vallisneria americana*	23	26	27	30	29	31	13	35	25	30	30	38	41
Water stargrass *Zosterella dubia*				0	0	0	2	7	1	3	3	7	5

3.3 Littoral Survey Results

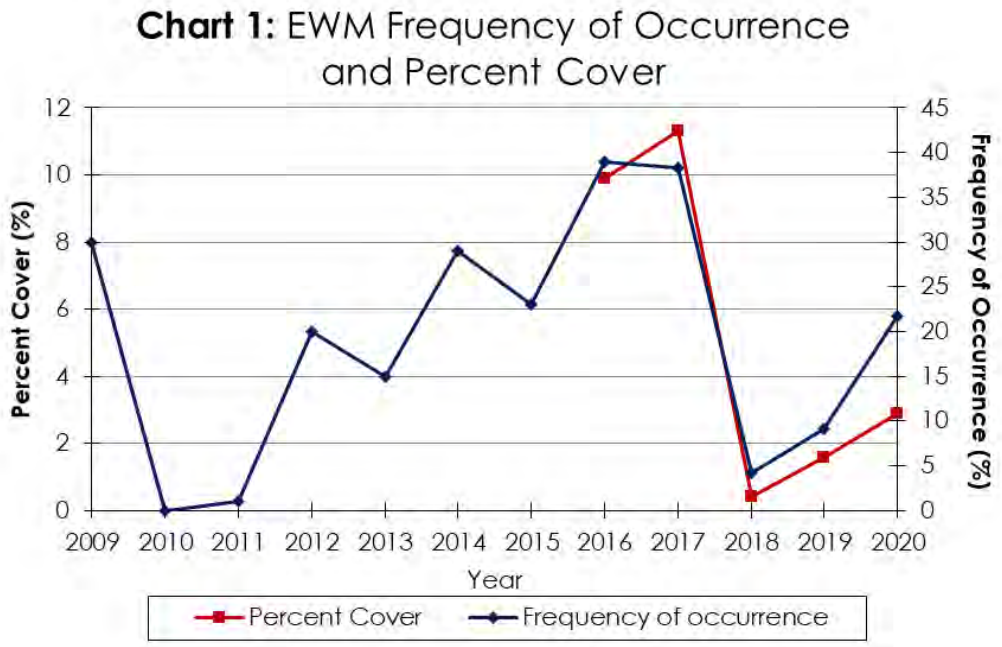
The qualitative visual survey of the lake was conducted to document occurrences of EWM and to create a more detailed spatial representation of the EWM distribution. The visual survey helps to identify areas of significant EWM growth that may be misrepresented or missed by the data point survey results alone. Figure 1 below depicts occurrences of EWM at data points as well as those recorded by GPS during the visual survey.

Figure 1: 2020 Late Season Eurasian Watermilfoil Distribution – Data Point & Visual Survey



As shown in Figure 1 above, the EWM distribution has expanded from last year through both the 120 pre-established survey points and the littoral area of Lake Fairlee. Chart 1 below, shows the slight increase in EWM frequency of occurrence that was observed this season.

Additionally, percent cover has been added to Chart 1 to show any relationships between it and frequency of occurrence values over time. Percent cover data was not available for years prior to 2016. However, available percent cover data trends similarly to the EWM frequency of occurrence, where higher frequency years have greater percent cover.



4.0 Non-Chemical Control Activities

The LFA intends to continue DASH and diver hand-pulling for EWM maintenance in 2021. Additionally, educational efforts using the ramp greeter program also continued as the ramp was staffed through the season to interact, educate and monitor incoming and departing boats and trailers for any entangled plant fragments.

5.0 Summary and Discussion

The results of the survey indicate that the Renovate OTF treatment conducted in 2018 continued to provide control of EWM this season at Lake Fairlee as a small increase in distribution and density were observed, although nearly double that of last year's results. Additionally, frequency of occurrence of almost all other species remained relatively stable in comparison to 2019 results. Regardless, the lake still supports a diverse native aquatic plant assemblage with an increase in species observed this year.

There is some EWM growth in Lake Fairlee that will require management in 2021 to prevent further expansion in high use areas of the lake. It is expected that DASH and hand-pulling efforts will effectively manage approximately half of the expected EWM distribution in 2021; however, a new permit application for use of ProcellaCOR EC herbicide should be filed this winter and some of the 2020 observed EWM distribution should be targeted for treatment as well in 2021 while acreage remains low and easily manageable.

Based on historical post-Renovate regrowth observed at Lake Fairlee and other Vermont waterbodies, it is anticipated that EWM regrowth will expand significantly in 2021 as it will be the third full season following the large scale Renovate treatment in 2018. Management of smaller areas of dense, nuisance and/or expanding EWM is recommended on a more frequent basis than allowing conditions to worsen lake-wide before conducting a large-scale management effort. Additionally, herbicide permits issued by Vermont DEC are now conditioned to only allow for up to 40% of the littoral zone to be managed (inclusive of herbicide, DASH and bottom barriers total)

in any one calendar year; this condition is expected to continue as it has effectively balanced stakeholder concerns and successful EWM control.

Although triclopyr has been the herbicide of choice for EWM control in Vermont for over a decade, the new herbicide, ProcellaCOR EC, is now believed to be a better fit for Lake Fairlee. ProcellaCOR has a significantly shorter concentration-exposure-time (CET) requirement than triclopyr, which will make it effective for the shoreline spot-treatments that Lake Fairlee typically needs. ProcellaCOR is also applied targeting in-water concentrations of less than 10 parts per billion, as opposed to the 1.5-2.0 parts per million (1500-2000 ppb) rates that are needed for triclopyr. ProcellaCOR has proven to be extremely selective for milfoil control and it should provide longer-term control of EWM than the typical ~1-2 years that have been achieved with triclopyr. All of these reasons make ProcellaCOR a better fit than triclopyr for Lake Fairlee's integrated management approach and should result in reduced herbicide treatment frequency in future years. ProcellaCOR was used at other waterbodies across Vermont in 2019 and 2020 and excellent results were observed post-treatment at all sites, as well as outside of many treatment areas.

6.0 Recommendations for 2021 Season

An ongoing management program will be required to maintain control of EWM growth and to prevent further spread within littoral zone areas. For the 2021 management season, we recommend the following:

- Filing for a new Aquatic Nuisance Control permit to utilize ProcellaCOR EC herbicide in 2021-2026
- Early summer visual inspection to reassess EWM distribution and to finalize 2021 management areas – treatment or otherwise
- Conduct ProcellaCOR herbicide treatment for areas of regrowth identified in 2020 fall survey, and any found during the early summer inspection
- Diver hand-pulling and DASH efforts to target EWM growth identified during early summer survey, outside of treatment areas
- Continued regular monitoring throughout the summer by LFA volunteers and continuation of the boat ramp greeter program
- Comprehensive late season aquatic plant survey to assess management activities' success and guide future EWM control efforts

APPENDIX A

Comprehensive Aquatic Vegetation Survey Information

- Survey Points and Depths
- Survey Point Biomass
- Survey Point Eurasian Watermilfoil Density
- 2021 Eurasian Watermilfoil Management Areas
- Fall 2020 Native Vegetation Distribution
- Field Data Table

Figure 1: Survey Points and Depths

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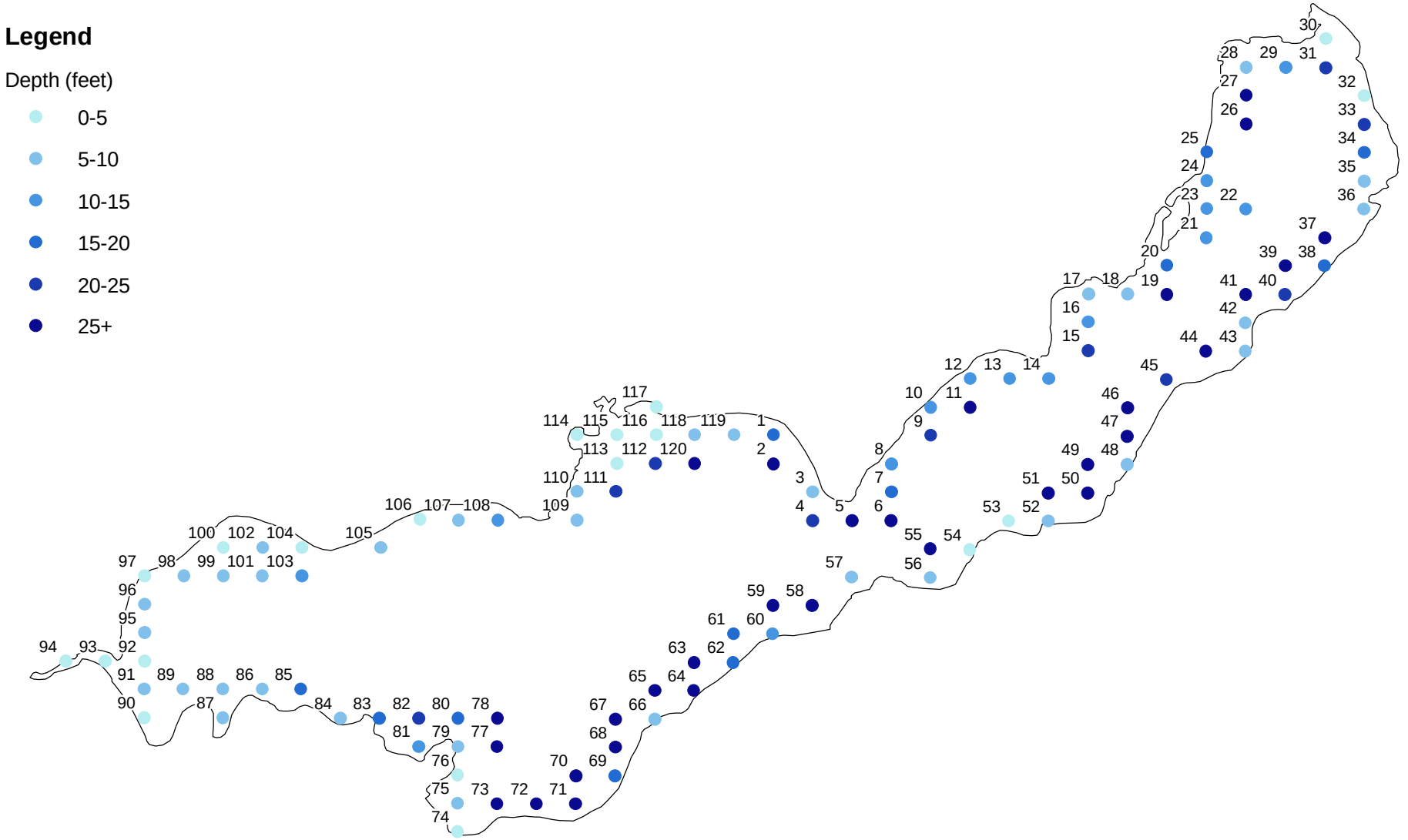

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:17,500

0 1,300 2,600 Feet

N

Prepared by: KS
Office: Shrewsbury, MA

Figure 2: Survey Point Biomass

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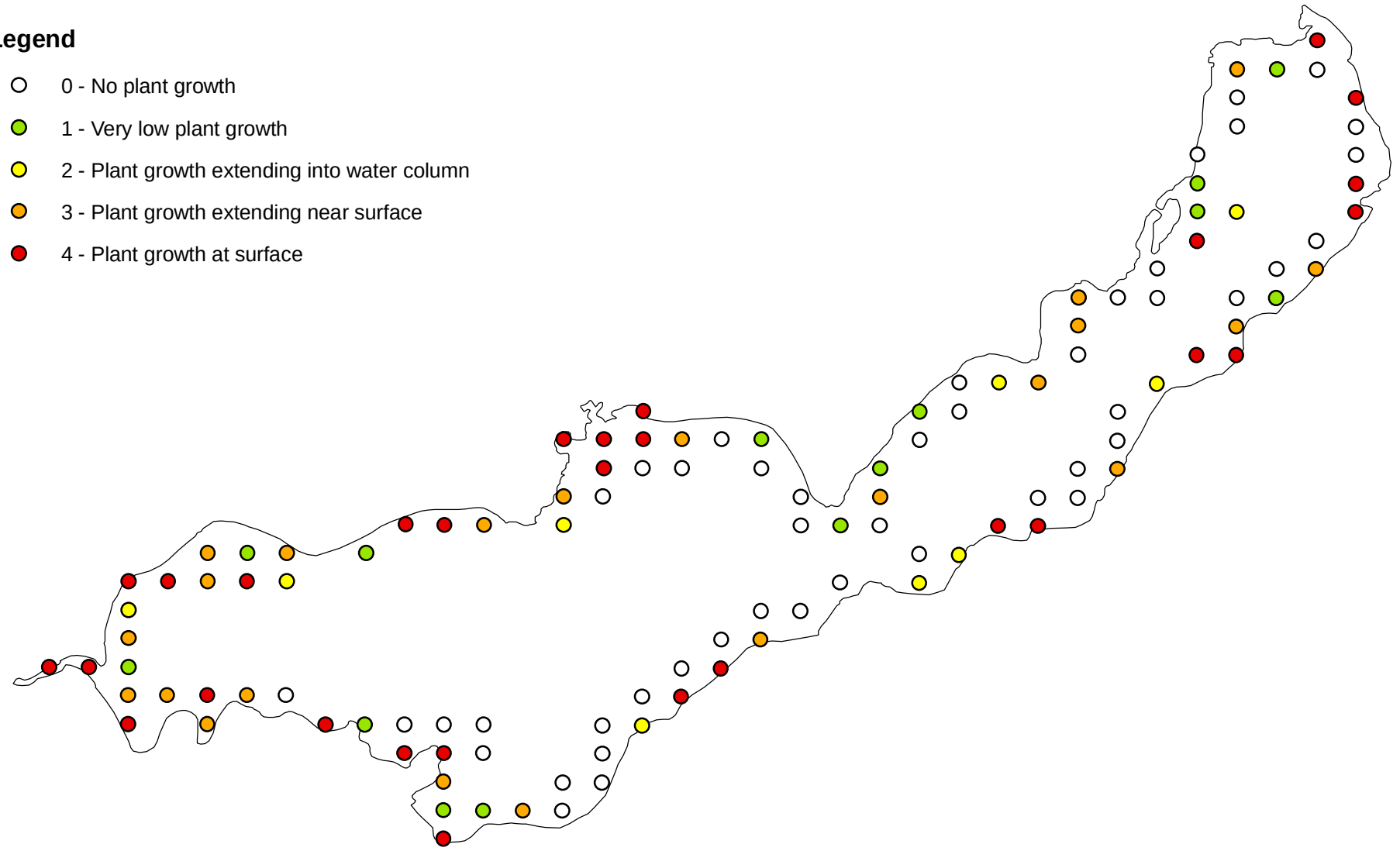

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:17,500

0 1,300 2,600 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 3: Survey Point Eurasian Watermilfoil Density

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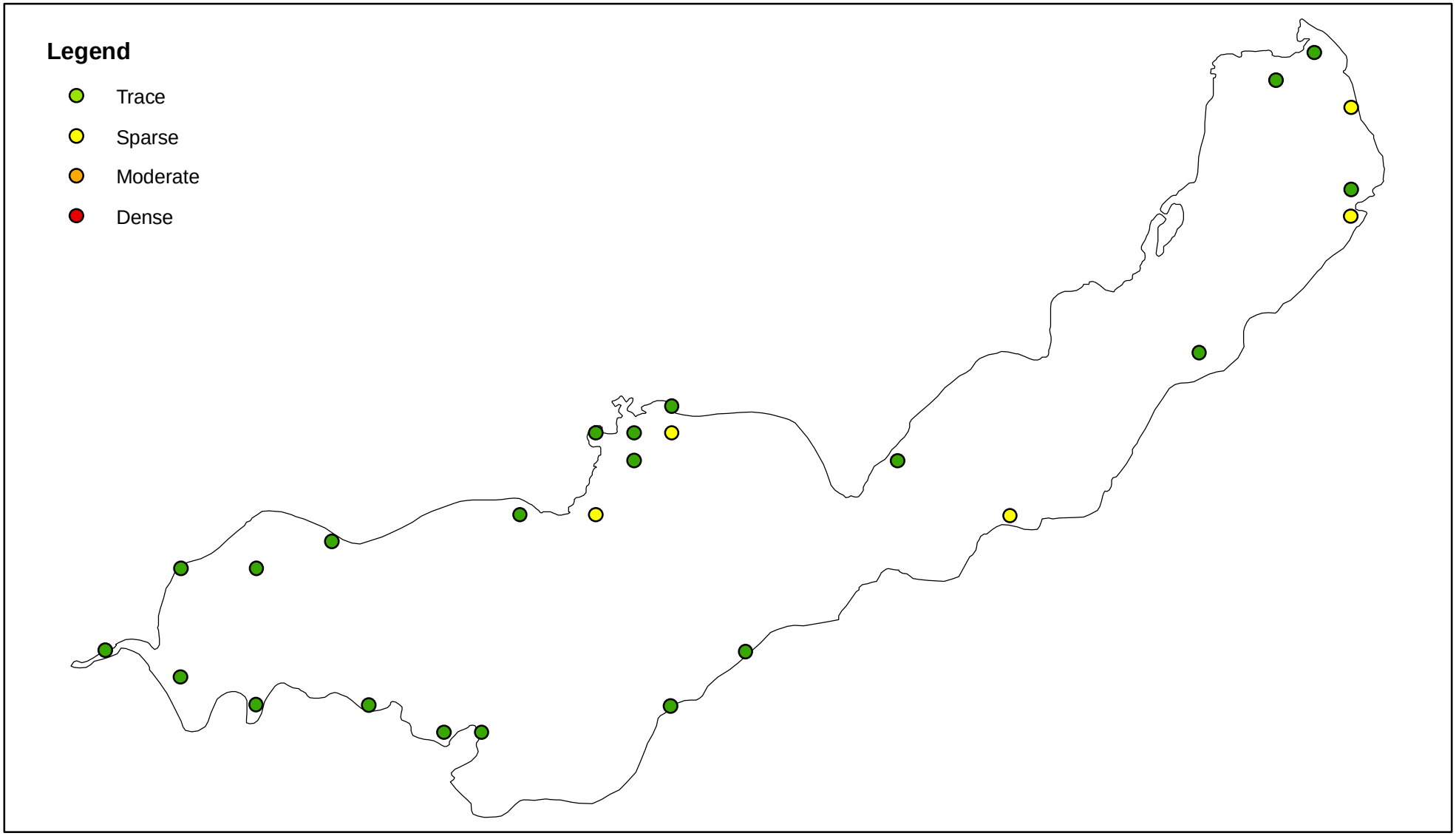

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:17,500

0 1,300 2,600 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 4: Potential 2021 Eurasian Watermilfoil Management Areas

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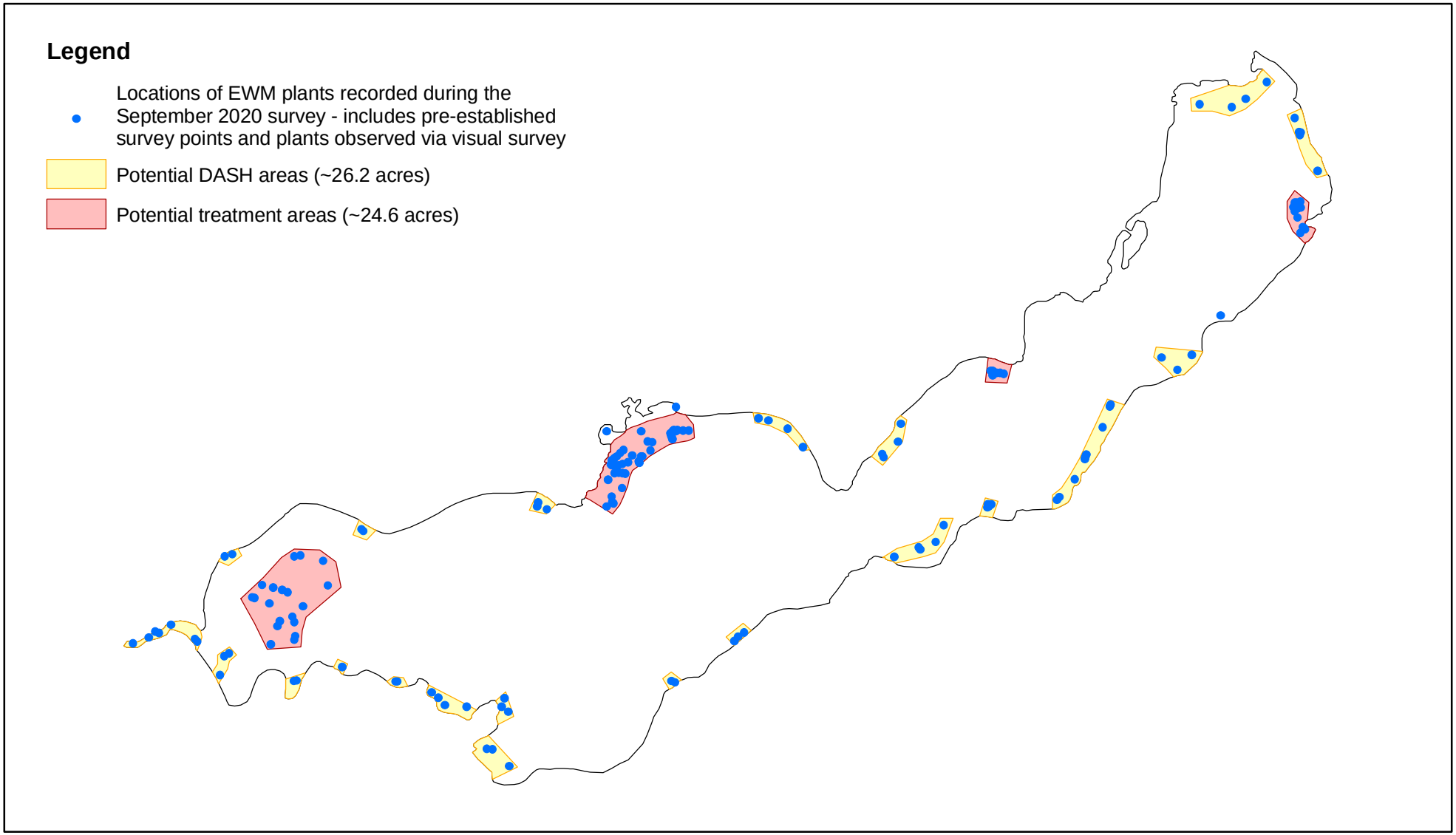

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:19,036

0 1,400 2,800 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 5.1: Fall 2020 Native Vegetation Distribution

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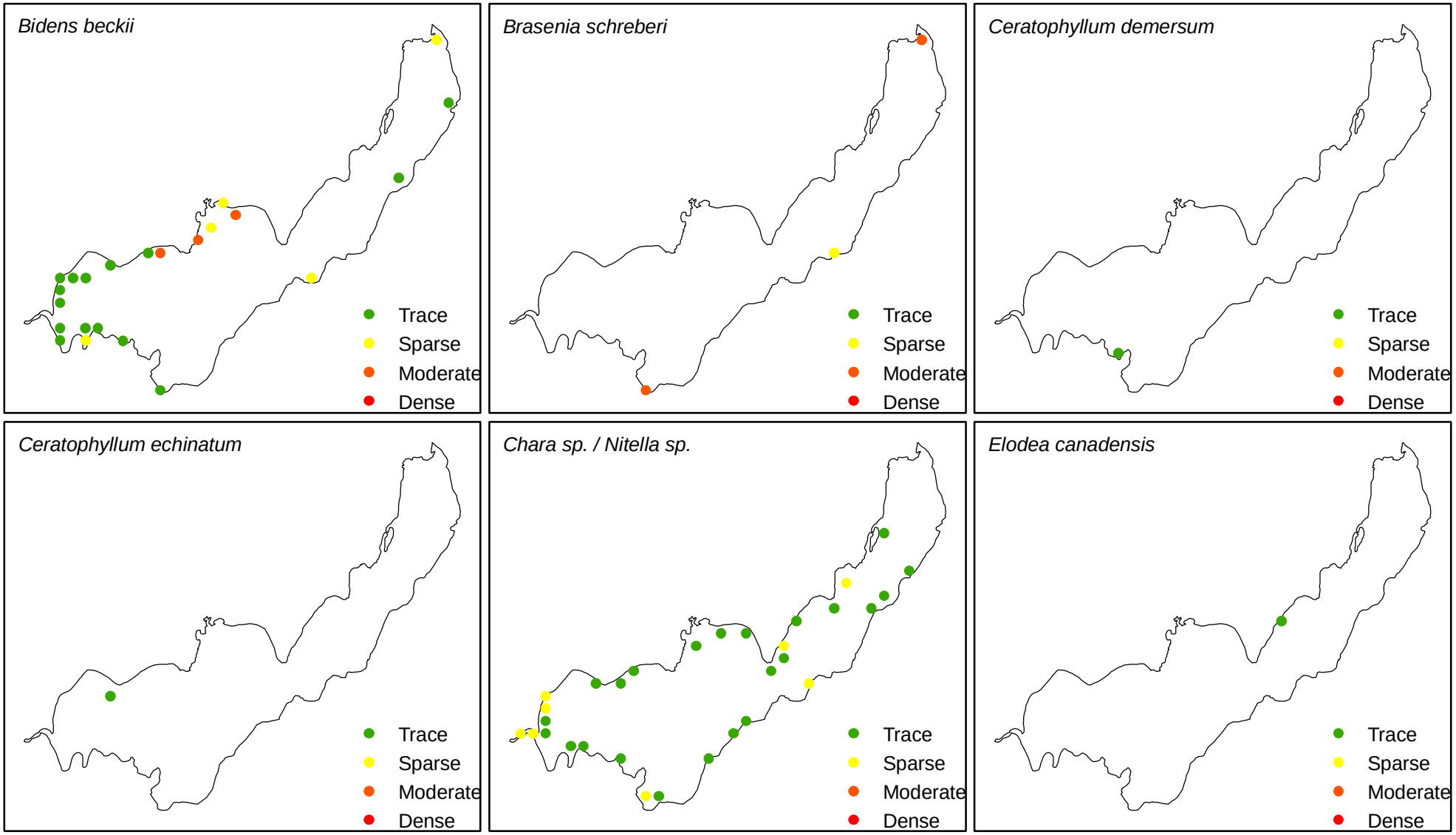

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 2,600 5,200 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 5.2: Fall 2020 Native Vegetation Distribution

SOLITUDE LAKE MANAGEMENT
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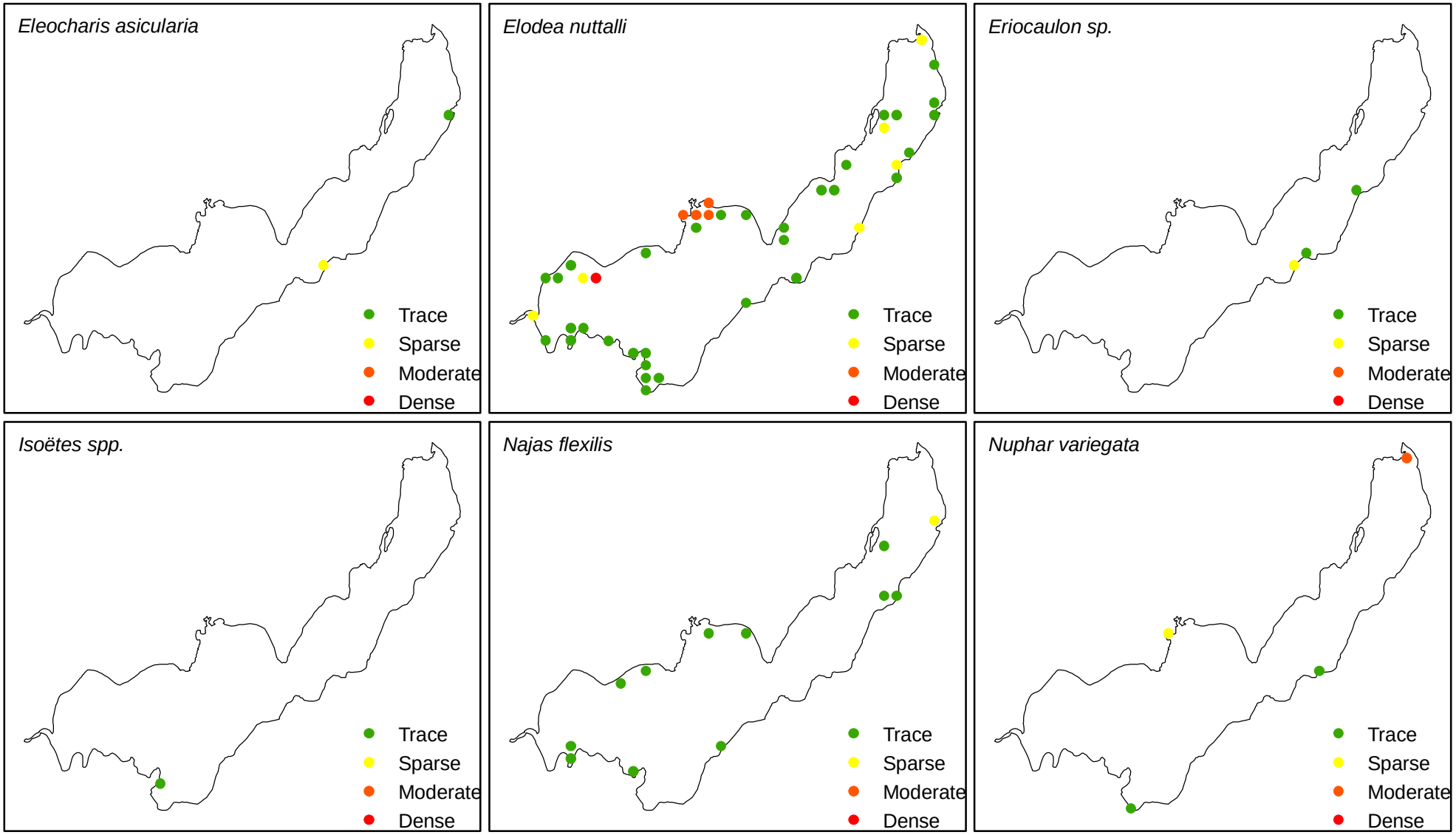

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 2,600 5,200 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 5.3: Fall 2020 Native Vegetation Distribution

SOLITUDE LAKE MANAGEMENT
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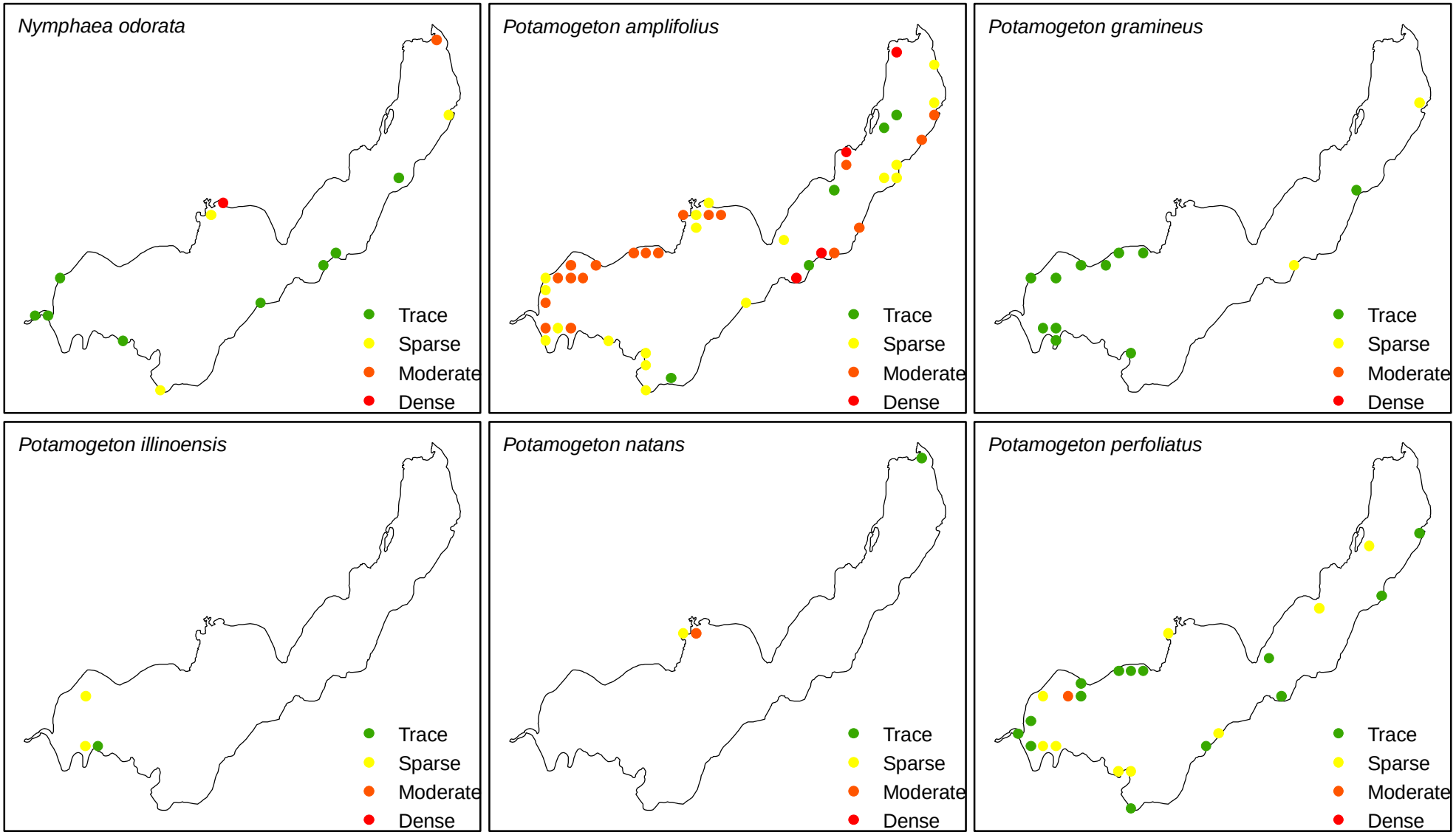
solitudelakemanagement.com



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 2,600 5,200 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 5.4: Fall 2020 Native Vegetation Distribution

SOLITUDE LAKE MANAGEMENT
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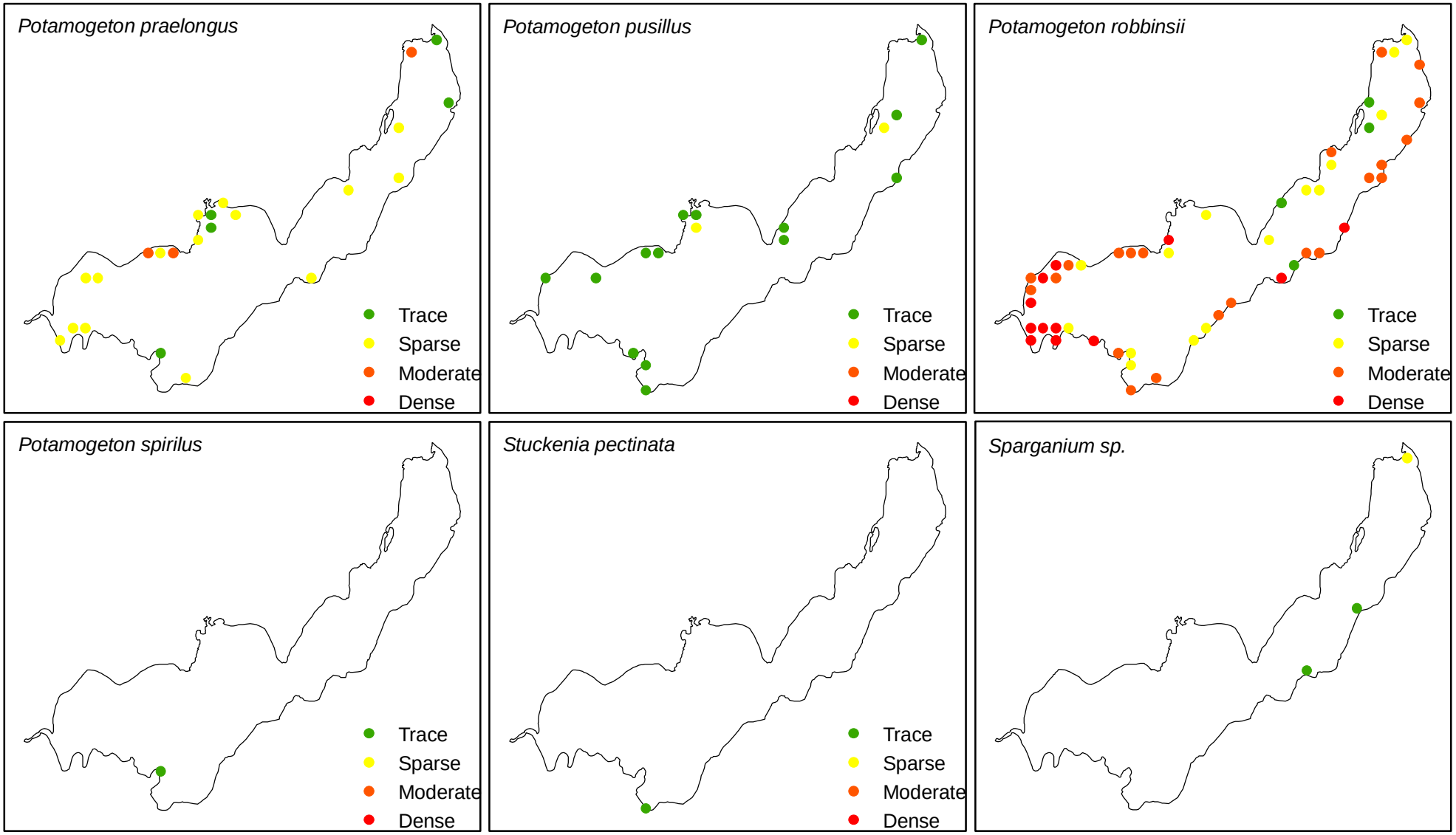
solitudelakemanagement.com



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 2,500 5,000 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

Figure 5.5: Fall 2020 Native Vegetation Distribution

SOLITUDE LAKE MANAGEMENT
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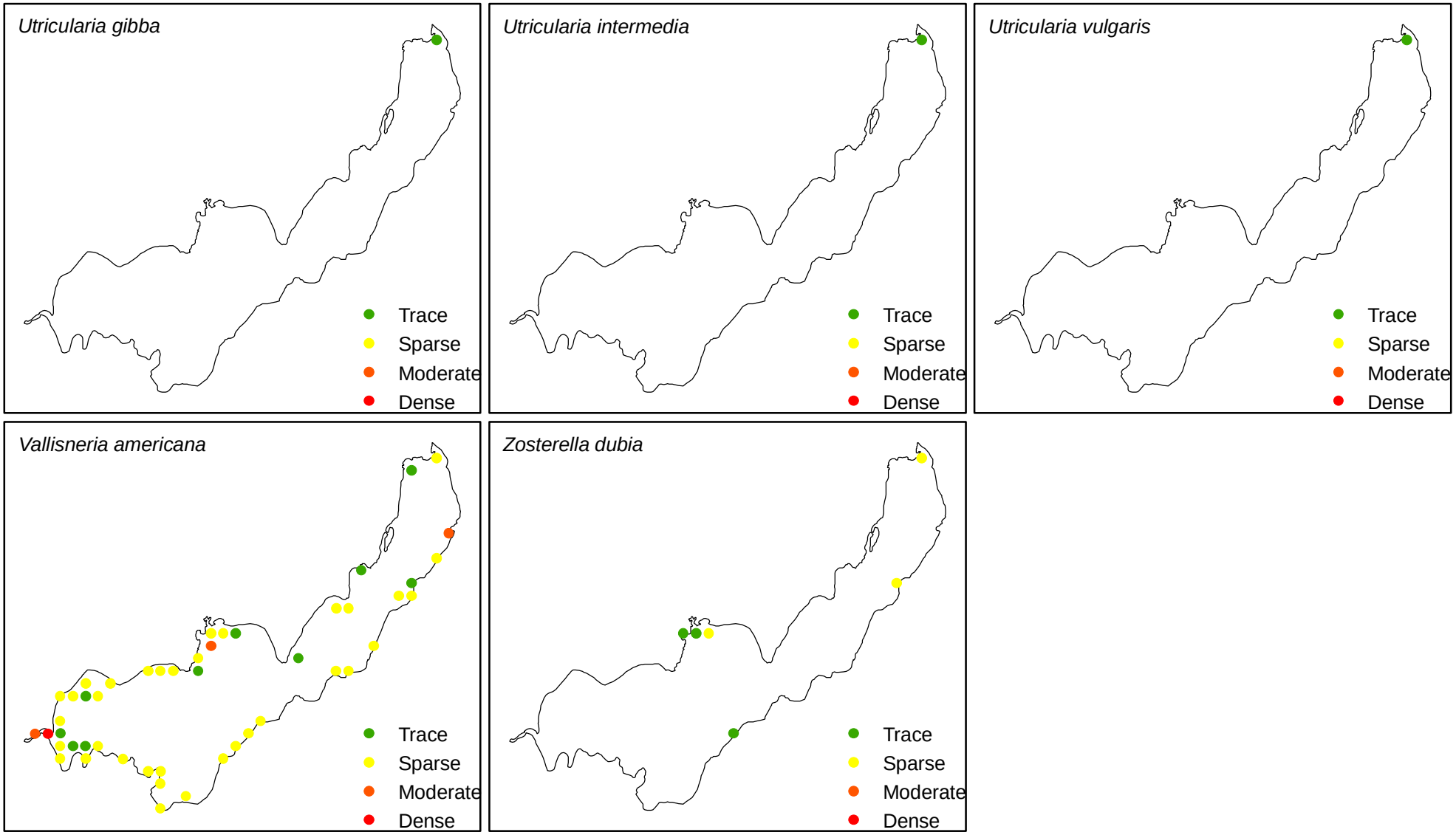

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 2,500 5,000 Feet

N

Map Date: 11/30/20
Prepared by: KS
Office: Shrewsbury, MA

ident	DEPTH	BMI	%CVR-ALL	%CVR-TRG	SPECIES RICHNESS	MS	BB	BS	CD	CE	CH	EC	EL	EN	ERIO	FA	IS	NF	NI	NM	NO	NV	PA	PBER	PE	PF	PG	PI	PN	PPER	PPRA	PPU	PRIC	PR	PS	PV	PZ	SP	SPAR	UG	UI	UV	VA	ZD
1	17	1	15	0	3									T				T	T																									
2	25	0	0	0	0																																							
3	7	0	0	0	0																																							
4	28	0	0	0	0																																							
5	17	1	5	0	1														T																									
6	25	0	0	0	0																																							
7	15	3	30	0	7									T					T				S						T		T		S									T	
8	14	1	20	10	4	T								T					S												T												
9	18	0	0	0	0																																							
10	3	1	15	0	3							T							T															T										
11	28	0	0	0	0																																							
12	15	0	0	0	0																																							
13	6	2	55	0	3									T																				S										
14	9	3	80	0	7									T					T				T						S	S			S									S	
15	23	0	0	0	0																																							
16	13	3	65	0	4						S			T									M											S										
17	6	3	100	0	3																		D											M									T	
18	11	0	0	0	0																																							
19	26	0	0	0	0																																							
20	17	0	0	0	0																																							
21	12	4	45	0	7									S				T					T						S	S	S		T										
22	26	2	30	0	4									T									T								T		S										
23	16	1	20	0	2						T			T																													
24	12	1	10	0	1																													T										
25	16	0	0	0	0																																							
26	27	0	0	0	0																																							
27	23	0	0	0	0																																							
28	7	3	100	0	4																		D								M			M									T	
29	4	1	30	10	2	T																												S										
30	3	4	100	10	16	T	S	M						S							M	M						T		T	T		S						S	T	T	T	S	S
31	19	0	0	0	0																																							
32	10	4	70	25	4	S								T									S											M										
33	12	0	0	0	0																																							
34	20	0	0	0	0																																							
35	4	4	95	20	8	T	T							T				S					S				S				T			M										
36	4	4	80	25	7	S							T	T							S		M							T													M	
37	22	0	0	0	0																																							
38	11	3	60	0	3																		M											M									S	
39	19	0	0	0	0																																							
40	15	1	10	0	2									T					T																									
41	17	0	0	0	0																																							
42	5	3	80	0	5									S									S											M									T	S
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45	5	2	20	0	4										T				T								T													T				
46	19	0	0	0	0																																							
47	15	0	0	0	0																																							
48	4	3	85	0	4									S									M											D									S	
49	21	0	0	0	0																																							
50	24	0	0	0	0																																							
51	20	0	0	0	0																																							
52	4	4	100	0	5			S														T	M											M									S	
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69	25	0	0	0	0																																							
70	30	0	0	0	0																																							
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77	18	0	0	0	0																																							
78	37	0	0	0	0																																							
79	6	4	80	15	9	T								T									S				T		S	T			S	T								S	
80	19	0	0	0	0																																							
81	6	4	85	20	9	T			T					T		P		T											S		T		M									S	
82	30	0	0	0	0																																							
83	10	1	20	0	1														T																									
84	6	4	65	15	7	T	T							T							T		S											D									S	
85	15	0	0	0	0																																							
86	8	3	35	0	6		T							T					T									T						S									S	
87	9	3	100	10	7	T	S							T				T									T							D									S	
88	8	4	100	0	11		T							T				T	T				M				T	S		S	S			D									T	

ident	DEPTH	BMI	%CVR-ALL	%CVR-TRG	SPECIES RICHNESS	MS	BB	BS	CD	CE	CH	EC	EL	EN	ERIO	FA	IS	NF	NI	NM	NO	NV	PA	PBER	PE	PF	PG	PI	PN	PPER	PPRA	PPU	PRIC	PR	PS	PV	PZ	SP	SPAR	UG	UI	UV	VA	ZD
89	7	3	100	0	6																		S				T			S	S			D									T	
90	3	4	100	0	6		T							T									S								S			D									S	
91	5	3	100	5	6	T	T																M							T				D									S	
92	4	1	10	0	2														T																							T	
93	4	4	75	0	5									S					S		T								T												D	
94	0	4	55	5	4	T													S		T																				M	
95	4	3	75	0	6		T												T				M							T				D									S	
96	5	2	55	0	4		T												S				S											M										
97	2	4	75	10	10	T	T							T					S		T		S				T				T			M									S	
98	5	4	100	0	6		T							T									M							S				D									S	
99	7	3	100	5	8	T	T																M				T	S			S			M									T	
100	5	3	100	0	4									T									M											D									S	
101	9	4	80	0	5									S									M							M	S												S	
102	9	1	70	0	1																													M										
103	12	2	30	0	4					T				D																T		T												
104	4	3	55	5	8	T	T												T				M				T			T				S									S	
105	10	1	10	0	3													T	T								T																	
106	2	4	60	0	8		T												T				M				T			T	M			M									S	
107	6	4	90	0	9		M							T				T					M							T	S	T		M									S	
108	9	3	90	10	8	T																	M				T			T	M	T		M									S	
109	7	2	35	10	3	S																												S									T	
110	5	3	100	0	4		M																								S			D									S	
111	19	0	0	0	0																																							
112	26	0	0	0	0																																							
113	3	4	100	10	8	T	S							T					T				S							T	S												M	
114	2	4	85	15	9	T								M								S	M						S	S	S	T												T
115	2	4	70	10	9	T								M							S		S						M		T	T											S	T
116	4	4	100	30	6	S								M				T					M																				S	S
117	3	4	100	20	6	T	S							M							D		S								S													
118	12	3	80	0	7		M							T					T				M								S			S									T	
119	18	0	0	0	0																																							
120	18	0	0	0	0																																							
120		1.78	39.29	2.88	3.43																																							

T	21	15	0	1	1	1	1	1	32	2	0	1	11	22	0	8	2	5	0	0	0	11	1	1	14	5	14	0	4	1	0	0	1	2	1	1	1	10	3
S	5	5	1	0	0	1	0	1	6	1	0	0	1	7	0	3	1	18	0	0	0	2	2	1	9	15	2	0	15	0	0	0	0	1	0	0	0	35	3
M	0	3	2	0	0	0	0	0	4	0	0	0	0	0	0	1	1	19	0	0	0	0	0	1	1	3	0	0	22	0	0	0	0	0	0	0	0	3	0
D	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	1	0
COUNT	26	23	3	1	1	2	1	2	43	3	0	1	12	29	0	13	4	46	0	0	0	13	3	3	24	23	16	0	53	1	0	0	1	3	1	1	1	49	6
%	21.67	19.17	2.50	0.83	0.83	1.67	0.83	1.67	35.83	2.50	0.00	0.83	10.00	24.17	0.00	10.83	3.33	38.33	0.00	0.00	0.00	10.83	2.50	2.50	20.00	19.17	13.33	0.00	44.17	0.83	0.00	0.00	0.83	2.50	0.83	0.83	0.83	40.83	5.00

FAIRLEE

55 Records

Basin 14 | Lake Area = 461.8 acres

Species	Common Name	Most Recent	Rare, Threatened Endangered Info			
			State Rank	Global Rank	State Status	Federal Status
		8/18/2010				
Bidens beckii	water marigold	9/18/2013				
Brasenia schreberi	watershield	9/9/2014				
Carex sp.	sedge	5/14/2012				
Ceratophyllum demersum	coontail	9/9/2014				
Ceratophyllum echinatum	prickly hornwort	5/14/2012	S2	G4?	R	
Chara sp.	muskgrass or stonewort	9/18/2013				
Eleocharis acicularis	slender spikerush	5/14/2012				
Elodea canadensis	common elodea	9/9/2014				
Elodea sp.	waterweed	7/14/1992				
Equisetum sp.	horsetail	5/14/2012				
Eriocaulon aquaticum	pipewort	8/10/2010				
Isoetes sp.	quillwort	9/18/2013				
Juncus sp.	rush	6/21/1984				
Lemna minor	little duckweed	5/14/2012				
Lobelia dortmanna	water lobelia	6/21/1984				
Ludwigia palustris	Water-purslane	5/14/2012				
Lythrum salicaria	purple loosestrife	8/10/2010				
Myriophyllum spicatum	Eurasian watermilfoil	9/9/2014				
Najas flexilis	common naiad	8/10/2010				
Najas sp.	waternymph	9/9/2014				
Nitella sp.	brittlewort or stonewort	9/18/2013				
Nuphar sp.	pond-lily	8/3/1995				
Nuphar variegata	cow lily or spatterdock	9/18/2013				
Nymphaea odorata ssp. Odorata	white waterlily	9/9/2014				
Nymphaea odorata ssp.	American white waterlily	8/14/1990				
Nymphaea sp.	water lily	9/18/2013				
Polygonum amphibium	water smartweed	8/10/2010				
Polygonum sp.	knotweed	7/14/1992				
Pontederia sp.	pickerelweed	6/21/1984				
Potamogeton alpinus	red pondweed	6/21/1984				
Potamogeton amplifolius	big-leaf pondweed	9/9/2014				
Potamogeton epihydrus	ribbonleaf pondweed	5/14/2012				
Potamogeton foliosus	leafy pondweed	5/26/2010				
Potamogeton gramineus	variable-leaf pondweed	9/9/2014				
Potamogeton natans	floating-leaf pondweed	5/14/2012				
Potamogeton perfoliatus	claspingleaf pondweed	9/9/2014				
Potamogeton praelongus	boat-tipped pondweed	5/14/2012				
Potamogeton pusillus	small pondweed	9/9/2014				
Potamogeton richardsonii	Richard's pondweed	6/21/1984				
Potamogeton robbinsii	Robbin's pondweed	9/9/2014				
Potamogeton sp.	pondweed	8/10/2010				
Potamogeton spirillus	snailseed pondweed	8/10/2010				
Potamogeton zosteriformis	flatstem pondweed	9/9/2014				
Proserpinaca palustris	marsh mermaidweed	5/14/2012	S2	G5	R	
Sagittaria sp.	arrowhead	8/10/2010				
Sparganium sp.	bur-reed	5/14/2012				
Typha latifolia	broad-leaved cattail	8/14/1990				
Typha sp.	cattail	5/14/2012				
Utricularia gibba	humped bladderwort	5/14/2012	S3	G5	R	
Utricularia macrorhiza	common bladderwort	8/10/2010				
Utricularia minor	lesser bladderwort	5/26/2010	S2	G5	R	
Utricularia sp.	bladderwort	9/9/2014				
Vallisneria americana	wild celery or eelgrass	9/9/2014				
Zosterella dubia	water stargrass	8/3/1995				

FAIRLEE

17 Records

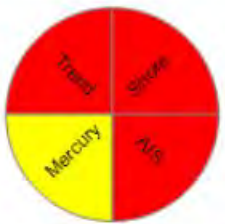
Basin

Lake Area = acres

		Rare, Threatened Endangered Info			
Common Name	**Scientific Name**	**State Rank**	**Global Rank**	**State Status**	**Federal Status**
Brown bullhead	Ameiurus nebulosus				
Bluegill	Lepomis macrochirus				
Brown trout	Salmo trutta				
Chain pickerel	Esox niger				
Fallfish	Semotilus corporalis				
Golden shiner	Notemigonus crysoleucas				
Largemouth bass	Micropterus salmoides				
Longnose sucker	Catostomus catostomus				
Pumpkinseed	Lepomis gibbosus				
Rock bass	Ambloplites rupestris				
Redbreast sunfish	Lepomis auritus				
Rainbow trout	Oncorhynchus mykiss				
Silvery minnow	Hybognathus regius	S3S4	G5		
Smallmouth bass	Micropterus dolomieu				
Rainbow smelt	Osmerus mordax				
White sucker	Catostomus commersoni				
Yellow perch	Perca flavescens				

FAIRLEE - data through 2020

[Learn How Lakes Are Scored]



Lake Area:
461.8 acres

Basin Lake Area Ratio:
28

Max Depth:
15.2 meters

Mean Spring TP:
12.2 ug/L

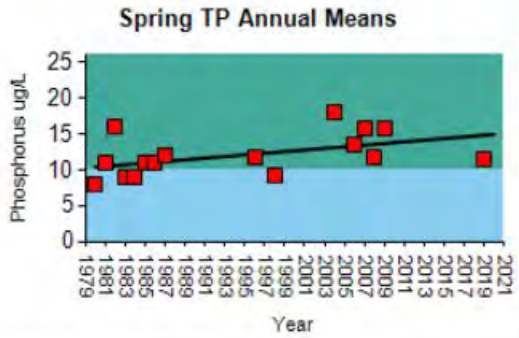
Mean Summer TP:
15.6 ug/L

Mean Summer Chla:
4.7 ug/L

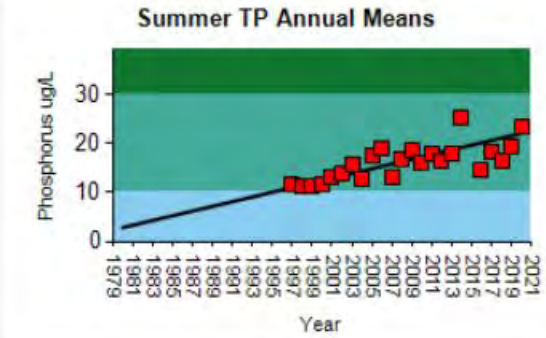
Mean Summer Secchi:
6.1 meters

Hypereutrophic
Eutrophic
Mesotrophic
Oligotrophic

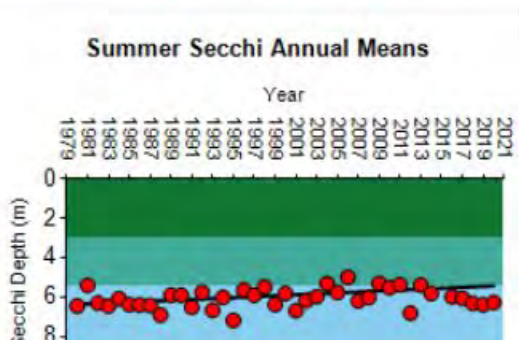
Spring TP Trend: p = 0.0374 | CV = 24
Significantly increasing



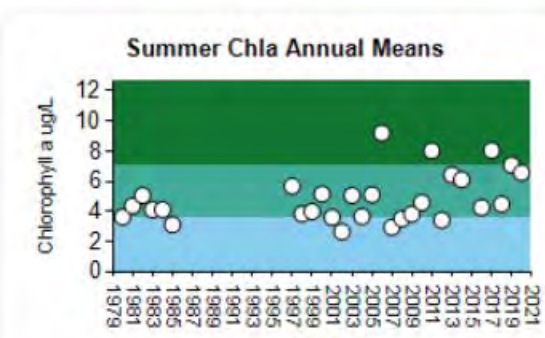
Summer TP Trend: p = 0.0002 | CV = 23
Highly significantly increasing



Summer Secchi Trend: p = 0.0126 | CV = 9
Significantly decreasing



Summer Chla Trend: p = 0.4129 | CV = 34
Stable



Stresses / Impairments

Stressed -- Nutrients

Stressed -- Phosphorus

Trend Score: Poor

WQ Standards Status: Stressed

Watershed Score: Moderately Disturbed

APPENDIX B

Maps

Site Locus

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:24,000

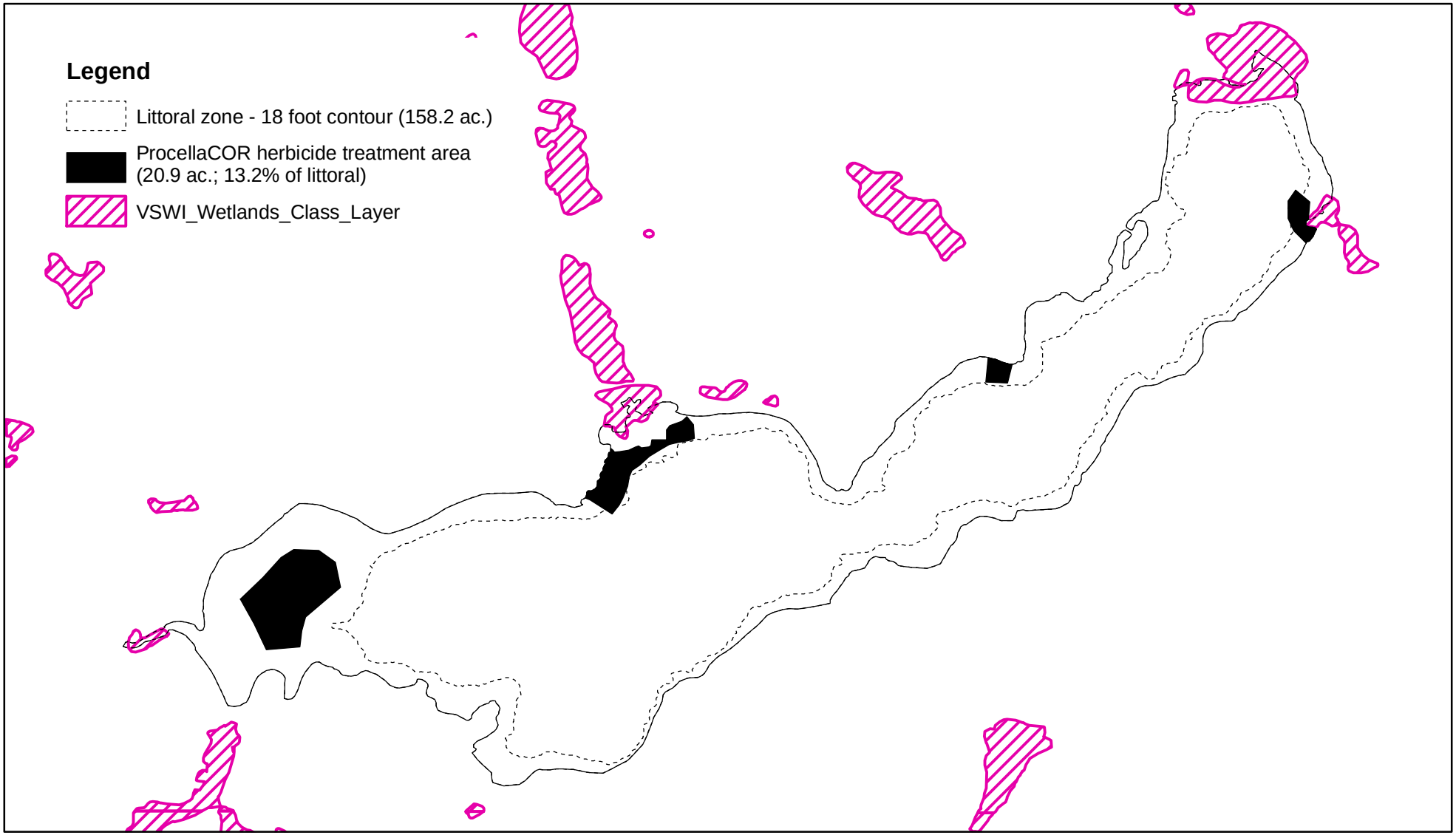
0 1,800 3,600 Feet

N

Map Date: 03/11/21
Prepared by: KS
Office: Shrewsbury, MA

Wetland Areas - Herbicide Treatment Areas

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:19,000

0 1,800 3,600 Feet

N

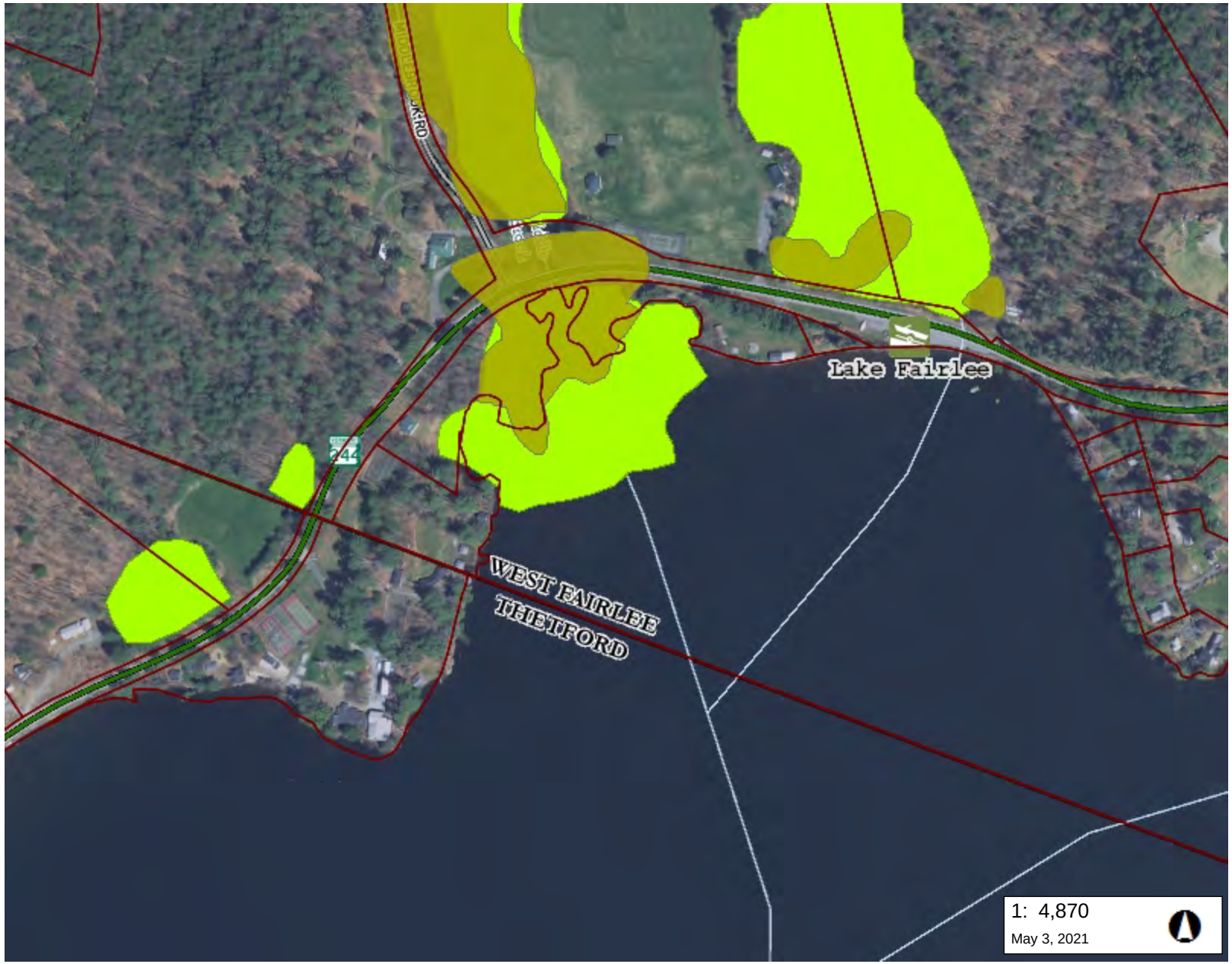
Map Date: 06/30/21
Prepared by: KS
Office: Shrewsbury, MA

VERMONT

Fairlee Inlet: Wetlands

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- Fishing Access Areas
- Wetland - VSWI
  - Class 1 Wetland
  - Class 2 Wetland
  - Buffer
- Wetlands Advisory Layer
- Parcels (standardized)
- Roads
  - Interstate
  - US Highway; 1
  - State Highway
  - Town Highway (Class 1)
  - Town Highway (Class 2,3)
  - Town Highway (Class 4)
  - State Forest Trail
  - National Forest Trail
  - Legal Trail
  - Private Road/Driveway
  - Proposed Roads
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

247.0 0 124.00 247.0 Meters

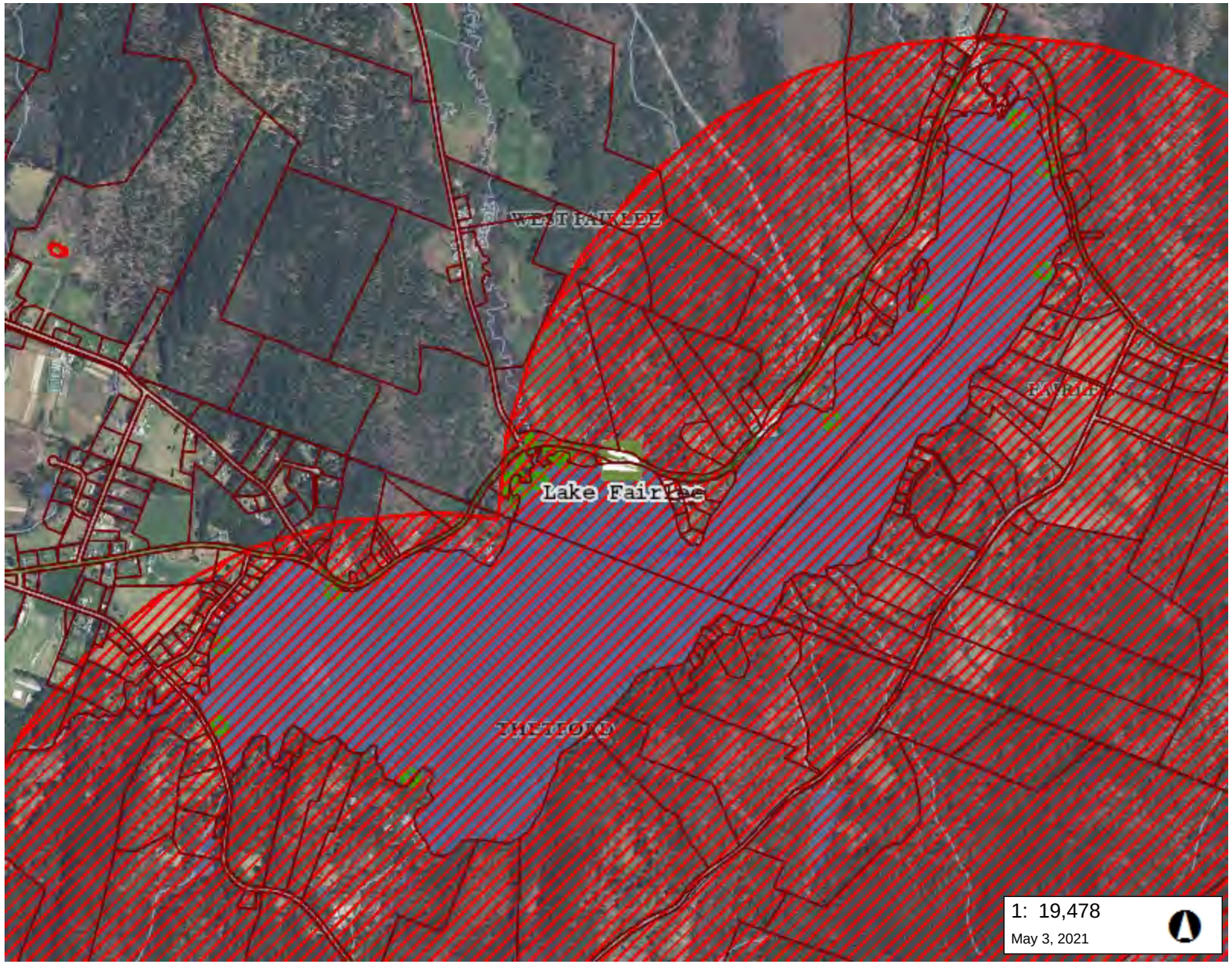
WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 406 Ft. 1cm = 49 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Lake Fairlee Rare, Threatened, Endangered

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- Fishing Access Areas
- Rare Threatened Endangered
  - Threatened or Endangered
  - Rare
- Parcels (standardized)
- Roads
  - Interstate
  - US Highway; 1
  - State Highway
  - Town Highway (Class 1)
  - Town Highway (Class 2,3)
  - Town Highway (Class 4)
  - State Forest Trail
  - National Forest Trail
  - Legal Trail
  - Private Road/Driveway
  - Proposed Roads
- Waterbody
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

1: 19,478

May 3, 2021

990.0 0 495.00 990.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 1623 Ft. 1cm = 195 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

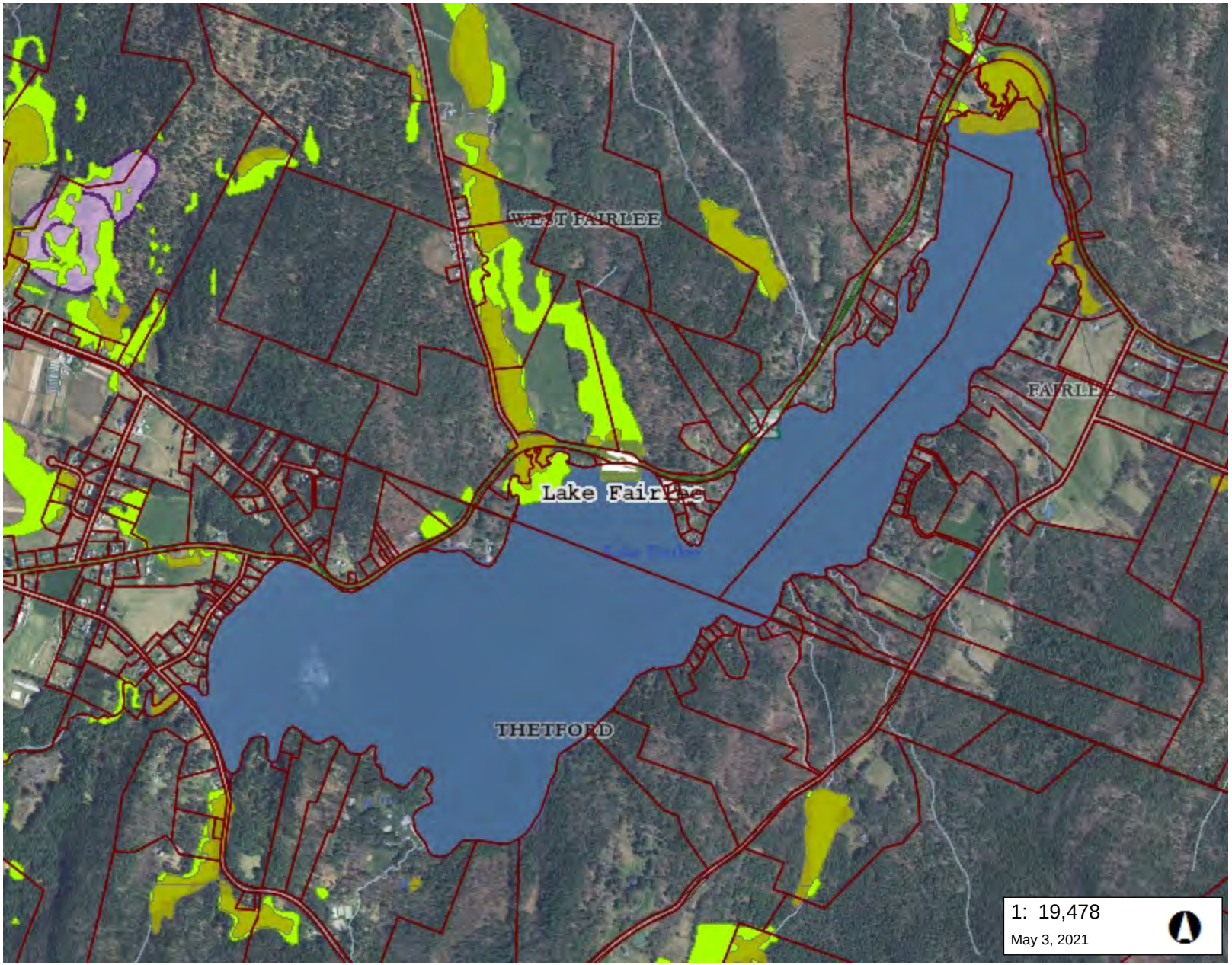
VERMONT

Lake Fairlee Wetlands & Source Protection

Vermont Agency of Natural Resources

Atlas

vermont.gov



LEGEND

- Fishing Access Areas
- Wetland - VSWI
  - Class 1 Wetland
  - Class 2 Wetland
  - Buffer
- Wetlands Advisory Layer
- SurfaceWaterSPA
  - Active
  - Inactive
- Ground Water SPA
  - Active
  - Proposed
  - Inactive
- Parcels (standardized)
- Roads
  - Interstate
  - US Highway; 1
  - State Highway
  - Town Highway (Class 1)
  - Town Highway (Class 2,3)
  - Town Highway (Class 4)
  - State Forest Trail
  - National Forest Trail
  - Legal Trail
  - Private Road/Driveway
  - Proposed Roads
- Waterbody

NOTES

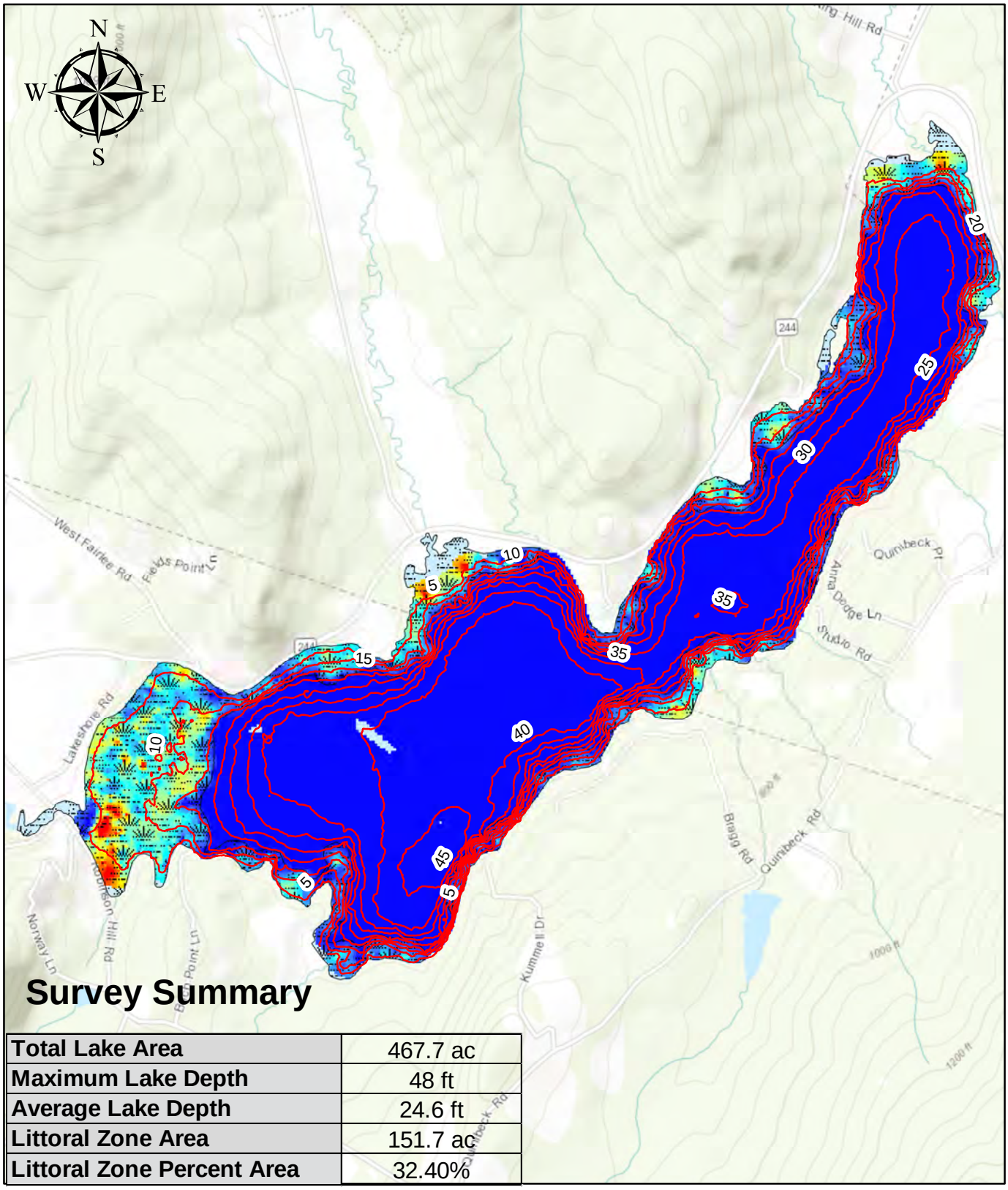
Map created using ANR's Natural Resources Atlas

990.0 0 495.00 990.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 1623 Ft. 1cm = 195 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Lake Fairlee, Fairlee, VT



Survey Summary

Total Lake Area	467.7 ac
Maximum Lake Depth	48 ft
Average Lake Depth	24.6 ft
Littoral Zone Area	151.7 ac
Littoral Zone Percent Area	32.40%

Legend

Biovolume

High : 1

Low : 0

Littoral Zone

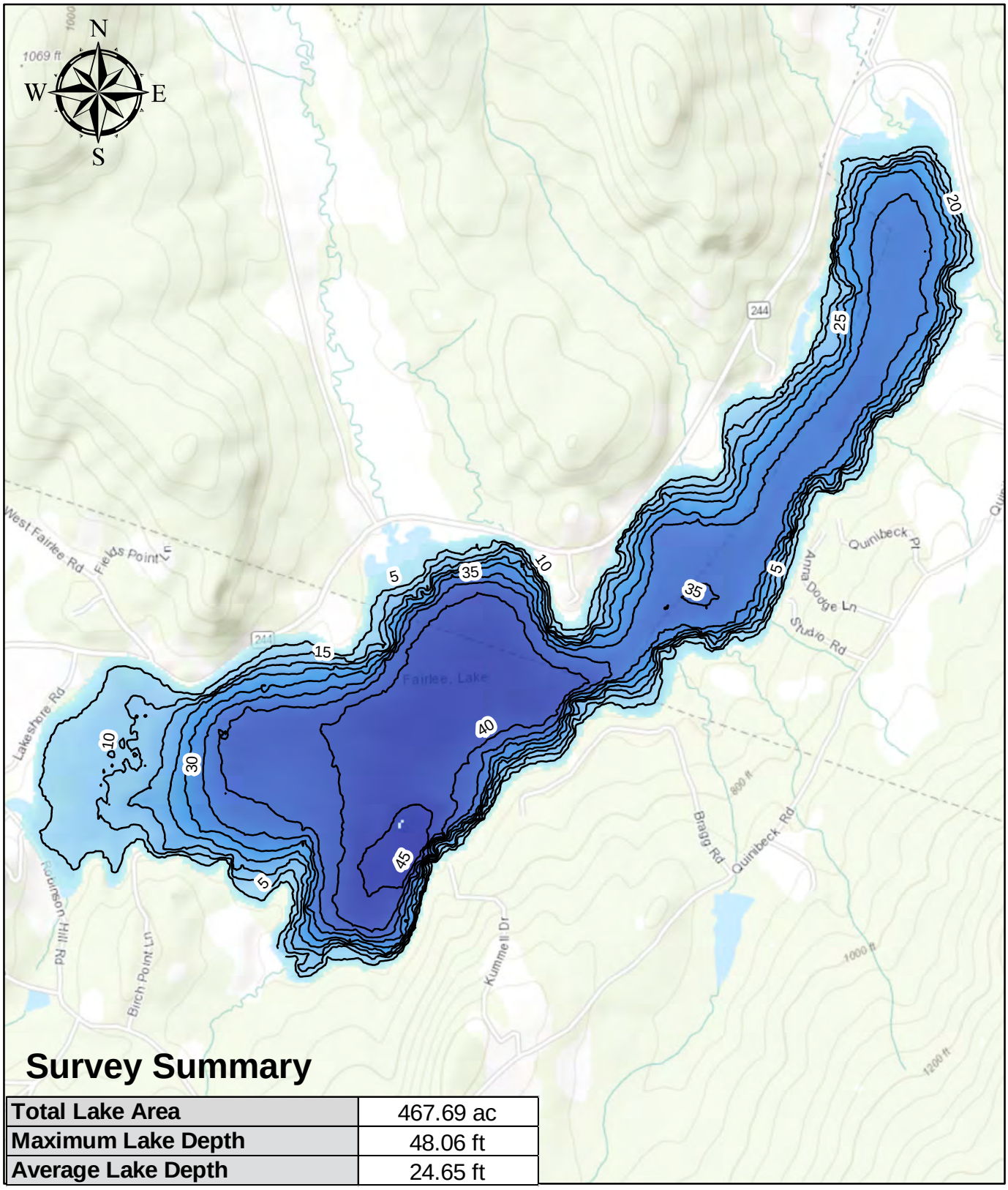
Depth Contour (5 ft.)

0 0.125 0.25 0.5 Miles

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Survey Date: 8/22/2018

Lake Fairlee, Fairlee, VT



Survey Summary

Total Lake Area	467.69 ac
Maximum Lake Depth	48.06 ft
Average Lake Depth	24.65 ft

Legend

Depth (ft.)

High : 0

Low : 48

Depth Contour (5 ft.)

0 0.125 0.25 0.5 Miles

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Survey Date: 8/22/2018

APPENDIX C

ProcellaCOR EC Product Label & MSDS

Label:

https://www.sepro.com/Documents/ProcellaCOR_EC--Label.pdf

MSDS:

https://sepro.com/Documents/ProcellaCOR_EC--SDS.pdf

Washington State Department of Ecology Evaluation of ProcellaCOR 2017

VT Department of Environmental Conservation: Aquatic Toxicity Review 2020

VT Department of Health: Review of ProcellaCOR 2021

SPECIMEN LABEL

ProcellaCOR™ EC

A selective systemic herbicide for management of freshwater aquatic vegetation in slow-moving/quiescent waters with little or no continuous outflow: ponds, lakes, reservoirs, freshwater marshes, wetlands, bayous, drainage ditches, and non-irrigation canals, including shoreline and riparian areas in or adjacent to these sites. Also for management of invasive freshwater aquatic vegetation in slow-moving/quiescent areas of rivers (coves, oxbows or similar sites).

FLORPYRAUXIFEN-BENZYL	GROUP	4	HERBICIDE

Produced for:
SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032, U.S.A.

EPA Reg. No. 67690-80
FPL20180226

Active Ingredient:

Florpyrauxifen-benzyl: 2-pyridinecarboxylic acid, 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxy-phenyl)-5-fluoro-, phenyl methyl ester	2.7%
Other Ingredients	97.3%
TOTAL	100.0%

Contains 0.0052 lb florpyrauxifen-benzyl per Prescription Dose Unit™ (PDU™) or 0.21 lb florpyrauxifen-benzyl/gallon. 1 PDU is equal to 3.2 fl. oz. of product.

Keep Out of Reach of Children

CAUTION

Refer to the inside of label booklet for additional precautionary information including directions for use.

Notice: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read *Warranty Disclaimer* and *Misuse* statements inside label booklet. If terms are not acceptable, return at once unopened.**

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION. Causes moderate eye irritation. Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants;
- Shoes plus socks;
- Protective eyewear; and
- Waterproof gloves.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Controls: When handlers use closed systems or enclosed cabs in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(5)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations
Users should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

FIRST AID	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 to 20 minutes. • Remove contact lenses, if present, after the first 5 minutes; then continue rinsing eye. • Call a poison control center or doctor for treatment advice.

HOTLINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Environmental Hazards
Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may cause fish suffocation. Water bodies containing very high plant density should be treated in sections to prevent the potential suffocation of fish. Consult with the State agency for fish and game before applying to public waters to determine if a permit is needed.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

Shake well before using.

PRODUCT INFORMATION

ProcellaCOR EC is a selective systemic herbicide for management of freshwater aquatic vegetation in slow-moving/quiescent waters with little or no continuous outflow: ponds, lakes, reservoirs, freshwater marshes, wetlands, bayous, drainage ditches, and non-irrigation canals, including shoreline and riparian areas in or adjacent to these sites. Also for management of invasive freshwater aquatic vegetation in slow-moving/quiescent areas of rivers (coves, oxbows or similar sites).

Apply ProcellaCOR EC directly into water or spray onto emergent foliage of aquatic plants. Depending upon method of application and target plant, ProcellaCOR EC is absorbed by aquatic vascular plants through emergent or floating leaves and from water through submersed plant shoots and leaves. In-water treatments are effective in spot and partial treatment designs with relatively short exposure times (hours to several days). Species susceptibility to ProcellaCOR EC may vary depending upon time of year, stage of growth, and water movement. For best results, apply to actively growing plants. However, effective control can be achieved over a broad range of growth stages and environmental conditions. Application to mature target plants may require higher application rates and longer exposure periods to achieve control.

Resistance Management
ProcellaCOR EC is classified as a WSSA Group 4 Herbicide (HRAC Group O). Weed populations may contain or develop biotypes that are resistant to ProcellaCOR EC and other Group 4 herbicides. If herbicides with the same mode of action are used repeatedly at the same site, resistant biotypes may eventually dominate the weed population and may not be controlled by these products. Unless ProcellaCOR EC is used as part of an eradication program or in a plant management system where weed escapes are aggressively controlled, do not use ProcellaCOR EC alone in the same treatment area for submersed and emergent plant control for more than 2 consecutive years, unless used in combination or rotated with an herbicide with an alternate mode of action.

To further delay herbicide resistance consider taking one or more of the following steps:

- Use tank mixtures with herbicides from a different group if such use is permitted; Consult your local extension service or SePRO Corporation if you are unsure as to which active ingredient is currently less prone to resistance.
- Adopt an integrated weed-management program for herbicide use that includes scouting and uses historical information related to herbicide use, and that considers other management practices.
- Scout after herbicide application to monitor weed populations for early signs of resistance development. Indicators of possible herbicide resistance include: (1) failure to control a weed species normally controlled by the herbicide at the dose applied, especially if control is achieved on adjacent weeds; (2) a spreading patch of non-controlled plants of a particular weed species; (3) surviving plants mixed with controlled individuals of the same species. If resistance is suspected, prevent weed seed production in the affected area by using an alternative herbicide from a different group or by a mechanical method that minimizes plant fragmentation.
- If a weed pest population continues to progress after treatment with this product, switch to another management strategy or herbicide with a different mode of action, if available.
- Contact your local extension specialist or SePRO Corporation for additional pesticide resistance-management and/or integrated weed-management recommendations for specific weed biotypes.

Stewardship Guidelines For Use

Apply this product in compliance with Best Management Practices (BMP) that include site assessment, prescription, and implementation. BMP have been developed to ensure accurate applications, minimize risk of resistance development, and monitor concentrations in water to document levels needed for optimal performance and manage potential irrigation use. SePRO Corporation will work with applicators and resource managers to implement BMP for application and monitoring to meet management objectives and ensure compatibility with potential water uses.

Use Precautions

- There are no restrictions for recreational purposes, including swimming and fishing.

Use Restrictions

- **Obtain Required Permits:** Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.
- **Chemigation:** Do not apply this product through any type of irrigation system.
- For in-water applications, the maximum single application rate is 25.0 Prescription Dose Units (PDU) per acre-foot of water with a limit of three applications per year.
- For aquatic foliar applications, do not exceed 10.0 PDU per acre for a single application, and do not apply more than 20.0 PDU total per acre per year.
- To minimize potential exposure in compost, do not allow livestock to drink treated water.
- Do not compost any plant material from treated area.
- Allow 14 days or greater between applications.
- Do not use water containing this product for hydroponic farming.
- Do not use treated water for any form of irrigation, except as described in the Application to *Water Used for Irrigation on Turf and Landscape Vegetation* section.
- Do not use for greenhouse or nursery irrigation.
- Make applications in a minimum of 10 gallons per acre (GPA) for ground and a minimum of 15 gallons per acre (GPA) for aerial applications.
- Do not apply to salt/brackish water.
- Do not apply ProcellaCOR EC directly to, or otherwise permit ProcellaCOR EC to come into contact during an application, with carrots, soybeans, grapes, tobacco, vegetable crops, flowers, ornamental shrubs or trees, or other desirable broadleaf plants, as serious injury may occur. Do not permit spray mists containing ProcellaCOR EC to drift onto desirable broadleaf plants. Further information on spray drift management is provided in the Spray Drift Management section of this label.
- For treatments out of water, do not permit spray mists containing this product to drift onto desirable broadleaf plants as injury may occur. Further information on spray drift management is provided in the *Spray Drift Management* section of this label.
- Do not allow tank mixes of ProcellaCOR EC to sit overnight. See additional tank mix restrictions below.
- Do not use organosilicone surfactants in spray mixtures of this product.
- Do not tank mix this product with malathion or methyl parathion.
- Do not make an application of malathion or methyl parathion within 7 days of an application of this product. See additional tank mix restrictions below.

Application to Water Used for Irrigation on Turf and Landscape Vegetation

To reduce the potential for injury to sensitive vegetation, follow the waiting periods (between application and irrigation) and restrictions below, and inform those who irrigate with water from the treated area. Follow local and state requirements for informing those who irrigate.

When monitoring ProcellaCOR EC concentrations, analyze water samples using an appropriate analytical method for both the active ingredient and the acid form. Use of HPLC (High-Performance Liquid Chromatography), which is also referenced as FasTEST®, is recommended.

Applications to invasive freshwater aquatic vegetation in slow-moving/ quiescent areas of rivers (coves, oxbows or similar sites).

- Users must be aware of relevant downstream use of water for irrigation that may be affected by the treatment and must ensure all label restrictions are followed. All potential downstream water intakes with irrigation practices that may be affected by the treatment must be documented and affected irrigation users notified of the restrictions associated with such treatment.

Residential and other Non-Agricultural Irrigation (such as shoreline property use including irrigation of residential landscape plants and homeowner gardens, golf course irrigation, and non-residential property irrigation around business or industrial properties. Excludes greenhouse or nursery irrigation).

- Turf Irrigation: Turf may be irrigated immediately after treatment.
- For irrigation of landscape vegetation or other forms of non-agricultural irrigation not excluded above, conduct one of the following:
  - o analytically verify that water contains less than 2 ppb (SePRO recommends use of FasTEST); or
  - o if treated area(s) have the potential to dilute with untreated water, follow the precautionary waiting periods described in the tables 1 and 2 below for in-water or foliar application.

TABLE 1: Non-agricultural irrigation following in-water application

Waiting Period (Days) for Irrigation at Specific Target Treatment Rates (PDU per acre-foot)						
Percent Area of Waterbody Treated*	1-3 PDU	>3-5 PDU	>5.0 to 10.0 PDU	>10.0 to 15.0 PDU	>15.0 to 20.0 PDU	>20.0 to 25.0 PDU
2% or less	6 hours	1 day	1 day	2 days	2 days	3 days
3 - 10%	1 day	3 days	5 days	7 days	10 days	14 days
11 - 20%	3 days	7 days	10 days	10 days	14 days	21 days
21 - 30%	5 days	10 days	14 days	21 days	28 days	35 days
>30%	7 days	14 days	21 days	28 days	35 days	35 days

* Assumes treated area(s) have the potential to dilute with untreated water. If the treated area is not projected to dilute rapidly (example: confined cove area), utilize FasTEST to confirm below 2 ppb or verify vegetation tolerance before irrigation use. Consult a SePRO Aquatic Specialist for additional site-specific recommendations.

TABLE 2: Non-agricultural irrigation following foliar application

Waiting Period (days) for Irrigation at Specific Target Treatment Rates		
Percent Area of Waterbody Treated*	5.0 PDU / acre	>5.0 to 10.0 PDU / acre
10% or less	0.5 day	1 day
11 - 20%	1 day	2 days
>20%	2 days	3 days

* Assumes treated area(s) have the potential to dilute with untreated water. If the treated area is not projected to dilute rapidly (example: confined cove area), utilize FasTEST to confirm below 2 ppb or verify vegetation tolerance before irrigation use. Consult a SePRO Aquatic Specialist for additional site-specific recommendations.

Susceptible Plants

Do not apply where spray drift may occur to food, forage, or other plantings that might be damaged. Spray drift may damage or render crops unfit for sale, use or consumption. Small amounts of spray drift that may not be visible may injure susceptible broadleaf plants. **Before making a foliar or surface spray application, please refer to your state's sensitive crop registry (if available) to identify any commercial specialty or certified organic crops that may be located nearby. At the time of a foliar or surface spray application, the wind cannot be blowing toward adjacent cotton, carrots, soybeans, corn, grain sorghum, wheat, grapes, tobacco, vegetable crops, flowers, ornamental shrubs or trees, or other desirable broadleaf plants.**

Spray Drift Management
Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to limit off-target drift movement from aerial applications:

Aerial Application:
- Aerial applicators must use a minimum finished spray volume of 15 gallons per acre.
- Drift potential is lowest between wind speeds of 2 to 10 mph. Do not apply below
  2 mph due to variable wind direction and high potential for temperature inversion. Do not apply in wind speeds greater than 10 mph.
- To minimize spray drift from aerial application, apply with a nozzle class that ensures coarse or coarser spray (according to ASABE S572) at spray boom pressure no greater than 30 psi.
- The distance of the outer most operating nozzles on the boom must not exceed 70% of wingspan or 80% of rotor diameter.
- Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.
- Do not apply under conditions of a low-level air temperature inversion.
- The maximum release height must be 10 feet from the top of the weed canopy, unless a greater application height is required for pilot safety.

Evaluate spray pattern and droplet size distribution by applying sprays containing a water-soluble dye marker or appropriate drift control agents over a paper tape (adding machine tape). Mechanical flagging devices may also be used. Do not apply under conditions of a low-level air temperature inversion. A temperature inversion is characterized by little or no wind and lower air temperature near the ground than at higher levels. The behavior of smoke generated by an aircraft-mounted device or continuous smoke column released at or near site of application will indicate the direction and velocity of air movement. A temperature inversion is indicated by layering of smoke at some level above the ground and little or no lateral movement.

Ground Application
- Ground applicators must use a minimum finished spray volume of 10 gallons per acre.
- To minimize spray drift from ground application, apply with a nozzle class that ensures coarse or coarser spray (according to ASABE S572).
- For boom spraying, the maximum release height is 36 inches from the soil for ground applications.
- Where states have more stringent regulations, they must be observed.

The applicator should be familiar with, and take into account the information covered in the following Aerial Drift Reduction Advisory (this information is advisory in nature and does not supersede mandatory label requirements.)

Aerial Drift Reduction Advisory
Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see Wind, Temperature and Humidity, and Temperature Inversions).

Controlling Droplet Size:
- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's specified pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is released parallel to the air stream produces larger droplets than other orientations. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type -** Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length: To further reduce drift without reducing swath width, boom must not exceed 70% of wingspan or 80% of rotor diameter.

Application Height: Do not make applications at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Do not make applications below 2 mph due to variable wind direction and high inversion potential. Do not apply in wind speeds greater than 10 mph. Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Do not apply during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of the smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

USE DIRECTIONS
ProcellaCOR EC performance and selectivity may depend on dosage, time of year, stage of growth, method of application, and water movement.

Aquatic Plants Controlled: In-Water Application
Table 3 lists the expected susceptible species under favorable treatment conditions for aquatic plant control. Use of lower rates will increase selectivity on some species listed. Consultation with SePRO Corporation is recommended before applying ProcellaCOR EC to determine best in-water treatment protocols for given target vegetation.

TABLE 3. Vascular aquatic plant control with in-water application

Vascular Aquatic Plants Controlled: In-Water Application	
Common name	**Scientific name**
Floating Plants	
Mosquito fern	*Azolla* spp.
Water hyacinth	*Eichhornia crassipes*
Emersed Plants	
Alligatorweed	*Alternanthera philoxeroides*
American lotus	*Nelumbo lutea*
Floating heart	*Nymphoides* spp.
Water pennywort	*Hydrocotyle umbellata*
Water primrose	*Ludwigia* spp.
Watershield	*Brasenia schreberi*
Submersed Plants	
Bacopa	*Bacopa* spp.
Coontail[1]	*Ceratophyllum demersum*
Hydrilla[1]	*Hydrilla verticillata*
Parrotfeather	*Myriophyllum aquaticum*
Water chestnut	*Trapa* spp.
Watermilfoil, Eurasian	*Myriophyllum spicatum*
Watermilfoil, Hybrid Eurasian	*Myriophyllum spicatum X M.* spp.
Watermilfoil, Variable	*Myriophyllum heterophyllum*

[1] Higher-rate applications within the specified range may be required to control less-sensitive weeds.

Aquatic Plants Controlled: Foliar Application
Table 4 lists the expected susceptible species using labeled foliar rates (5.0 – 10.0 PDU per acre) under favorable treatment conditions for aquatic plant control. Use higher rates in the rate range on more established, dense vegetation. Consultation with SePRO Corporation is recommended before applying ProcellaCOR EC to determine best foliar treatment protocols for given target vegetation.

TABLE 4. Vascular aquatic plant control with foliar application

Vascular Aquatic Plants Controlled: Foliar Application	
Common name	**Scientific name**
Floating Plants	
Mosquito fern	*Azolla* spp.
Water hyacinth	*Eichhornia crassipes*
Emersed Plants	
Alligatorweed	*Alternanthera philoxeroides*
American lotus	*Nelumbo lutea*
Floating heart	*Nymphoides* spp.
Parrotfeather (emersed)	*Myriophyllum aquaticum*
Water pennywort	Hydrocotyle umbellata
Water primrose	*Ludwigia spp.*
Watershield	*Brasenia schreberi*

APPLICATION INFORMATION

Mixing Instructions

In-Water Application to Submersed or Floating Aquatic Weeds
ProcellaCOR EC can be applied undiluted or diluted with water for in-water applications. To dilute with water, it is recommended to fill the spray tank to one-half full with water. Start agitation. Add correct quantity of ProcellaCOR EC. Continue agitation while filling spray tank to required volume and during application.

Foliar Application to Floating and Emergent Weeds
Dilute ProcellaCOR EC with water to achieve proper coverage of treated plants. To dilute with water, it is recommended to fill spray tank to one-half full with water. Start agitation. A surfactant must be used with all post-emergent foliar applications. Use only surfactants that are approved or appropriate for aquatic use. For best performance, a methylated seed oil (MSO) surfactant is recommended. Read and follow all use directions and precautions on aquatic surfactant label. After adding ProcellaCOR EC and surfactant, continue agitation while filling spray tank to required volume and during application.

TANK-CLEANOUT INSTRUCTIONS

ProcellaCOR EC should be fully cleaned from application equipment prior to use for other applications. Contact a SePRO Aquatic Specialist for guidance on methods for thorough cleaning of application equipment after use of the product.

APPLICATION METHODS

In-Water Application to Submersed or Floating Aquatic Weeds
ProcellaCOR EC can be applied via trailing hose, by sub-surface injection, or surface spray as an in-water application to control weeds such as hydrilla, floating heart, water hyacinth, and other susceptible weed species. This product has relatively short exposure requirements for in-water treatments (hours to days), but treatments with high exchange and short exposure periods should be carefully planned to achieve best results. Where greater plant selectivity is desired - such as when controlling hydrilla or other more susceptible species, choose a lower dose in the specified range. A SePRO Aquatic Specialist can provide site-specific prescriptions for optimal control based on target weed, management objectives, and site conditions.

Apply ProcellaCOR EC to the treatment area at a prescription dose unit (PDU) to achieve appropriate concentrations. A PDU is a unit of measure that facilitates the calculation of the amount of product required to control target plants in 1 acre-foot of water or 1 acre for foliar applications. Per Table 5 below, 1-25 PDU are needed to treat 1 acre-foot of water, depending on target species and the percent of waterbody to be treated.

Use Table 5 to select the dose needed to treat 1 acre-foot of water.

TABLE 5: Prescription Dose Units (PDU) per acre-foot of water***

Percent Area of Waterbody Treated	Target Species			
	Eurasian Watermilfoil	Hybrid Watermilfoil	Variable Leaf Watermilfoil	Other
≤ 2%	3 - 4	4 - 5	3 - 5	3 - 25
>2 - 10%	2 - 3	3 - 5	3 - 4	3 - 20
>10 - 20%	1 - 3	3 - 4	2 - 4	3 - 15
>20 - 30%	1 - 2	2 - 3	2 - 3	2 - 10
>30%	1 - 2	2 - 3	1 - 2	1 - 5

* In all cases, user may apply up to the maximum of 25 PDU per acre-foot. Consult your SePRO Aquatics Specialist for site-specific recommendations.
** 1 PDU contains 3.17 fl. oz. of product.

To calculate the amount of product needed in fluid ounces, use the formula below:
Number of acres X average depth (feet) X PDU* X 3.17 = fluid ounces
*: from Table 5

Example Calculation:
To control hybrid watermilfoil in 2 acres of a 5-acre lake (>30% treated) with an average depth of 2 feet:
2 acres X 2 feet X 3 PDU X 3.17 = 38.04 fl. oz.

For in-water applications, the maximum single application is 25.0 PDU / acre-foot, with a limit of three applications per year. Allow 14 days or greater between applications. Product may be applied as a concentrate or diluted with water prior to or during the application process. Use an appropriate application method that ensures sufficiently uniform application to the treated area.

Foliar Application to Floating and Emergent Weeds
Apply ProcellaCOR EC as a foliar application to control weeds such as water hyacinth, water primrose, and other susceptible floating and emergent species. Use an application method that maximizes spray interception by target weeds while minimizing the amount of overspray that inadvertently enters the water.

For all foliar applications, apply ProcellaCOR EC at 5.0 to 10.0 PDU per acre. Use of a surfactant is required for all foliar applications of ProcellaCOR EC. Use only surfactants that are approved or appropriate for aquatic use. Methylated seed soil (MSO) is a recommended surfactant and is typically applied at 1.0% volume/volume. Refer to the surfactant label for use directions. For best results, apply to actively growing weeds. ProcellaCOR EC may be applied more than once per growing season to meet management objectives. Do not exceed 10.0 PDU per acre during any individual application or 20.0 PDU total per acre, per year from all combined treatments.

Foliar Spot Treatment
To prepare the spray solutions, thoroughly mix ProcellaCOR EC in water at a ratio of 5.0 to 10.0 PDU per 100 gallons (0.12 to 0.24% product) plus an adjuvant. For best results, a methylated seed oil at 1% volume/volume is the recommended spray adjuvant. When making spot application, ensure spray coverage is sufficient to wet the leaves of the target vegetation but not to the point of runoff.

Aerial Foliar Application to Floating and Emergent Weeds
Apply ProcellaCOR EC in a spray volume of 15 gallons per acre (GPA) or more when making a post-emergence application by air. Apply with coarse to coarser droplet category per S-572 ASABE standard; see NAAA, USDA or nozzle manufacturer guidelines. Follow guidelines and restrictions in the *Spray Drift Management and Aerial Drift Reduction Advisory* sections to minimize potential drift to off-target vegetation. Aircraft should be patterned per Operation Safe/PAASS program for calibration and uniformity to provide sufficient coverage and control.

Boat or Ground Foliar Application to Floating and Emergent Weeds
When applying ProcellaCOR EC by boat or with ground equipment to emergent or floating-leaved vegetation, use boom-type, backpack or hydraulic handgun equipment. Apply ProcellaCOR EC in a sufficient spray volume (e.g. 20 to 100 gpa) to provide accurate and uniform distribution of spray particles over the treated vegetation while minimizing runoff. Use higher spray volumes for medium to high density vegetation. For boom spraying, use coarse or coarser nozzle spray quality per S-572 ASABE standard; see USDA literature or nozzle manufacturer guidelines. Follow nozzle manufacturer's recommendations for nozzle pressure, spacing and boom height to provide a uniform spray pattern. Follow appropriate spray drift management information where drift potential is a concern.

TANK MIXES WITH OTHER AQUATIC HERBICIDES

DO NOT TANK MIX ANY PESTICIDE PRODUCT WITH THIS PRODUCT without first referring to the following website for the specific product: www.3206tankmix.com. This website contains a list of active ingredients that are currently prohibited from use in tank mixture with this product.

Only use products in tank mixture with this product that: 1) are registered for the intended use site, application method and timing; 2) are not prohibited for tank mixing by the label of the tank mix product; and 3) do not contain one of the prohibited active ingredients listed on www.3206tankmix.com website.

Applicators and other handlers (mixers) who plan to tank-mix must access the website within one week prior to application in order to comply with the most up-to-date information on tank mix partners.

Do not exceed specified application rates for respective products or maximum allowable application rates for any active ingredient in the tank mix.

Read carefully and follow all applicable use directions, precautions, and limitations on the respective product labels. It is the pesticide user's

responsibility to ensure that all products in the mixtures are registered for the intended use. Users must follow the most restrictive directions for use and precautionary statements of each product in the tank mixture.

Always perform a (jar) test to ensure the compatibility of products to be used in tank mixture.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.
Pesticide Storage: Store in original container only. Keep container closed when not in use. Do not store near food or feed. In case of spill or leak on floor or paved surfaces, soak up with vermiculite, earth, or synthetic absorbent.
Pesticide Disposal: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste Representative at the nearest EPA Regional Office for guidance.
Container Handling
Non-refillable Container. DO NOT reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying; then offer for recycling, if available, or reconditioning, if appropriate, or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures approved by state and local authorities.
Triple rinse containers small enough to shake (capacity ≤ 5 gallons) as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.
Triple rinse containers too large to shake (capacity > 5 gallons) as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container ¼ full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank, or store rinsate for later use or disposal. Repeat this procedure two more times.
Pressure rinse as follows: Empty the remaining contents into application equipment or mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank, or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

Warranty Disclaimer: SePRO Corporation warrants that this product conforms to the chemical description on the product label. Testing and research have also determined that this product is reasonably fit for the uses described on the product label. To the extent consistent with applicable law, SePRO Corporation makes no other express or implied warranty of fitness or merchantability nor any other express or implied warranty and any such warranties are expressly disclaimed.

Misuse: Federal law prohibits the use of this product in a manner inconsistent with its label directions. To the extent consistent with applicable law, the buyer assumes responsibility for any adverse consequences if this product is not used according to its label directions. In no case shall SePRO Corporation be liable for any losses or damages resulting from the use, handling or application of this product in a manner inconsistent with its label.

For additional important labeling information regarding SePRO Corporation's Terms and Conditions of Use, Inherent Risks of Use and Limitation of Remedies, please visit *http://seprolabels.com/terms* or scan the image below.

SePRO Corporation
11550 North Meridian Street, Suite 600
Carmel, IN 46032, U.S.A.

SAFETY DATA SHEET

ProcellaCOR EC

Section 1. Identification

GHS product identifier : ProcellaCOR EC

Recommended use of the chemical and restrictions on use

Identified uses : End use herbicide product

EPA Registration No. : 67690-80

Supplier's details :
SePRO Corporation
11550 North Meridian Street
Suite 600
Carmel, IN 46032 U.S.A.
Tel: 317-580-8282
Toll free: 1-800-419-7779
Fax: 317-580-8290
Monday - Friday, 8am to 5pm E.S.T.
www.sepro.com

Emergency telephone number (with hours of operation) **INFOTRAC - 24-hour service 1-800-535-5053**

The following recommendations for exposure controls and personal protection are intended for the manufacture, formulation and packaging of this product. For applications and/or use, consult the product label. The label directions supersede the text of this Safety Data Sheet for application and/or use.

Section 2. Hazards identification

Hazard classification: This material is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Other hazards: No data available.

Section 3. Composition/information on ingredients

Chemical nature: This product is a mixture.

Component	CASRN	Concentration
Florpyrauxifen-benzyl	1390661-72-9	2.7%
Ethylhexanol	104-76-7	2.1%
Methanol	67-56-1	0.9%
Balance	Not available	94.3%

Section 4. First aid measures

Description of first aid measures

General advice: If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air. If person is not breathing, call an emergency responder or ambulance, then give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask etc). Call a poison control center or doctor for treatment advice.

Skin contact: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Eye contact: Hold eyes open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eyes. Call a poison control center or doctor for treatment advice.

Ingestion: No emergency medical treatment necessary.

Most important symptoms and effects, both acute and delayed: Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Indication of any immediate medical attention and special treatment needed

Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Have the Safety Data Sheet, and if available, the product container or label with you when calling a poison control center or doctor, or going for treatment.

Section 5. Fire-fighting measures

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream. May spread fire. General purpose synthetic foams (including AFFF type) or protein foams are preferred if available. Alcohol resistant foams (ATC type) may function.

Unsuitable extinguishing media: No data available

Special hazards arising from the substance or mixture

Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen fluoride. Hydrogen chloride. Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters
Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Consider feasibility of a controlled burn to minimize environment damage. Foam fire extinguishing system is preferred

because uncontrolled water can spread possible contamination. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the "Accidental Release Measures" and the "Ecological Information" sections of this SDS.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Spills or discharges to natural waterways are likely to kill aquatic organisms. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Contain spilled material if possible. Small spills: Absorb with materials such as: Clay. Dirt. Sand. Sweep up. Collect in suitable and properly labeled containers. Large spills: Contact SePRO Corporation for clean-up assistance. See Section 13, Disposal Considerations, for additional information.

Section 7. Handling and storage

Precautions for safe handling: Keep out of reach of children. Do not swallow. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Conditions for safe storage: Store in a dry place. Store in original container. Keep container tightly closed when not in use. Do not store near food, foodstuffs, drugs or potable water supplies.

Section 8. Exposure controls/personal protection

Control parameters: Exposure limits are listed below, if they exist.

Component	Regulation	Type of Listing	Value/Notation
Ethylexanol	Dow IHG	TWA	2 ppm
	Dow IHG	TWA	SKIN
Methanol	ACGIH	TWA	200 ppm
	ACGIH	STEL	250 ppm
	OSHA Z-1	TWA	260 mg/m^3 200 ppm
	ACGIH	TWA	SKIN, BEI

ACGIH	STEL	SKIN, BEI
CAL PEL	C	1,000 ppm
CAL PEL	PEL	260 mg/m^3 200 ppm
CAL PEL	STEL	325 mg/m^3 250 ppm

RECOMMENDATIONS IN THIS SECTION ARE FOR MANUFACTURING, COMMERCIAL BLENDING AND PACKAGING WORKERS. APPLICATORS AND HANDLERS SHOULD SEE THE PRODUCT LABEL FOR PROPER PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING.

Exposure controls

Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use safety glasses (with side shields).

Skin protection

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Chlorinated polyethylene. Neoprene. Polyethylene. Ethyl vinyl alcohol laminate (“EVAL”). Polyvinyl chloride ("PVC" or "vinyl"). Viton. Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber (“latex”). Nitrile/butadiene rubber (“nitrile” or “NBR”). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Other protection: Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Section 9. Physical and chemical properties

Appearance	
Physical State	Liquid
Color	Amber
Odor	Solvent
Odor Threshold	No data available
pH	4.24 (1% aqueous suspension)
Melting point/range	Not applicable to liquids
Freezing point	No data available
Boiling point (760 mmHg)	No data available
Flash point	> 100 °C (> 212 °F)
Evaporation Rate (Butyl Acetate =1)	No data available
Flammability (solid, gas)	Not applicable
Lower explosion limit	No data available
Upper explosion limit	No data available
Vapor pressure	0.0000002 mmHg at 20°C (68°F)
Relative Vapor Density (air = 1)	No data available

Relative Density (water = 1)	0.93
Water solubility	0.015 mg/l at 20°C (68°F)
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	260°C (500 °F)
Decomposition temperature	No data available
Dynamic Viscosity	15.4 mPa.s at 20°C (68°F) 8.90 mPa.s at 40°C (104°F)
Kinematic Viscosity	14.2 mm^2/s at 20°C (68°F) 7.91 mm^2/s at 40°C (104°F)
Explosive properties	Not explosive
Oxidizing properties	Not oxidizing
Liquid Density	0.9257 g/cm3 at 20 °C (68 °F) *Digital density meter*
Molecular weight	No data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

Section 10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.

Chemical stability: Thermally stable at typical use temperatures.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose.

Incompatible materials: None known.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Carbon monoxide. Carbon dioxide. Hydrogen chloride. Hydrogen fluoride. Nitrogen oxides.

Section 11. Toxicological information

Toxicological information appears in this section when such data is available.

Acute toxicity

Acute oral toxicity Very low toxicity if swallowed. Harmful effects not anticipated from swallowing small amounts.
As product: LD50, Rat, female, > 5,000 mg/kg

Acute dermal toxicity Prolonged skin contact is unlikely to result in absorption of harmful amounts.
As product: LD50, Rat, male and female, > 5,000 mg/kg

Acute inhalation toxicity No adverse effects are anticipated from single exposure to mist. Based on the available data, respiratory irritation was not observed.
As product: LC50, Rat, male and female, 4 Hour, dust/mist, > 5.40 mg/l No deaths occurred at this concentration.

Skin corrosion/irritation Brief contact may cause slight skin irritation with local redness.

Serious eye damage/ eye irritation May cause slight eye irritation. Corneal injury is unlikely.

Sensitization Did not cause allergic skin reactions when tested in guinea pigs. For respiratory sensitization: No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)	Evaluation of available data suggests that this material is not an STOT-SE toxicant.
Specific Target Organ Systemic Toxicity (Repeated Exposure)	For the active ingredient(s): Based on available data, repeated exposures are not anticipated to cause significant adverse effects. For the major component(s): Based on available data, repeated exposures are not anticipated to cause significant adverse effects. For the minor component(s): In animals, effects have been reported on the following organs: Blood, kidney, liver, and spleen.
Carcinogenicity	For the active ingredient(s): Did not cause cancer in laboratory animals. For the major component(s): No relevant data found.
Teratogenicity	For the active ingredient(s): Did not cause birth defects or any other fetal effects in laboratory animals. For the major component(s): No relevant data found. For the minor component(s): Has caused birth defects in laboratory animals only at doses toxic to the mother. Has been toxic to the fetus in laboratory animals at doses toxic to the mother. These concentrations exceed relevant human dose levels.
Reproductive toxicity	For the active ingredient(s): In animal studies, did not interfere with reproduction. For the major component(s): In animal studies, did not interfere with reproduction. In animal studies, did not interfere with fertility.
Mutagenicity	In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.
Aspiration Hazard	Based on physical properties, not likely to be an aspiration hazard. No aspiration toxicity classification

Section 12. Ecological information

Ecotoxicological information appears in this section when such data is available.

Toxicity

Acute toxicity to fish	Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L). EC50, *Cyprinus carpio* (Carp), static test, 96 Hour, > 120 mg/l, OECD Test Guideline 203 or Equivalent
Acute toxicity to aquatic invertebrates	Material is slightly toxic to aquatic invertebrates on an acute basis (LC50/EC50 between 10 and 100 mg/L). EC50, *Daphnia magna* (Water flea), 48 Hour, 49 mg/l, OECD Test Guideline 202
Acute toxicity to algae/aquatic plants	Material is very highly toxic to some aquatic vascular plant species. ErC50, *Pseudokirchneriella subcapitata* (green algae), 72 Hour, > 5.4 mg/l, OECD Test Guideline 201 ErC50, *Myriophyllum spicatum*, 14 d, 0.000919 mg/l NOEC, *Myriophyllum spicatum*, 14 d, 0.0000954 mg/l

Toxicity to Above Ground Organisms Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).

oral LD50, *Colinus virginianus* (Bobwhite quail), > 2500mg/kg bodyweight.

oral LD50, *Apis mellifera* (bees), 48 Hour, > 212.2µg/bee

contact LD50, *Apis mellifera* (bees), 48 Hour, >200µg/bee

Toxicity to soil-dwelling organisms LC50, *Eisenia fetida* (earthworms), 14 d, mortality, >2,500 mg/kg

Persistence and degradability

florpyrauxifen-benzyl

Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.
10-day Window: Fail
Biodegradation: 14.6 %
Exposure time: 29 d
Method: OECD Test Guideline 301B

Stability in Water (1/2-life)
Hydrolysis, DT50, 913 d, pH 4, Half-life Temperature 25 °C
Hydrolysis, DT50, 111 d, pH 7, Half-life Temperature 25 °C
Hydrolysis, DT50, 1.3 d, pH 9, Half-life Temperature 25 °C

Ethylhexanol

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).
10-day Window: Not applicable
Biodegradation: > 95 %
Exposure time: 5 d
Method: OECD Test Guideline 302B or Equivalent
10-day Window: Pass
Biodegradation: 68 %
Exposure time: 17 d
Method: OECD Test Guideline 301B or Equivalent

Theoretical Oxygen Demand: 2.95 mg/mg

Chemical Oxygen Demand: 2.70 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	26-70 %
10 d	75-81 %
20 d	86-87 %

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 9.7 Hour
Method: Estimated.

Methanol

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. 10-day Window: Pass
Biodegradation: 99%
Exposure time: 28 d
Method: OECD Test Guideline 301D or Equivalent

Theoretical Oxygen Demand: 1.50 mg/mg

Chemical Oxygen Demand: 1.49 mg/mg Dichromate

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	72 %
20 d	79 %

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Atmospheric half-life: 8-18 d
Method: Estimated.

Balance

Biodegradability: No relevant data found.

Bioaccumulative potential

Florpyrauxifen-benzyl

Bioaccumulation: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).
Partition coefficient: n-octanol/water(log Pow): 5.5 at 20 °C
Bioconcentration factor (BCF): 356 *Lepomis macrochirus* (Bluegill sunfish) 30 d

Ethylhexanol

Bioaccumulation: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).
Partition coefficient: n-octanol/water(log Pow): 3.1 Measured

Methanol

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -0.77 Measured
Bioconcentration factor (BCF): <10 Fish Measured

Balance

Bioaccumulation: No relevant data found.

Mobility in soil

Florpyrauxifen-benzyl

Expected to be relatively immobile in soil (Koc > 5000).
Partition coefficient (Koc): 34200

Ethylhexanol

Potential for mobility in soil is low (Koc between 500 and 2000).
Partition coefficient (Koc): 800 Estimated.

Methanol

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 0.44 Estimated.

Balance

No relevant data found.

Section 13. Disposal considerations

Disposal methods: If wastes and/or containers cannot be disposed of according to the product label directions, disposal of this material must be in accordance with your local or area regulatory authorities. This information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. If the material as supplied becomes a waste, follow all applicable regional, national and local laws.

Section 14. Transport information

DOT Not regulated for transport

Classification for SEA transport (IMO-IMDG):

Proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (Florpyrauxifen-benzyl)
UN number	UN 3082
Class	9
Packing group	III
Marine pollutant	Florpyrauxifen-benzyl
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (Florpyrauxifen-benzyl)
UN number	UN 3082
Class	9
Packing group	III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

Section 15. Regulatory information

OSHA Hazard Communication Standard

This product is not a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

This product is not a hazardous chemical under 29CFR 1910.1200, and therefore is not covered by Title III of SARA.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Pennsylvania Worker and Community Right-To-Know Act:

The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	**CASRN**
Ethylhexanol	104-76-7

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

United States TSCA Inventory (TSCA)

This product contains chemical substance(s) exempt from U.S. EPA TSCA Inventory requirements. It is regulated as a pesticide subject to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requirements.

Section 16. Other information

Hazard Rating System
National Fire Protection Association (U.S.A.)

Health: 1 Flammability: 1 Instability: 0

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
C	Ceiling
CAL PEL	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
Dow IHG	Dow Industrial Hygiene Guideline
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) – Table Z-1 Limits for Air Contaminants
PEL	Permissible exposure limit
SKIN	Absorbed via skin
SKIN, BEI	Absorbed via Skin, Biological Exposure Indice
STEL	Short term exposure limit
TWA	Time weighted average

History

Date of issue mm/dd/yyyy : 10/09/2017

Version : 1.0

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

4.3 EVALUATION OF RINSKOR (PROCELLACOR™)

NOTE: GEI Consultants, Inc. executed a confidential non-disclosure agreement with SePRO Corporation to obtain and review proprietary studies and data. SePRO is working in partnership with Dow AgroSciences to develop this technology for aquatic weed control. In the absence of peer-reviewed journal articles or other scientific literature, these studies—many of which were performed in support of EPA's Office of Pesticide Programs (OPP) registration requirements—were used to prepare the evaluation of the candidate aquatic herbicide.

4.3.1 Registration Status

PROCELLACOR™ (Procellacor™) Aquatic Herbicide (active ingredient Rinskor™, or 2-pyridinecarboxylic acid, 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoro-, phenylmethyl ester; common name: florpyrauxifen-benzyl) has not yet been registered nationally by the EPA or in Washington State by the WSDA under 15.58 Revised Code of Washington (RCW). This SEIS provides technical, environmental, and other information required by Ecology to determine whether to add Procellacor™ to existing water quality NPDES permits, which will allow this herbicide to be discharged to the waters of the State as allowed under the Clean Water Act.

Procellacor™ (as the aquatic use of Rinksor)was granted Reduced Risk status by EPA under the Pesticide Registration Improvement Act (PRIA) Version 3 (https://www.epa.gov/pria-fees/pria-overview-and-history#pria3) in early 2016 (Denny, Breaux, 2016; also see notification letter at Attachment A) because of its promising environmental and toxicological profiles in comparison to currently registered herbicides utilized for partial treatment of hydrilla, invasive watermilfoils, and other noxious plant species. EPA concluded that the overall profile appeared more favorable when compared to the registered alternatives for the proposed use patterns for these noxious species, and that the reduction in risk pertaining to human health was the driving factor in this determination. As discussed later in the document, Procellacor™ shows excellent selectivity with few or limited impacts to native aquatic plants such as aquatic grasses, bulrush, cattail, pondweeds, naiads, and tapegrass. In its review, EPA also noted that the overall profile for the herbicide appears favorable when compared to currently registered alternative herbicides (e.g. 2,4-D, endothall, triclopyr) for this aquatic use pattern. Procellacor™ represents an alternative mode of chemical action which is more environmentally favorable than currently registered aquatic herbicides. Procellacor™ would be expected to offer improvements in IPM for control of noxious aquatic weeds. The alternative mode of action should also help to prolong the effectiveness of many aquatic herbicide solutions by offering a new rotation or combination alternative as part of herbicide resistance management strategies.

The new candidate aquatic herbicide is under expedited review from EPA under the PRIA per the Reduced Risk status designation discussed above, with an anticipated registration date of April 2017. As part of the review, EPA's OPP is also currently conducting human health and ecological risk assessments with an expected date of release in spring 2017. This SEIS document relies on information currently available at this time, much of which necessarily is limited to data provided by Dow AgroSciences and SePRO Corporation in developing and testing the herbicide. It can be revised with more updated information following the release of EPA review information as well as other peer-reviewed literature expected to be released later in 2017. Dow AgroSciences has also concurrently applied to EPA for

registration of the Rinskor active ingredient for weed control in rice paddies. The initial Procellacor™ formulation is expected to be a 300 g TGAI/L suspension concentrate. Control of hydrilla and invasive watermilfoils can be achieved at in-water spot/partial treatment rates of 10 to 50 µg a.i./L with Procellacor™, as opposed to rates of 1,000 to 5,000 µg a.i./L for endothall, 2,4-D, and triclopyr (Getsinger 2016, Beets and Netherland 2017a *in review*, Netherland et al 2017 *in prep*).

This analysis considers Procellacor™'s mode of action, efficacy, and range of in-water treatment concentrations required to achieve control across different water exchange / exposure scenarios. The review discusses results of mesocosm and other field studies conducted in partial site and whole pond treatments, described in more detail below.

To help expedite development and future adoption of the technology, SePRO has been working with numerous partners and collaborators to conduct experimental applications to confirm field efficacy on a variety of target aquatic vegetation, as well as to document non-target effects or impacts. As an unregistered product that does not have a federal experimental use permit, EPA guidelines require that field testing be limited to one acre or less of application per target pest species and that uses of water potentially affected by this application such as swimming, fishing, and irrigation be restricted. The discussion below provides a summary of the herbicides' physical properties, mammalian and ecotoxicological information, environmental fate, and other requirements for EPA registration. Most of these studies have been conducted by Dow AgroSciences and SePRO Corporation in fulfillment of EPA's OPP pesticide registration requirements under FIFRA (as represented by Heilman 2016). As noted above, few peer-reviewed publications have yet been released, although more are expected later in 2017 and beyond.

4.3.2 Description

Procellacor™ is the aquatic trade name for use of a new active ingredient (Rinskor), which is one chemistry in a novel class of herbicides known as the arylpicolinates. The primary end-use formulation anticipated for in-water application at time of registration is a 300 g active ingredient/liter suspension concentrate, but other aquatic use formulations are being considered for registration shortly after the initial EPA decision.

Aquatic herbicides are grouped by contact (controls plant shoots only) vs. systemic (controls entire plant), and by aqueous concentration and exposure time (CET) requirements. In general, contact products are quicker acting with shorter CET requirements, while systemic herbicides are slower acting with longer CET requirements. In light of this, Procellacor™ is quick-acting, has relatively short CET requirements, is systemic, and requires low application rates compared to other currently registered herbicides. Moreover, it has shown short persistence in both water and sediment relative to currently registered herbicides such as endothall, 2,4-D, and triclopyr, is species-selective, and has minimal non-target effects to both plant and animal species. Its effective chemical mode of action and high selectivity for aquatic invasive and noxious plants provides a significant impetus for its development and eventual registration. Procellacor™ has demonstrated this selective, systemic activity with relatively short CET requirements on several major aquatic weed species, including hydrilla and invasive watermilfoils. Netherland and Richardson (2016) and Richardson *et al*. (2016) investigated the sensitivity of numerous aquatic plant species to the compound, and provided verification of Procellacor™'s activity on key

invasives and greater tolerance by the majority of native aquatic plants tested to date. Additional government and university research has documented high activity and different selectivity patterns relative to possible impacts to non-target aquatic vegetation compared to other currently registered, well-documented herbicides such as triclopyr, endothall, and/or 2,4-D (Beets and Netherland 2017a *in review*, Beets and Netherland 2017b *in prep*, Haug and Richardson 2017 *in prep*).

4.3.2.1 Environmental Characteristics: Product Use and Chemistry

Procellacor™ shows excellent activity on several major US aquatic weeds including hydrilla (*H. verticillata*) and multiple problematic watermilfoils (*Myriophyllum spp.)*, including Eurasian (EWM) and hybrid Eurasian (*M. spicatum X M. sibiricum*), parrotsfeather (*M. aquaticum*), and variable-leaf milfoil (*M. heterophyllum*). Procellacor™ provides a new systemic mode of action for hydrilla control and a new class of auxin-mimic herbicide chemistry for selective management of invasive watermilfoils. It also has in-water or foliar herbicidal activity on a number of noxious emergent and floating aquatic plants such as water hyacinth and invasive floating hearts (*Nymphoides spp*.). Procellacor™ has low application rates (50 µg/L or less) for systemic activity with short CET requirements (12 – 72 hours depending on rate and target weed) allowing for spot and/or partial in-water applications. For such treatments, Procellacor™ provides selective control with several hundred times less herbicide use versus current in-water, spot treatment herbicides such as endothall (5,000 µg/L maximum use rate for dipotassium salt form) and 2,4-D (4,000 µg/L maximum use rate). Procellacor™ also appears to show high selectivity with few impacts to native aquatic plants such as aquatic grasses, bulrush, cattail, pondweeds, naiads, and tapegrass (see discussion on selectivity below).

Procellacor™ is effective in controlling hydrilla, and offers a new pattern of selectivity for removing hydrilla from mixed aquatic-plant communities. The strong activity of this new alternative mode of action supports its development for selective hydrilla control. Mesocosm studies summarized by Heilman (2016) and in preparation or under active review for peer-reviewed publication have shown that control of standing biomass of hydrilla and EWM can be achieved in two to three weeks, with high activity even on 2,4-D and triclopyr-tolerant stands of hybrid EWM (Beets and Netherland 2017a *in review*, Netherland et al. 2017 *in prep*). Multiple small-scale laboratory screening studies were conducted to support both target weed activity and regulatory consideration of potential effects of Procellacor™ on non-target aquatic vegetation. The test plant EC_{50} response (herbicide concentration having 50% effect) to static exposures of Procellacor™ was determined for 12 different plant species: the general EC_{50} range was approximately 0.11 µg/L to greater than 81 µg/L (Netherland and Richardson, 2016; Richardson *et al*., 2016). Similar small-scale comparative efficacy testing of Procellacor™ vs. 2,4-D and triclopyr on multiple invasive watermilfoils confirms orders of magnitude greater activity with Procellacor™ versus the older auxin herbicides, including activity on hybrid EWM with documented tolerance to the older herbicides (Beets and Netherland 2017b *in prep*). These findings are promising for Procellacor™, as they support significantly lower herbicide application rates combined with a favorable environmental profile, discussed in more detail below.

4.3.2.2 Environmental Mobility and Transport

Procellacor™/Rinskor is known to have low water solubility (laboratory assay of TGAI: 10 to 15 µg/L at pH 5 to 9, 20^{o}C), low volatility (vapor pressure approx. 10^{-7} mm Hg), with moderately high partition

coefficients (log K_{ow} values of approximately 5.4 to 5.5), which describe an environmental profile of low solubility and relatively high affinity for sorption to organic substrates.

The environmental fate of the herbicide in soil and water has been characterized as part of the registration package and is well understood. The parent compound is not persistent and degrades via a number of pathways including photolysis, aerobic soil degradation, aerobic aquatic degradation, and/or hydrolysis to a number of hydroxyl, benzyl-ester, and acid metabolites. In aerobic soil, Procellacor™ degrades moderately quickly, with half-lives ranging from 2.5 to 34 days, with an average of 15 days. Anaerobic soil metabolism studies also show relatively rapid degradation rates, with half-lives ranging from 7 to 15 days, and an average of 9.8 days. The herbicide is short-lived, with half-lives ranging from 4 to 6 days and 2 days, respectively, in aerobic and anaerobic aquatic environments, and in total water-sediment systems such as mesocosms. These half-lives are consistently rapid compared to other currently registered herbicides such as 2,4-D, triclopyr, and endothall. Degradation in surface water is accelerated when exposed to sunlight, with a reported photolytic half- life in laboratory testing of 0.07 days.

In two outdoor aquatic dissipation studies, as summarized by Heilman (2016), the SC formulation of the herbicide was directly injected into outdoor ponds at nominal rates of 50 and 150 µg/L as the active ingredient. Water phase dissipation half-lives of 3.0 – 4.9 days were observed, which indicates that the material does not persist in the aquatic environment. With conditions similar to wetland and marsh habitat, results from another field dissipation study in rice paddies that incorporated appropriate water management practices for both wet-seeded and dry-seeded rice (also reported by Heilman 2016) resulted in aquatic-phase half-lives ranging from 0.15 to 0.79 days, and soil phase half-lives ranging from 0.0037 to 8.1 days These results do not indicate a tendency to persist in the aquatic environment. The herbicide can be classified as generally immobile based on soil log K_{oc} values in the order of 10^{-5}, and suggest that the potential for off-site transport is minimal. This is consistent with numerous observations that Procellacor™ undergoes rapid degradation in the soil and aqueous environments via a number of degradation mechanisms, summarized above.

4.3.2.3 Field Surveys and Investigations

A human health and ecological risk assessment is currently being conducted by EPA Office of Pesticide Programs. Results of this assessment are expected to be released during spring of 2017 (Denny, 2016), and these conclusions will either support or refute data already collected for Procellacor™. There are no preliminary findings to report, but based on the current understanding of available environmental fate, chemistry, toxicological, and other data, there is little to no cause for concern to human health or ecotoxicity for acute, chronic, or subchronic exposures to Procellacor™ formulations.

4.3.2.4 Bioconcentration and Bioaccumulation

A fish bioconcentration factor study and magnitude of residue studies for clam, crayfish, catfish, and bluegill support that, as anticipated from its physical chemistry and organic affinity, Procellacor™/Rinskor will temporarily bioaccumulate but is rapidly depurated and/or metabolized within freshwater organisms within 1 – 3 days after exposure to high concentrations (150 µg/L or higher). Based on these findings and the low acute and chronic toxicity to a wide variety of receptor organisms, summarized below, bioconcentration or bioaccumulation are not expected to be of concern for the

Procellacor™ aquatic use. EPA's forthcoming human health and ecological risk assessment will include exposure scenarios that will help to further clarify and refine the understanding of bioconcentration or bioaccumulation potential for Procellacor™.

4.3.2.5 Toxicological Profile

Mammalian and Human Toxicity

Extensive mammalian toxicity testing of Procellacor™ has been conducted by the proposed registrant, and results have shown little evidence of acute or chronic toxicity. Acute mammalian toxicity testing for Procellacor™ showed very low acute toxicity by oral or dermal routes (LD_{50} values greater than 5,000 mg/kg). Acute toxicity is also reported low via the inhalation route of exposure (LC_{50} value greater than 5.2 mg/L). Procellacor™ is reported not to be an irritant to eyes or skin and only demonstrated a weak dermal sensitization potential in a mouse local lymph node assay (EC_3 of 19.1%).

Absorption, distribution, metabolism, and elimination profiles have been developed for Procellacor™. In summary, Procellacor™ has demonstrated rapid absorption (T_{max} of 2 hours), with higher absorption rates at lower doses (36 to 42% of the administered dose), rapid hydrolysis, and rapid elimination via the feces (51 to 101%) and urine (8 to 42%) during the first 24 hours following administration to laboratory mammals. In general, the lower doses tested would be more representative of levels potentially encountered by people, mammals, or other organisms.

Based on laboratory testing, Procellacor™ is not genotoxic, and there was no treatment-related toxicity even up to the highest doses tested in the acute, short-term, two generation reproduction or developmental toxicity studies or in the acute or subchronic neurotoxicity studies. Chronic administration of the herbicide did not show any carcinogenicity potential and did not cause any adverse effects in mice, rats or dogs, at the highest doses tested. In summary, studies conducted in support of EPA registration indicate there is little or no concern for acute, short term, subchronic or chronic dietary risk to humans from Procellacor™ applications. Tests have shown no evidence of genotoxicity/carcinogenicity, immunotoxicity, neurotoxicity, subchronic or chronic toxicity, reproductive or developmental toxicity, and only showed evidence of low acute toxicity.

Several studies conducted on both mice and rats, over the course of 1-2 years have indicated no treatment-related (post-necropsy) clinical observations or gross histopathological lesions. An 18-month mouse study was conducted, and no chronic toxicity, carcinogenicity, or other adverse effects were observed, even in those male and female mice receiving the highest doses tested. A 1-year dog study is also ongoing; similar to the above mammalian toxicity tests, no treatment-related toxicity or pathology has yet been observed during this study. Reproductive, developmental, and endocrine toxicity (immunotoxicity) has also been tested, and results of all these tests showed no evidence of toxicity. Although no specific human testing has been conducted for Procellacor™, based on extensive laboratory testing on mammalian species, little to no acute or chronic toxicity would be expected in association with environmental exposures.

General Ecotoxicity

Procellacor™ has undergone extensive ecotoxicological testing and has been shown to be nearly non-toxic to birds in acute oral, dietary, and reproduction studies. Similar to the mammalian testing

summarized above, no toxicity was observed for avian, fish, or other species exposed to the herbicide in acute and long-term studies, with endpoints set at the highest concentration tested, which are well above those actually released as part of label-specified application of Procellacor™. As would be expected for an herbicide, toxicity has been observed to certain sensitive terrestrial and aquatic plants (see plant discussion below).

As noted above, the TGAI of Procellacor™ exhibits low water solubility, and in laboratory aquatic ecotoxicity studies, the highest concentration of TGAI that could be dissolved in the test water (or functional solubility) was approximately 40-60 µg/L in freshwater. The acute and/or chronic endpoints for freshwater fish and invertebrates are generally at, or above, the limit of functional solubility. Additional evaluations indicate a lack of toxicity of the aquatic end-use product (greater functional solubility than the TGAI) and metabolites up to several orders of magnitude above the typical in-water use rates of Procellacor™ (50 µg/L or less).

Fish Ecotoxicity

A variety of fish tests have been conducted in cold and warm water fish species using the TGAI as well as the end-use formulation and various metabolites. Acute toxicity results using rainbow trout (*O. mykiss*, a standard cold water fish testing species) indicated LC_{50} values of greater than 49 µg/L, and greater than 41 µg/L for fathead minnow (*P. promelas*, a standard warm water species). The pure TGAI would not be expected to be released into the environment, and comparable acute ecotoxicity testing was performed for carp using an end-use formulation for Procellacor™. Results indicate an LC_{50} value of greater than 1,900 ug/L for carp (*C. carpio*), indicating much lower acute toxicity potential. A marine toxicity test was identified, where sheepshead minnows (*C. variegatus*) were tested for acute toxicity, and a LC_{50} value of greater than 40 µg/L was produced, which is comparable to freshwater species tested for acute toxicity. This value is indicative of slight acute toxicity potential if environmental concentrations were to be present at these levels, which is unlikely. Comparable acute ecotoxicity testing using various Procellacor™ metabolites indicated LC_{50} values uniformly greater than 1,000 µg/L, indicating a minimal potential for acute toxicity from metabolites. Salmonid toxicity data also indicated no overt toxicity to juvenile rainbow trout at limit of solubility for both the TGAI and end-use formulation at the maximum application rate (40 µg/L). If fish were to occupy a plant-infested littoral zone that was treated by Procellacor™, no toxic exposure would be expected to occur, as toxicity thresholds would not be exceeded by the concentrations predicted to be allowed for use by the FIFRA label.

Fish toxicity testing, in addition to that summarized above, has been planned and is currently under way for sensitive and ESA-listed aquatic species and habitat considerations in the Pacific Northwest, as reported by Grue (2016). The emphasis for this aquatic toxicity testing is on salmonid species (Chinook salmon, bull trout, coho salmon, etc.), which are the most frequently listed and probably the most representative fish species in the Northwest under ESA. The most commonly accepted surrogate fish test species for salmonids is the coldwater salmonid rainbow trout (*O. mykiss*), but to help alleviate additional uncertainty, this additional testing will use age- and species- appropriate salmon species, and is intended to replicate pre-registration toxicity tests with trout. Test endpoints will include acute mortality, growth, and other sublethal endpoints (e.g. erratic swimming, on-bottom gilling, etc.) to evaluate more subtle toxicological effects potentially associated with Procellacor™.

This testing will screen comparable treatments to the trout testing (0, 40 and 80 µg/L Procellacor™, with the latter being well in excess of anticipated maximum labeled use rate). Testing will follow standard guidelines (ASTM, 2002; EPA, 1996) as did the earlier testing (e.g. Breaux, 2015), to ensure comparability. Results from this additional testing are expected to become available by late spring 2017, and will be useful in expanding our understanding of the toxicological properties of Procellacor™ when used in salmon-bearing waters.

Avian Toxicity

As noted above, Procellacor™ has been shown to be of low acute and chronic toxicity to birds as shown in a series of acute oral, dietary, and reproduction studies (Breaux, 2015). Little to no toxicity was observed for avian species exposed to the herbicide in both acute and longer-term chronic studies, with the highest test concentrations exceeded expected labeled rates, a common practice in laboratory toxicology. Bird testing was conducted to include standard test species including mallard duck (*A. platyrhynchos*), the passerine (songbird) species zebra finch (*T. guttata*), and bobwhite quail (*C. virginianus*). Tests involved oral administration for acute and chronic testing and reproductive studies, eggshell thinning, life cycle testing, and other endpoints. In summary, acute oral testing using bobwhite quail and zebra finch yielded LD_{50} values of greater than 2,250 mg/kg-day for both species. Two five-day acute dietary tests were also conducted, which both yielded LC_{50} values of greater than 5,620 mg/kg-day. Subchronic reproductive tests were also conducted for bobwhite quail and mallard ducks both yielded NOEC values of 1,000 mg/kg in the feed. All of these results are highly indicative of little to no toxicity to each of the avian species tested.

No amphibian or reptile toxicity testing was required by EPA Office of Pesticide Programs registration requirements, or conducted as part of the testing regimen for Procellacor™. EPA guidelines generally assert that avian testing is an adequate surrogate for amphibian or reptile testing, and invertebrate and mammalian test results are available as well to support projection of minimal toxicity of Procellacor™ to amphibians or reptiles.

Invertebrate Ecotoxicity

Acute and chronic testing of Procellacor™ with honey bees, the only insect species tested, has indicated no evidence of ecotoxicity to this species (Breaux, 2015). Concerning aquatic invertebrates, acute testing was performed for both the daphnid *D. magna* and the midge *Chironomus* sp. Tests were conducted using both the TGAI and end-use formulation for Procellacor™, as well as various metabolites. Acute toxicity results for the TGAI using *D. magna* indicated LC_{50} values of greater than 62 µg/L, and greater than 60 µg/L for *Chironomus.* This is generally consistent with acute toxicity testing conducted for the freshwater amphipod *Gammarus* sp., for which a NOEC value of 42 µg/L was developed. These results are indicative of little to no acute toxicity to these species. Comparable acute ecotoxicity testing was performed for *D. magna* using a Procellacor™ end-use formulation, and results indicated an LC_{50} value of greater than 80,000 µg/L, also indicating negligible acute toxicity potential. Acute ecotoxicity testing using various metabolites of the herbicide indicated LC_{50} values uniformly greater than 980 µg/L, with most values exceeding 10,000 µg/L, indicating little to no potential for acute toxicity for the metabolites.

Life cycle testing was also completed for a freshwater (*D. magna*) for both the TGAI and metabolites, and results showed a Lowest Observable Adverse Effect Concentration (LOAEC) and an NOAEC of 38

µg/L (both endpoints) showing low toxicity potential for the TGAI in an artificial scenario of static exposure using a renewal protocol design. The spot/partial use pattern of the herbicide and instability of TGAI under natural conditions project to a lack of chronic exposure to aquatic fauna. Comparable testing with metabolites showed LOAEC/NOAEC values both exceeding 25,000 µg/L, indicating negligible levels of toxicity for metabolites. Whole sediment testing using the TGAI for a freshwater invertebrate (chironomid midge) was also conducted for acute (10 day) and chronic (28 day) duration. The chronic test spiked water overlying sediments to a target concentration as the means to initiate exposure. Results of the whole sediment testing indicated an acute 10-day LOAEC of 10.5 mg ai/kg sediment and 28-day NOEC level of 78.5 µg/L (overlying water target concentration), which would generally be indicative of very low to negligible aquatic ecotoxicity.

Additionally, acute screening was recently performed by North Carolina State University (Principal Investigator: Dr. Greg Cope, cited as Buczek *et al.* 2017) on the juvenile life stage of a representative freshwater mussel (*L. siliquoidea*) with the TGAI, a primary metabolite (acid metabolite), and two TEP / formulations (the SC above and a 25 g/L EC formulation). The study showed no toxicity to juvenile mussels in any test with formulated results showing No Effect Concentrations (NOEC) that were 25 – 50 times greater than anticipated maximum application rate for the new herbicide (Cope *et al.* 2017 *in prep*).

Although the proposed registration for Procellacor™ in Washington State will be for freshwater application, it is possible that Procellacor™ would be applied near marine or estuarine habitats for weed control. Acute toxicity testing, using TGAI, conducted on the eastern oyster (*C. gigas*) produced an NOEC of greater than 24 µg ai/L and a comparable NOEC value for mysid shrimp (*M. bahia*) of greater than 26 ug ai/L, both the highest rates tested due to solubility limits with assays. Comparable NOEC values developed for primary aquatic end-use formulation were greater than 1,100 and 1,350 µg/L as formulated product (>289 and >362 µg/L as active ingredient), respectively, for the oyster and shrimp.

Marine invertebrate life cycle testing was conducted using the TGAI on a mysid shrimp) and a chronic NOAEC of 7.8 µg/L (LOAEC of 13 µg/L) was developed, which is potentially indicative of chronic toxicity to marine or estuarine invertebrates if these sustained concentrations were attained in environmental settings. Acute NOECs for oyster and mysids tested with the TGAI were set at the highest mean measured rate of tested material. There were no adverse effects noted in those studies. There are potential unknowns with possible effects with acute exposures to concentrations greater than 24-26 µg/L, but range finding-finding toxicity testing demonstrated that this range of concentrations were the highest limits to maintain solubility of TGAI in the assays.

In practice, due to rapid degradation of the TGAI in the field, rapid dilution from spot applications (main use pattern), and not labelling for estuarine and marine sites will mitigate any chance of acute exposures to marine invertebrates above the range of mid-20 µg/L. Chronic toxicity results for mysid shrimp do suggest possible chronic effects at 7.8 µg/L, with extended exposures to the TGAI. Again, however, the use pattern is not intended for estuarine/marine application with the initial labelling. The use pattern in freshwater is spot/partial treatments with negligible chance of sustained TGAI concentrations migrating downstream to estuarine habitat even if the freshwater site was in close proximity to an estuarine area. In general, the labeled freshwater use for spot/partial applications (high dilution potential) to control noxious freshwater aquatic plants and the rapid degradation of the TGAI

suggest minimal risk to marine and estuarine invertebrates following application to a nearby freshwater site. Metabolite testing with marine species yielded NOECs of greater than 25,000 µg/L, indicating negligible toxicity.

Data Gaps

No data gaps have been identified for the basic environmental profile, including environmental fate, product chemistry, toxicology and ecotoxicology, and field studies required by EPA for pesticide registration. However, a number of recent trials are currently in review (e.g., Beets and Netherland 2017a) or in preparation for publication (e.g. Beets and Netherland, 2017b, Netherland *et al.* 2017, Haug *et al.* 2017). These, along with the continued use of Procellacor™ under a variety of plant management scenarios, will add valuable information that can be incorporated into the product labels, improved treatment profiles and potentially required mitigation measures.

4.3.3 Environmental and Human Health Impacts

4.3.3.1 Earth

Soil and Sediments

Procellacor™ has moderately high measured K_{ow} and K_{oc} partition coefficients, with log K_{ow} and K_{oc} values of approximately 5.4 to 5.5, or about 10^{-5}, which supports low solubility and demonstrates a relatively high affinity for sorption to organically enriched substrates such as soils or sediments. However, as noted above, in aerobic soil Procellacor™ degrades quickly, with half-lives ranging from 2.5 to 34 days, with an average of 15 days. Anaerobic soil metabolism studies are similar, showing relatively rapid degradation rates with half-lives ranging from 7 to 15 days, and an average of 9.8 days. This rapid degradation in the soil and sediment environment strongly suggests low persistence in these media. Due to the low acute and chronic toxicity described below, low to negligible impacts are expected in soils and sediments adjoining Procellacor™ treatment areas. The herbicide can be classified as largely immobile based on soil log K_{oc} values in the order of 10^{-5}, and that potential for off-site transport would be minimal.

Agriculture

At anticipated use concentrations, irrigation or flooding of crops with water treated with Procellacor™ are not expected to damage crops or non-target wild plants, except under scenarios not addressed in the forthcoming EPA label.

Terrestrial Land Use

At anticipated use concentrations, water reentry or swimming in water treated with Procellacor™ is not expected to cause dermal, eye, or other irritation or toxicity to human or wildlife species.

4.3.3.2 Water

Surface Water and Runoff

Procellacor™ is known to have low water solubility (about 15 µg/L in lab testing) and the parent compound is not persistent and is known to quickly degrade via a number of well-established pathways.

As discussed above, the herbicide is short lived in aerobic and anaerobic aquatic environments in a total water-sediment system. When exposed to direct sunlight, degradation in surface water is even more accelerated, with a reported photolytic half-life as little as 0.1 days.

The two outdoor aquatic dissipation studies summarized above further support this rapid dissipation and low impact. Both studies show that when Procellacor™ was directly injected into outdoor freshwater ponds at nominal rates of 50 and 150 µg/L, very rapid water-phase dissipation half-lives (3 to 4.9 days) were observed. These characteristics strongly suggest that the potential for off-site transport or mobility is minimal. As noted above, Procellacor™ undergoes rapid degradation in both soil and aqueous-phase environments via a number of degradation mechanisms.

No use for aquatic vegetation management in marine or estuarine water using Procellacor™ will be labeled at this time in Washington State (Heilman, 2016).

No specific studies or exposure scenarios were identified where drift or runoff were specifically investigated, but the forthcoming EPA risk assessment for Procellacor™ is expected to address these scenarios. For drift, the low vapor pressure (approximately 10^{-7} mm Hg) indicates that the material is not prone to volatilize following application, thus minimizing drift potential, and the low water solubility, low acute and chronic toxicity, along with minimal potential for persistence suggest that potential hazards associated with surface water runoff would be minimal.

Groundwater and Public Water Supplies

Few studies have yet been completed for groundwater, but based on known environmental properties concerning mobility, solubility, and persistence, Procellacor™ is not expected to be associated with potential environmental impacts or problems in groundwater.

In laboratory aquatic ecotoxicity studies, the highest concentration of TGAI that could be dissolved in the test water (or functional solubility) was approximately 40-60 µg/L in freshwater and 20-40 µg/L in saltwater. This is due to the low water solubility of the active ingredient and limits the range for which these toxicity tests can be conducted. This finding suggests that the water chemistry of Procellacor™ would limit potential environmental impacts to groundwater or surface water.

Impacts to public water supplies are expected to be low to negligible based on the low solubility, low persistence, and low acute and chronic toxicity of Procellacor™. Section 4.3.4 discusses possible measures or best management practices (BMPs) that could be used to further reduce potential impacts to public water supplies. The Ecology permit has mitigation that requires permittees to obtain an approval letter for this treatment prior to obtaining coverage under the permit.

4.3.3.3 Wetlands

The habitat and aquatic structure found in rice paddies is similar to those in a wetland and marsh environments, making the studies reported by Heilman (2016a) and Netherland and Richardson (2016) important tools for this analysis. The wetland and marsh study, discussed above in Section 4.3.2.2., incorporated appropriate water management practices for both wet-seeded and dry-seeded rice, and reported rapid aquatic-phase half-lives ranging from 0.15 to 0.79 days, and soil phase half-lives were also rapid, ranging from less than 0.01 to 8.1 days.

4.3.3.4 Plants

Algae

Limited ecotoxicity testing using a growth endpoint was conducted for two species of freshwater algae, including a diatom and green algae. These tests showed EC_{50} values using the TGAI of greater than 40 and 34 µg/L, respectively (solubility limit of assays). These results indicate that Procellacor™ is generally not toxic to green algae, freshwater diatoms, or blue-green algae at the anticipated label rate. Metabolite testing showed little toxicity to these algae, with no EC_{50} value less than 450 µg/L. Comparable growth testing was also conducted using the end-use formulation for aquatic algal plant growth, and results showed an EC_{50} greater than 1,800 µg/L (480 µg/L as active), with a NOAEC of 420 µg/L of formulation (111 µg/L as active), again showing a lack of toxicity to algae within anticipated label use rates. A comparable test of the TGAI was performed for cyanobacteria (blue-green algae), and results showed an EC_{50} of greater than 45 µg/L, with a calculated NOAEC value of 23.3 µg/L, showing little evidence of toxicity for any of these species.

Higher Plants and Crops

Procellacor™ is known to have strong herbicidal activity on key target aquatic invasive species, and testing shows that many native plants are able to tolerate Procellacor™ at exposure rates greater than what is necessary to control key target invasives. Data collection is still underway for specific toxicity to non-target plant species. Initial results of a 2016 collaborative mesocosm study conducted in Texas, for which results will be formally available later in 2017 indicate favorable selectivity by Procellacor™ of multiple invasive watermilfoils in the presence of representative submersed aquatic native plants (Netherland *et al.* 2017 *in prep*). Aquatic native plants challenged in this study included tapegrass, Illinois pondweed, American pondweed, waterweed, and water stargrass. Using aboveground biomass as a response endpoint, no significant treatment effects were observed with tapegrass or American/Illinois pondweed. Similarly, no statistically significant treatment effects were observed with stargrass, although injuries were observed at higher rates and exposures, although it was much more tolerant than the two target milfoil species. Other mesocosm studies have shown similar responses in white water lily with other non-target species including Robbins pondweed, American pondweed, and multiple bladderwort species showing little or no discernible impact. Richardson *et al*. (2016) and Haug and Richardson (2017 *in prep*) report that Procellacor™ provides a new potential for selectivity for removing hydrilla from mixed aquatic-plant communities. They recommend that further research should be conducted to further characterize observed patterns of selectivity.

4.3.3.5 Habitat

Impacts to critical habitat for aquatic plant or animal species are expected to be minimal, and may benefit critical habitat overall by supporting plant selectivity. Procellacor™ is generally of a low order or acute and chronic toxicity to plants and animals and generally does not persist in the environment. Due to its documented selectivity, Procellacor™ would allow many native non-target plants to thrive and thus enhance quality habitat. Removing noxious aquatic plants creates open spaces in the littoral zone that may be recolonized by not only native plants but other invasive plant species.

For example, when left unchecked, dense stands of unwanted weeds such as watermilfoil, parrotsfeather, hydrilla, or numerous other noxious plant species can negatively impact critical salmonid or other habitat used at all life stages, as well as habitats to a wide variety of plant and animal species, including vulnerable life stages. Stands of invasive weeds can reduce water flow and circulation, thus impeding navigation for migrant salmonids. Such stands can also provide ambush cover for predatory species such as bass, which prey on critical juvenile and other salmonid life stages. Moreover, noxious plants may outcompete native plant species, thus reducing overall biodiversity and reducing overall habitat quality. Dense stands may also be conducive to creating warmer water (through reduced circulation and dissolved oxygen sags), and could become subject to wide fluctuations in water quality (e.g. temperature, dissolved oxygen (DO)) on a diurnal/seasonal basis.

4.3.4 Mitigation

4.3.4.1 Use Restrictions

Procellacor™ should only be used for the control of aquatic plants in accordance with label specifications. No data gaps have been identified for the basic environmental profile required by EPA for pesticide registration, although continued use of Procellacor™ under a variety of plant management scenarios will add valuable information that can be incorporated into improved treatment profiles and possible mitigation measures. For potential future irrigation with Procellacor™-treated water, final EPA labeling will include guidance on appropriate water use. Such restrictions can be refined once the human health and ecological risk assessment currently being conducted by EPA are released in spring 2017. The proposed label language is expected to reflect fewer application-related restrictions than other herbicides. Lower levels of personal protective equipment (PPE) for workers will be required, which is consistent with lower use rates, lower water use restrictions, and minimal effects to crops or other non-target species.

4.3.4.2 Swimming and Skiing

Recreation activities such as swimming, water skiing and boating are expected to be unaffected by applications or treatments using Procellacor™ herbicide formulations.

4.3.4.3 Irrigation, Drinking and other Domestic Water Uses

As a mitigation measure for experimental purposes, irrigation has been and will continue to be restricted until the herbicide has dissipated. In addition, Ecology's Aquatic Plant and Algae permit provides specific mitigation measures for irrigation water and water rights. Following registration, however, no water use restrictions are anticipated for the product use label except for some forms of irrigation. Any such restrictions will be specified on the final label language in collaboration with EPA. Procellacor™ is not expected to have any restrictions for watering turf. Before irrigation use on potentially sensitive crops or other plants, the final label language is anticipated to require concentrations to be analytically verified to less than 1 µg/L. Restrictions on irrigation use on sensitive plants may alternatively or additionally include times of post-application restrictions, depending on use rates and scale/locations of application. These options are currently being reviewed with EPA.

Drinking water is not expected to be affected by Procellacor™ applications.

4.3.4.4 Fisheries and Fish Consumption

Neither fisheries nor human fish consumption are expected to be affected by application of Procellacor™ herbicides. If there is potential to impact listed salmonid species (e.g. salmon, steelhead, bull trout, etc.) Ecology would enforce a fish timing window that would be protective of those species. Guidance for such timing windows are found at: http://www.ecy.wa.gov/programs/wq/pesticides/final_pesticide_permits/aquatic_plants/permitdocs/wdfwtiming.pdf.

4.3.4.5 Endangered Species

Data are limited for specific listed threatened or endangered species under the ESA, however, a number of carefully designed and relevant laboratory toxicity tests for endangered species are currently under way, as discussed above. These tests will increase available testing data and enhance our understanding of how to more effectively protect non-target listed and vulnerable species, with particular emphasis on ESA-listed salmonid species such as salmon species, steelhead, and bull trout.

4.3.4.6 Wetlands or Non-Target Plants

Ecology's APAM permit outlines specific restrictions on what can be treated in wetlands. For example, in identified wetlands, the APAM specifies that the permittee "may treat only *high use areas* to provide for safe *recreation* (e.g., *defined swimming corridors*) and boating (e.g., *defined navigation channels*) in *identified and/or emergent wetlands.* The permittee must also limit the treated area to protect native wetland vegetation. However, final mitigation measures and best management practices concerning potential effects to beneficial or desirable wetland plant species will be developed in conjunction with testing on higher plants, some of which may occur in wetlands.

In general, effects to wetlands are anticipated to be minimal. Toxicity to fish, invertebrates, wildlife, and non-target plants would not generally be expected, and persistence (and thus food chain effects) would also be minimal. No specific toxicity testing was required or conducted for amphibians or reptiles which are ubiquitous in wetlands, but test results from invertebrate, avian, mammalian and other test species would be expected to serve as representative surrogate species for amphibians and reptiles.

Regarding potential impacts to rare or endangered plants occurring in wetlands, Ecology uses the Washington Department of Natural Resources (WDNR) Natural Heritage Site guidelines to determine if rare plants are likely to occur in the treatment area. If rare plants may be present at the treatment site, Ecology would require a field survey, and if such plants are found mitigation would be required.

4.3.4.7 Post-treatment Monitoring

EPA, Ecology, and other agencies routinely require both short- and long-term post-treatment monitoring for the purpose of evaluating non-target effects from herbicides such as Procellacor™. For Ecology, this post-treatment monitoring would be required under the permit, and would be a permit condition requiring monitoring to determine potential non-target impacts. These requirements will be incorporated into both label and permit, as appropriate, in conjunction with pesticide registration prior to application.

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Agency of Natural Resources
Department of Environmental Conservation

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MEMORANDUM

To: Misha Cetner, Permit Analyst, Lakes & Ponds Section

Cc: Pete LaFlamme, Director, WSMD
Bethany Sargent, Manager, Monitoring and Assessment Program (MAP)
Oliver Pierson, Manager, Lakes and Ponds Program

From: Rick Levey, Environmental Scientist, MAP

Date: March 5, 2020

Subject: Aquatic Nuisance Control Permit, ProcellaCOR EC Aquatic Toxicity Review

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Aquatic Nuisance Control Permit (ANCP) applications propose use of the aquatic herbicide product ProcellaCOR EC with the active ingredient florpyrauxifen-benzyl, to help control the growth and spread of the aquatic nuisance plant Eurasian watermilfoil. ProcellaCOR EC received its full aquatic registration from EPA in February 2018 (EPA Registration #67690-80) and is registered for use in Vermont.

ProcellaCOR EC was granted Reduced Risk status by EPA under the Pesticide Registration Improvement Act (PRIA) because of its promising environmental and toxicological profiles in comparison to currently registered herbicides utilized for treatment of invasive watermilfoils, and other noxious plant species.

This memorandum provides a review of the proposed use of ProcellaCOR EC and the potential impact on non-target aquatic animals. The 2017 EPA Environmental Fate and Ecological Risk Assessment for florpyrauxifen-benzyl was the primary source of data reviewed. Florpyrauxifen-benzyl is practically non-toxic on an acute basis to bees, reptiles, fish, birds and mammals. Toxicity to fish and aquatic organisms was not observed, in most cases, at the highest levels tested.

Application rates of 2 - 4 Prescription Dose Units (PDUs) / per acre-foot will result in a maximum florpyrauxifen-benzyl concentration of 7.72 ppb (range 3.86 ppb – 7.72 ppb). These application rates are less than 20 percent of the maximum allowable application rate, which allows use of up to 25 PDUs per acre-foot, which corresponds to approximately 50 ppb.

ProcellaCOR EC exhibits low water solubility (~15 ppb), and in laboratory aquatic ecotoxicity studies, the highest concentration that could be dissolved in the test water was approximately 40-60 ppb. When applied directly to aquatic sites, ProcellaCOR EC is expected to dissipate quickly, with rapid photolysis (<1day) and aerobic aquatic metabolism (4-6 days) as the major routes of degradation. ProcellaCOR EC is also degraded by sunlight.

Review of ecotoxicity studies based on maximum label rate of 50 ppb, indicates parent compound and degradates show toxicity levels are well above the application rates used in aquatic environments. Therefore, the potential for acute risk to fish, invertebrates, amphibians, birds and mammals is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.

For aquatic animals, only the parent compound was considered the stressor of concern. Available toxicity data shows that the degradates of ProcellaCOR EC are less toxic to aquatic animals than the parent compound. Acute ecotoxicity testing using various ProcellaCOR EC metabolites indicated lethal concentration (LC50) values uniformly greater than 1,000 ppb, indicating a minimal potential for acute toxicity from metabolites.

ProcellaCOR EC was not acutely toxic up to its functional limit of solubility (40 ppb) in tests on freshwater invertebrates and freshwater fish, including rainbow trout, fathead minnow and common carp. It was not chronically toxic to freshwater fish up to limit of functional solubility. The freshwater fish studies served as surrogate for aquatic-phase amphibians. Chronic toxicity to freshwater invertebrates was accomplished with 21-day chronic test performed on *Daphnia magna*, the most sensitive endpoint from testing was a No Observable Adverse Effect Concentration (NOAEC) of 38.5 ppb.

Toxicity testing with juvenile rainbow trout indicated no toxicity at limit of solubility application rate (40 ppb). If fish were to occupy a plant-infested littoral zone that was treated by ProcellaCOR EC, no toxic exposure would be expected to occur, as toxicity thresholds would not be exceeded.

Bioaccumulation data in fish showed low bioconcentration factors and rapid depuration, suggesting extensive metabolism, and limited risk to predatory birds and mammals that may consume fish. Metabolism data for mammals also demonstrates extensive metabolism, indicating bioaccumulation is unlikely. ProcellaCOR EC is also short lived in aquatic metabolism systems (2-6 days), which further limits its potential for bioaccumulation in the environment. Acute and chronic effects on birds were studied in bobwhite quail and mallard duck, results indicated ProcellaCOR EC is practically non-toxic, with effect concentrations magnitudes of order greater than application rates.

No data gaps have been identified for the basic environmental profile of ProcellaCOR EC, including environmental fate, product chemistry, toxicology and ecotoxicology, and field studies required by EPA for pesticide registration.

Based on this review, the potential for acute and chronic risks to fish, aquatic invertebrates, amphibians and other aquatic animals is considered low. Any potential chronic toxicity of concern would be short lived due to dissipation in the environment. Acute and chronic risks are further limited by the functional solubility of the product. These findings support the conclusion that the proposed use of ProcellaCOR EC under ANCP applications at application rates of 2 – 4 PDUs / per acre-foot pose an acceptable risk to the non-target aquatic biota and environment.

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Agency of Human Services

M E M O R A N D U M

TO: Misha Cetner, Department of Environmental Conservation

FROM: Sarah Vose, State Toxicologist

SUBJECT: Aquatic Nuisance Control Permit, ProcellaCOR, EPA Registration 67690-80

DATE: April 27, 2021

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The Vermont Department of Environmental Conservation (DEC) recently received an aquatic nuisance control permit application that proposes use of the aquatic herbicide product ProcellaCOR with the active ingredient florpyrauxifen-benzyl, to help control the growth and spread of the aquatic nuisance plant Eurasian watermilfoil.
Per the request of DEC, the state of Vermont Department of Health (Health) has examined the product proposed for use at Lake Fairlee in 2021 and the potential level of concern for public health that may be associated with exposure to water that has been treated with such.

The EPA label for ProcellaCOR does not include any restrictions on use of the treated water for domestic (including drinking and cooking) or recreational use. The proposed treatments at Lake Fairlee would result in a maximum florpyrauxifen-benzyl concentration of 7.72 ppb, or ~4 PDUs. The EPA label allows use of up to 25 PDUs, which corresponds to roughly 50 ppb. While EPA identified no adverse impacts in animals across the required toxicology studies, Health selected a point of departure of 300 mg/kg/day and derived a chronic oral reference dose of 3 mg/kg/day. Use of this chronic oral reference dose in Health's standard drinking water equations, assuming daily exposure to a 0-1 year old, gives a drinking water health advisory of 3,429 ppb. The drinking water health advisory for florpyrauxifen-benzyl is over 400 times higher than the highest proposed concentration in the treated areas, and over 60 times higher than the highest use amount allowed on the EPA label.

Based on a review of the confidential statement of formulation, it is reasonable to conclude that human exposure to the inert compounds contained in ProcellaCOR at the concentrations that would result under the conditions proposed by the applicants, is not likely to result in an increase in the level of concern for public health. Thus, the proposed treatment of Lake Fairlee with ProcellaCOR is expected to result in negligible risk to public health, from both the active and inert compounds in ProcellaCOR.

Public notification of property owners and residents of the treated water body area as well as commercial camps and parents whose children are attending camps which use the treated water body and/or waters within one contiguous watermile of the treated water body should occur 30 days prior to application. Water body access areas as well as any nearby campgrounds should be posted for public awareness.

APPENDIX D

- **2021 Aquatic Plant Survey**
- **Lake Fairlee Association Pesticide Minimization Measures**

LAKE FAIRLEE

Aquatic Vegetation Management Program

2021 Annual Report

December 2021

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SŌLITUDE
LAKE MANAGEMENT

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Appendices

1.0 INTRODUCTION

A comprehensive Eurasian watermilfoil (*Myriophyllum spicatum*) management program has been conducted at Lake Fairlee since 2009. Lake Fairlee is a 457-acre lake located in Fairlee, West Fairlee and Thetford, Vermont, with reported maximum and average water depths of 50 and 23 feet, respectively. Through the years, milfoil has been distributed in varying densities throughout the littoral zone. Management efforts have included Renovate (triclopyr) herbicide treatments, hand-pulling, diver assisted suction-harvesting (DASH) and benthic barrier installation.

The following report summarizes the late season comprehensive aquatic plant survey that has been performed annually to document the late-season vegetation composition within the lake and allows for quantitative comparison to survey results from prior years. Reports documenting the survey and management activity results for Lake Fairlee have been annually prepared and submitted to the Lake Fairlee Association and VT DEC.

2.0 MANAGEMENT SUMMARY 2010-2021

Table 1. Management activities, 2010-2021 seasons

Year	Management
2010	- 128 acres treated with Renovate OTF - Hand-pulling performed
2011	- No treatment performed - Hand-pulling performed - Installed benthic barriers in Middlebrook
2012	- No treatment performed - Hand-pulling performed
2013	- 30 acres treated with Renovate OTF
2014	- No treatment performed
2015	- 60 acres treated with Renovate OTF
2016	- No treatment performed
2017	- No treatment performed - 12 days of DASH performed
2018	- 79 acres treated with Renovate OTF
2019	- No treatment performed
2020	- No treatment performed
2021	-No treatment performed

3.0 LATE SEASON AQUATIC VEGETATION SURVEY

3.1 Methods

The late season comprehensive aquatic vegetation survey was conducted on September 23, 2021. A point-intercept survey was completed and survey methodology from past years was replicated (Appendix A). A total of 120 data points, based on an 80-meter grid throughout the littoral zone, were surveyed (Figure 1).

In addition to the point-intercept survey, a visual qualitative survey of the lake's littoral zone was also conducted. This survey helps to identify areas of EWM growth that may be outside the boundaries of the data points, while providing a more representative spatial distribution of EWM. All occurrences of EWM were marked with a GPS unit.

Recorded at each data point was the following information: aquatic plants present, dominant species, plant biomass, percent total plant cover and percent EWM cover. Water depths that were verified using a high-resolution depth finder. The plant community was assessed through visual inspection, use of a throw-rake and when necessary, with an Aqua-Vu underwater camera system. Locations where EWM plants were observed were recorded with a GPS unit. Plants were identified to genus and species level when possible. Plant cover was given a percentage rank based on the areal coverage of plants within an approximate 400 square foot area assessed at each data point. Generally, in areas with 100% cover, bottom sediments could not be seen through the vegetation; percentages less than 100% indicated the amount of bottom area covered by plant growth. The percentage of EWM was also recorded at each data point. In addition to cover percentage, a plant biomass index was assigned at each data point to document the amount of plant growth vertically through the water column. Plant biomass was estimated on a scale of 0-4, as follows:

0 No biomass; plants generally absent
1 Low biomass; plants growing only as a low layer on the sediment
2 Moderate biomass; plants protruding well into the water column but generally not reaching the water surface
3 High biomass; plants filling enough of the water column and/or covering enough of the water surface to be considered a possible recreational nuisance or habitat impairment
4 Extremely high biomass; water column filled and/or surface completely covered, obvious nuisance conditions and habitat impairment severe

Field data and the location for each data point is provided in Appendix A.

3.2 Point-Intercept Survey Results

Twenty (20) native species and one (1) invasive species were identified during the survey. This is a decrease of nine species in comparison to last year, (Table 2). Forty-four (44) of the 120 survey points did not support any aquatic vegetation growth, which is a mild decrease from 2020's forty-six non-vegetated points; however, growth was present out to depths of approximately 18 feet, which is consistent with prior years.

Average species richness was 2.6 species per data point, a decrease of 0.8 from 2020. The 2021 decrease in species richness can be attributed to the decrease in the number of species observed.

Table 2. Annual Number of Species Observed and Average Species Richness

Year	Number of Species Observed	Average Species Richness (per survey point)
2009	11	-
2010	14	1.3
2011	15	1.4
2012	16	1.7
2013	16	1.5
2014	18	1.0
2015	27	3.0
2016	22	2.8
2017	18	2.0
2018	24	3.1
2019	24	3.2
2020	30	3.4
2021	21	2.6

'-' indicates data was unavailable for that year

Observed at 47% of the survey points, *Potamogeton robbinsii* was again the most commonly encountered species in Lake Fairlee. The next most abundant species observed, in decreasing order of abundance, were: *Potamogeton amplifolius (40%), Myriophyllum spicatum (35%),* and *Vallisneria americana (31%), and Elodea (21%).* All other species were observed at equal or less than 20% FOC.

EWM has continued to increase in abundance since the last herbicide application in 2018. Eurasian watermilfoil has continued to increase by 13% since 2019. The 2018 herbicide application provided a few years of control. At most survey points, Eurasian watermilfoil was present at primarily trace to sparse abundances (trace=30, sparse=9) which indicates that some level of control is being sustained. Only 3 survey points were considered present with moderate to dense abundance of Eurasian watermilfoil (moderate=1, dense=2).

The table below highlights the species identified and their frequency of occurrence for annual surveys 2009-2021.

Table 3. Aquatic plant species frequency of occurrence and comparison, 2009-2021

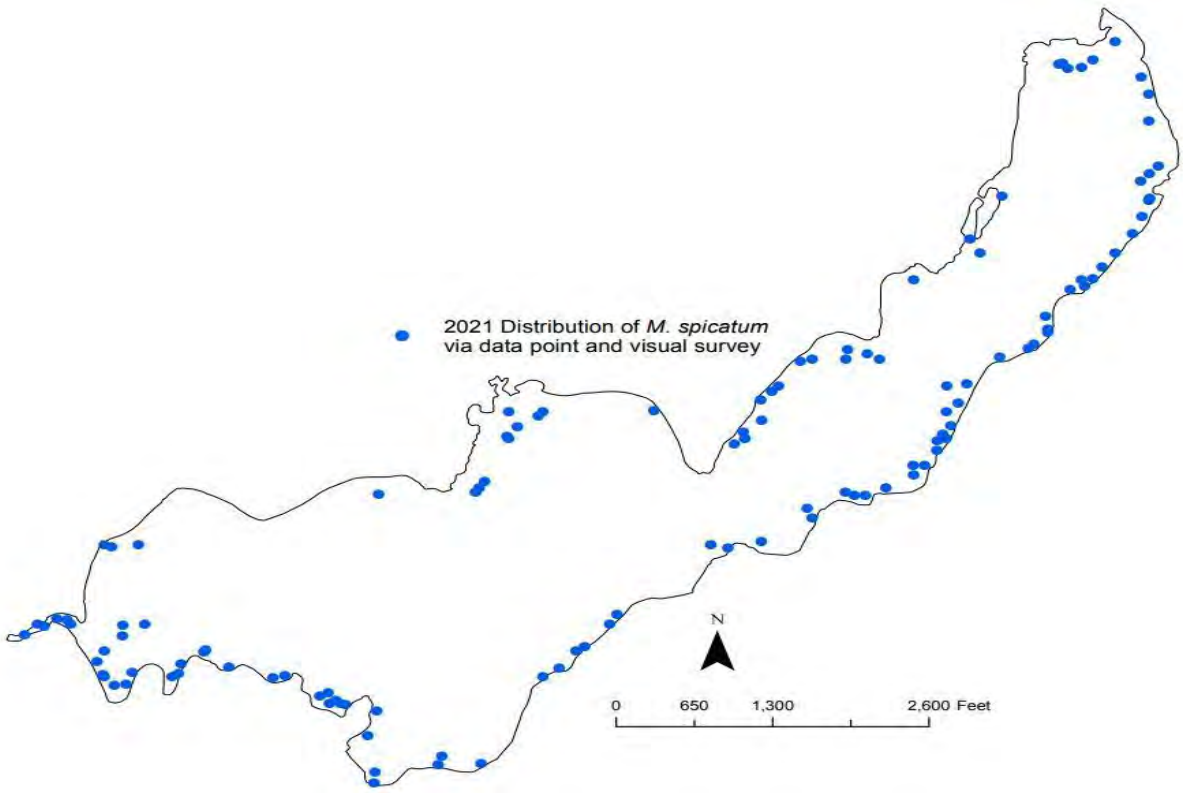
Species (Common Name / Scientific Name)	Frequency of Occurrence (%)												
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Water marigold *Bidens beckii*	30	18	7	8	16	13	7	19	11	24	18	19	20
Watershield *Brasenia schreberi*	2	1	0	1	1	2	2	3	1	5	6	3	6
Coontail *Ceratophyllum demersum*	1	0	0	1	0	4	0	0	0	3	0	<1	0
Spineless hornwort *Ceratophyllum echinatum*										2	2	<1	<1
Muskgrass / Stonewort *Chara / Nitella* sp.										45	18	26	9
Spikerush *Eleocharis spp.*												2	0
Common waterweed *Elodea canadensis*	23	3	11	26	22	19	12	24	18	0	0	<1	21
Pipewort *Eriocaulon* sp.										3	0	3	0
Quillwort *Isoëtes* spp.	2	3	0	2	2	0	0	0	1	0	0	<1	0
Water lobelia *Lobelia dortmanna*											<1	0	0
Eurasian watermilfoil *Myriophyllum spicatum*	30	0	1	20	15	29	8	39	38	4	9	22	35
Slender naiad *Najas flexilis*	0	4	5	2	4	5	4	5	3	6	17	10	2
Brittle naiad *Najas minor*											2	0	0
Yellow waterlily *Nuphar variegata*	0	0	2	0	1	0	1	2	0	7	4	3	2
White waterlily *Nymphaea odorata*	6	1	3	5	4	6	4	5	3	12	7	11	10
Large-leaf pondweed *Potamogeton amplifolius*	21	19	24	22	26	26	9	33	20	41	39	38	40
Berchtold's pondweed *Potamogeton berchtoldii*											10	0	2
Ribbon-leaf pondweed *Potamogeton epihydrus*	0	3	0	0	0	0	0	0	0	0	0	0	0
Thin-leaf pondweed *Potamogeton foliosus*										8	0	0	0
Grassy pondweed *Potamogeton gramineus*	0	0	1	0	2	9	3	8	2	4	8	11	4
Illinois pondweed *Potamogeton illinoensis*										2	6	3	3

Floating leaf pondweed *Potamogeton natans*	0	0	1	0	0	0	1	2	1	3	2	3	2
Clasping leaf pondweed *Potamogeton perfoliatus*	3	2	8	8	8	8	3	14	5	15	17	20	10
Whitestem pondweed *Potamogeton praelongus*							5	8	5	4	13	19	11
Thin-leaf pondweed *Potamogeton pusillus*	2	1	1	6	5	3	0	2	2	0	0	13	0
Robbins' pondweed *Potamogeton robbinsii*	33	25	18	18	19	28	10	43	30	45	45	44	47
Spiral pondweed *Potamogeton spirilus*							0	2	0	0	0	<1	<1
Vasey's pondweed *Potamogeton vaseyi*											8	0	0
Flat-stem pondweed *Potamogeton zosteriformis*	0	5	5	1	3	2	0	0	0	0	0	0	0
Sago pondweed *Stuckenia pectinata*											<1	<1	0
Burreed *Sparganium* sp.										1	0	3	0
Humped bladderwort *Utricularia gibba*	0	1	1	2	0	2	0.3	0	0	1	0	<1	0
Flat leaf bladderwort *Utricularia intermedia*												<1	0
Common bladderwort *Utricularia vulgaris*										3	2	<1	0
Tape-grass *Vallisneria americana*	23	26	27	30	29	31	13	35	25	30	38	41	31
Water stargrass *Zosterella dubia*				0	0	0	2	7	1	3	7	5	<1

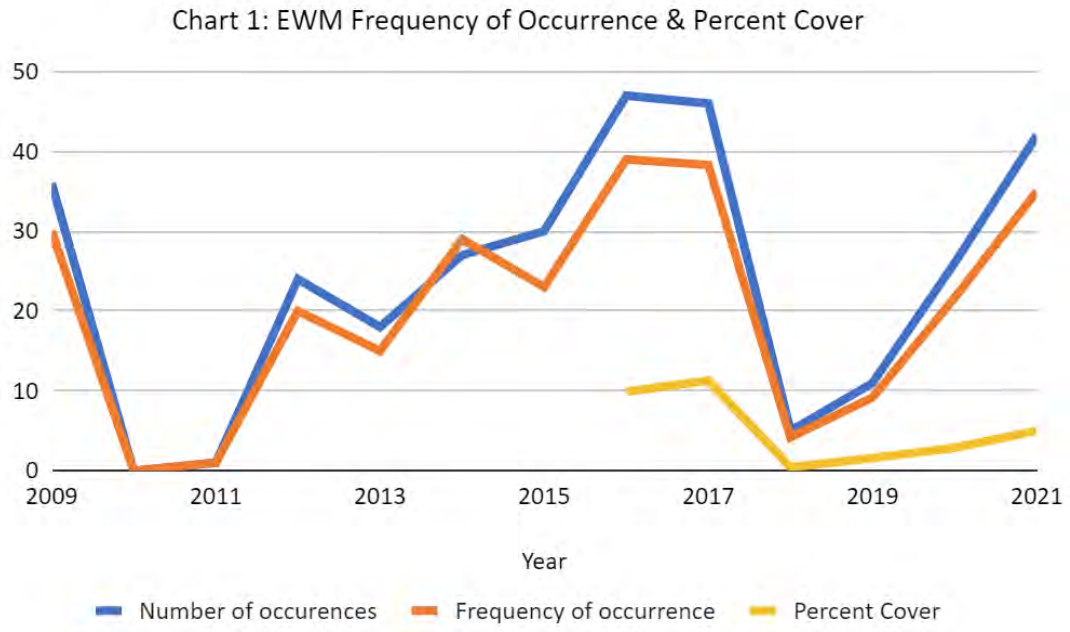
3.3 Littoral Survey Results

The qualitative visual survey of the lake was conducted to document occurrences of EWM and to create a more detailed spatial representation of the EWM distribution. The visual survey helps to identify areas of significant EWM growth that may be misrepresented or missed by the data point survey results alone. Figure 1 below depicts occurrences of EWM at data points as well as those recorded by GPS during the visual survey.

Figure 1: 2021 Late Season Eurasian Watermilfoil Distribution – Data Point & Visual Survey



As shown in Figure 1 above, the EWM distribution has expanded from last year through both the 120 pre-established survey points and the littoral area of Lake Fairlee. Chart 1 below, shows the slight increase in EWM frequency of occurrence that was observed this season. Additionally, percent cover has been added to Chart 1 to show any relationships between it and frequency of occurrence values over time. Percent cover data was not available for years prior to 2016. However, available percent cover data trends similarly to the EWM frequency of occurrence, where higher frequency years have greater percent cover. As chart 1 displays, EWM has never reached above 50% FOC, which shows that on-going management has been successful at keeping EWM controlled within the 12-years of data shown below.



4.0 Non-Chemical Control Activities

The LFA intends to continue DASH and diver hand-pulling for EWM maintenance in 2022. Additionally, educational efforts using the ramp greeter program also continued as the ramp was staffed through the season to interact, educate and monitor incoming and departing boats and trailers for any entangled plant fragments.

5.0 Summary and Discussion

The results of the survey indicate that the Renovate OTF treatment conducted in 2018 at Lake Fairlee continued to provide some control of EWM this season, but EWM is continuing to recover with a higher frequency of occurrence. Additionally, the frequency of occurrence of almost all other species were slightly higher than last year, but fewer species were observed. Regardless, the lake still supports a diverse native aquatic plant assemblage.

The EWM growth in Lake Fairlee will require management in 2022 to prevent further expansion in high-use areas of the lake. It is expected that DASH and hand-pulling efforts will effectively manage approximately half of the expected EWM distribution in 2022; however, the use of ProcellaCOR EC herbicide is recommended for 2022 while the EWM acreage remains low and manageable.

Although triclopyr has been the herbicide of choice for EWM control in Vermont for over a decade and was previously used at Lake Fairlee, ProcellaCOR EC herbicide is now believed to be a better fit for Lake Fairlee. ProcellaCOR has a significantly shorter concentration-exposure-time (CET) requirement than triclopyr, which will make it effective for the shoreline spot-treatments that Lake Fairlee typically needs. ProcellaCOR is also applied targeting in-water concentrations of less than 10 parts per billion, as opposed to the 1.5-2.0 parts per million (1500-2000 ppb) rates that are needed for triclopyr. ProcellaCOR has proven to be extremely selective for milfoil control in Vermont for up to three years now, and it should provide longer-term control of EWM than the typical ~1-2 years that have been achieved with triclopyr. All of these reasons make ProcellaCOR a better fit than triclopyr for Lake Fairlee's integrated management approach and should result in reduced herbicide treatment frequency in future years. ProcellaCOR was used at other waterbodies across Vermont in 2019-2021 and excellent results were observed post-treatment at all sites, as well as outside of many treatment areas.

Management of smaller areas of dense, nuisance and/or expanding EWM is recommended on a more frequent basis than allowing conditions to worsen lake-wide before conducting a large-scale management effort. Additionally, permits issued by Vermont DEC for the use of ProcellaCOR herbicide are now conditioned to allow for up to 40% of the littoral zone to be managed (inclusive of herbicide, DASH and bottom barriers total) in any one calendar year; this condition is expected to continue as it has effectively balanced all stakeholder concerns and successful EWM control.

6.0 Recommendations for 2022 Season

An ongoing management program will be required to maintain control of EWM growth and to prevent further spread within littoral zone areas. For the 2022 management season, we recommend the following:

- Support the recent Aquatic Nuisance Control permit application filing to utilize ProcellaCOR EC herbicide in 2022-2027
- Early summer visual inspection to reassess EWM distribution and to finalize 2022 management areas – treatment or otherwise
- Conduct ProcellaCOR herbicide treatment for areas of regrowth identified in 2021 fall survey, and any found during the early summer inspection
- Diver hand-pulling and DASH efforts to target EWM growth identified during early summer survey, outside of treatment areas
- Continued regular monitoring throughout the summer by LFA volunteers and continuation of the boat ramp greeter program
- Comprehensive late season aquatic plant survey to assess management activities' success and guide future EWM control efforts

APPENDIX A

Comprehensive Aquatic Vegetation Survey Information

Survey Points and Depths

Survey Point Biomass

Survey Point Eurasian Watermilfoil Density

2022 Eurasian Watermilfoil Management Areas

Fall 2021 Native Vegetation Distribution

Field Data Table

Survey Point and Depth (Feet)

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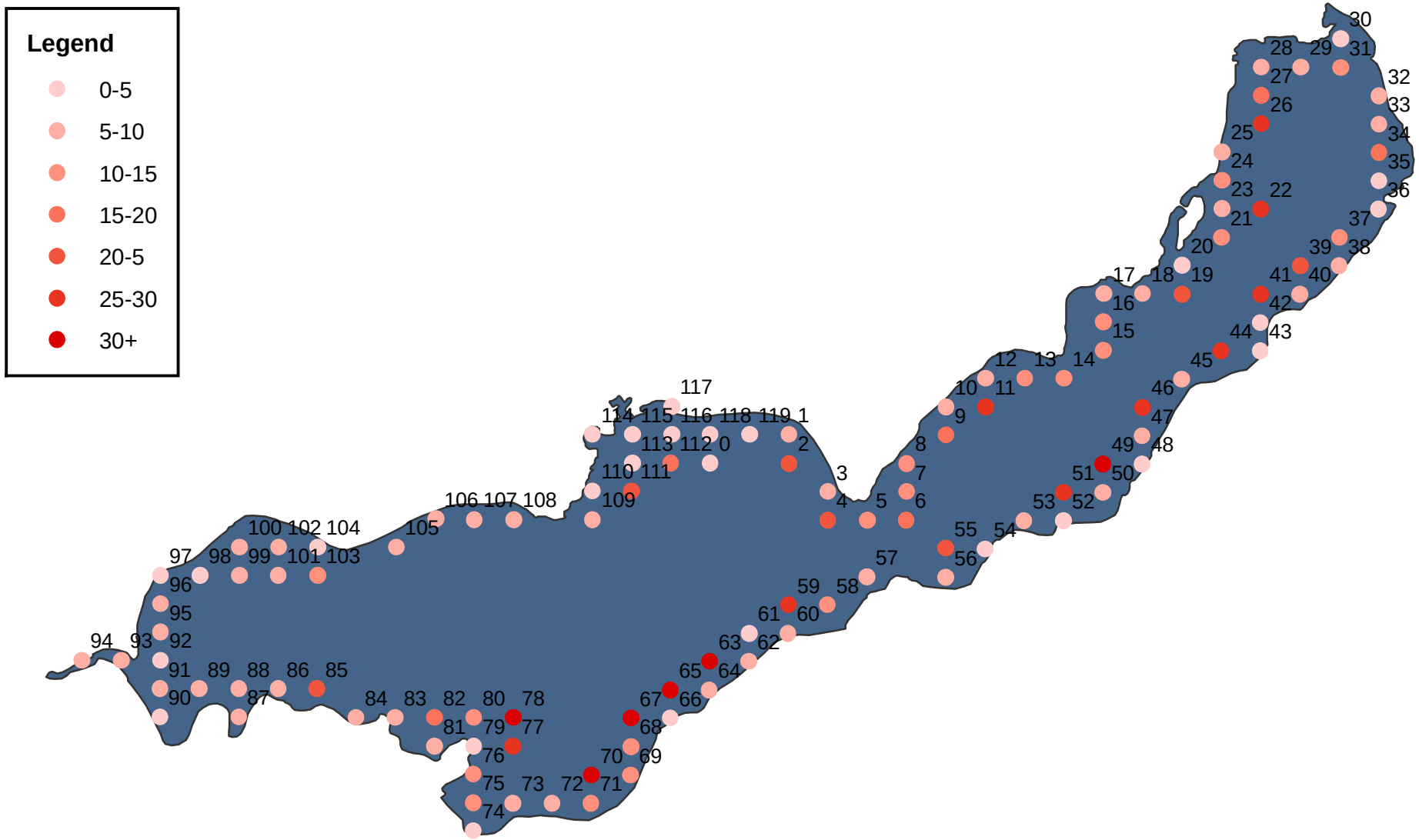

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:17,500

0 1,300 2,600 Feet

N

Map Date: 10/18/2021
Prepared by: AM
Office: Shrewsbury, MA

Survey Point Biomass

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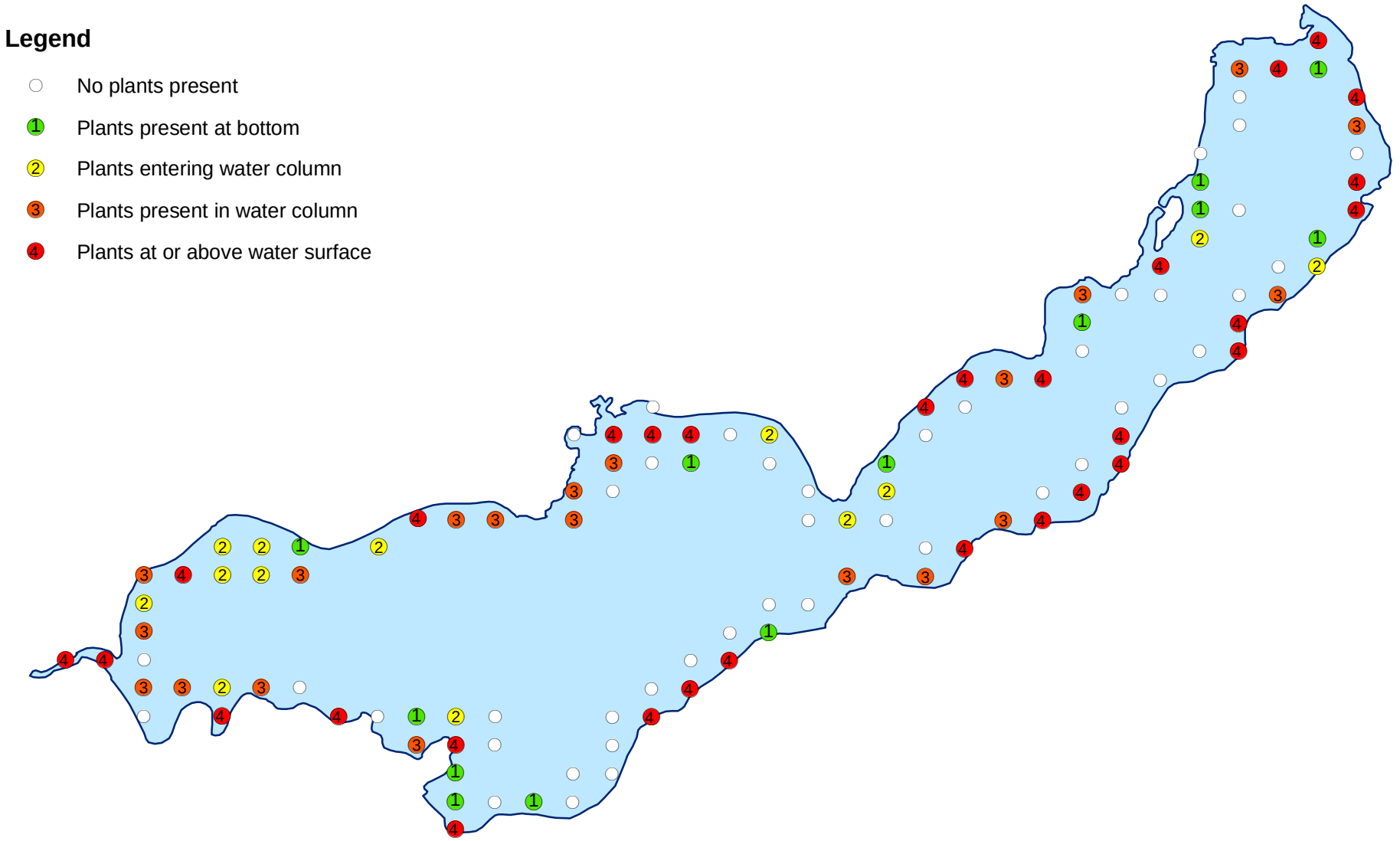

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:17,500

0 1,300 2,600 Feet

N

Map Date: 10/18/2021
Prepared by: AM
Office: Shrewsbury, MA

Density of Eurasian Watermilfoil *(M. spicatum)*

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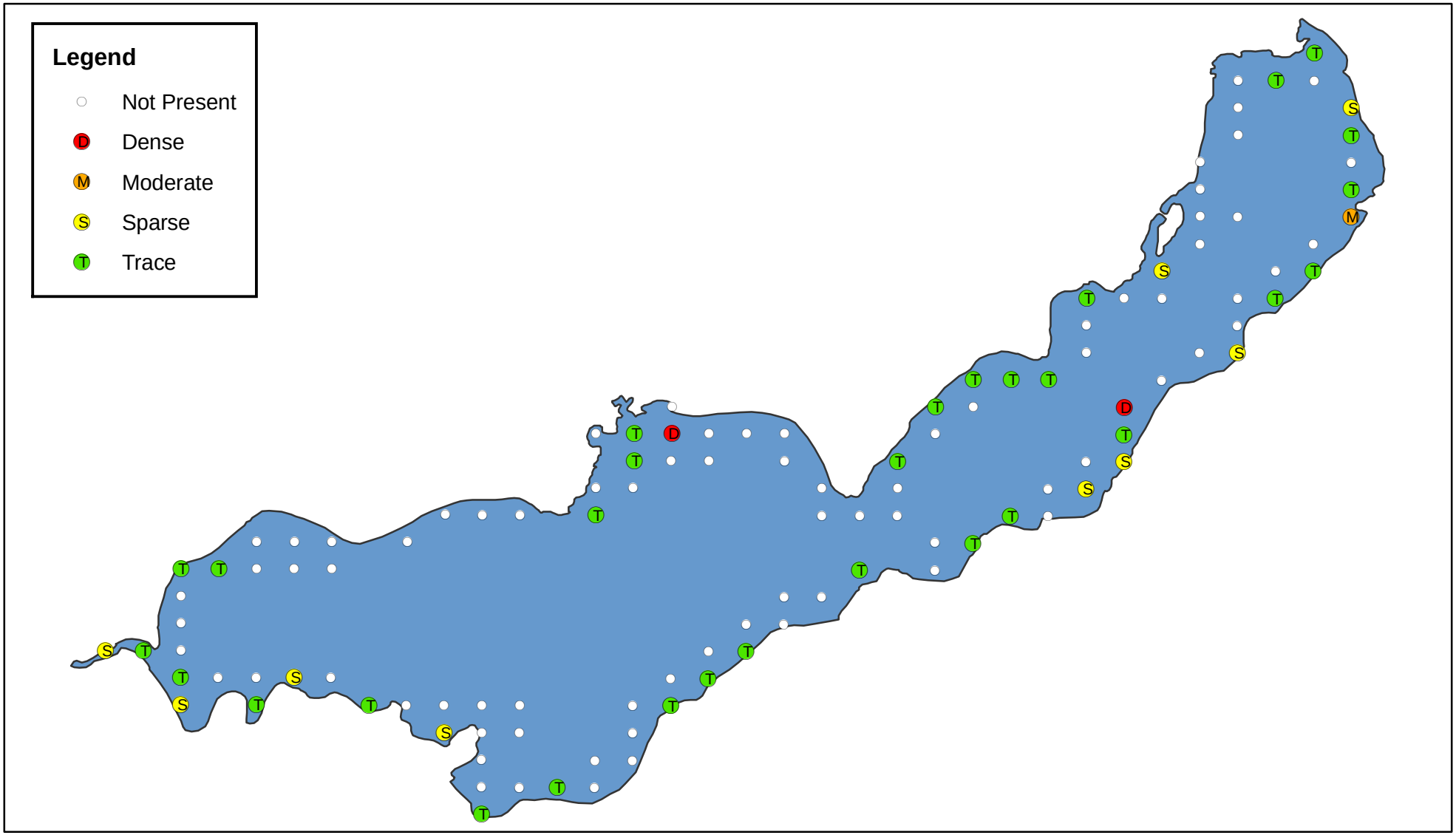

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

0 1,700 3,400 5,100
Feet
1:17,500
N

Map Date: 10/18/2021
Prepared by: AM
Office: Shrewsbury, MA

Overal Cover of All Species

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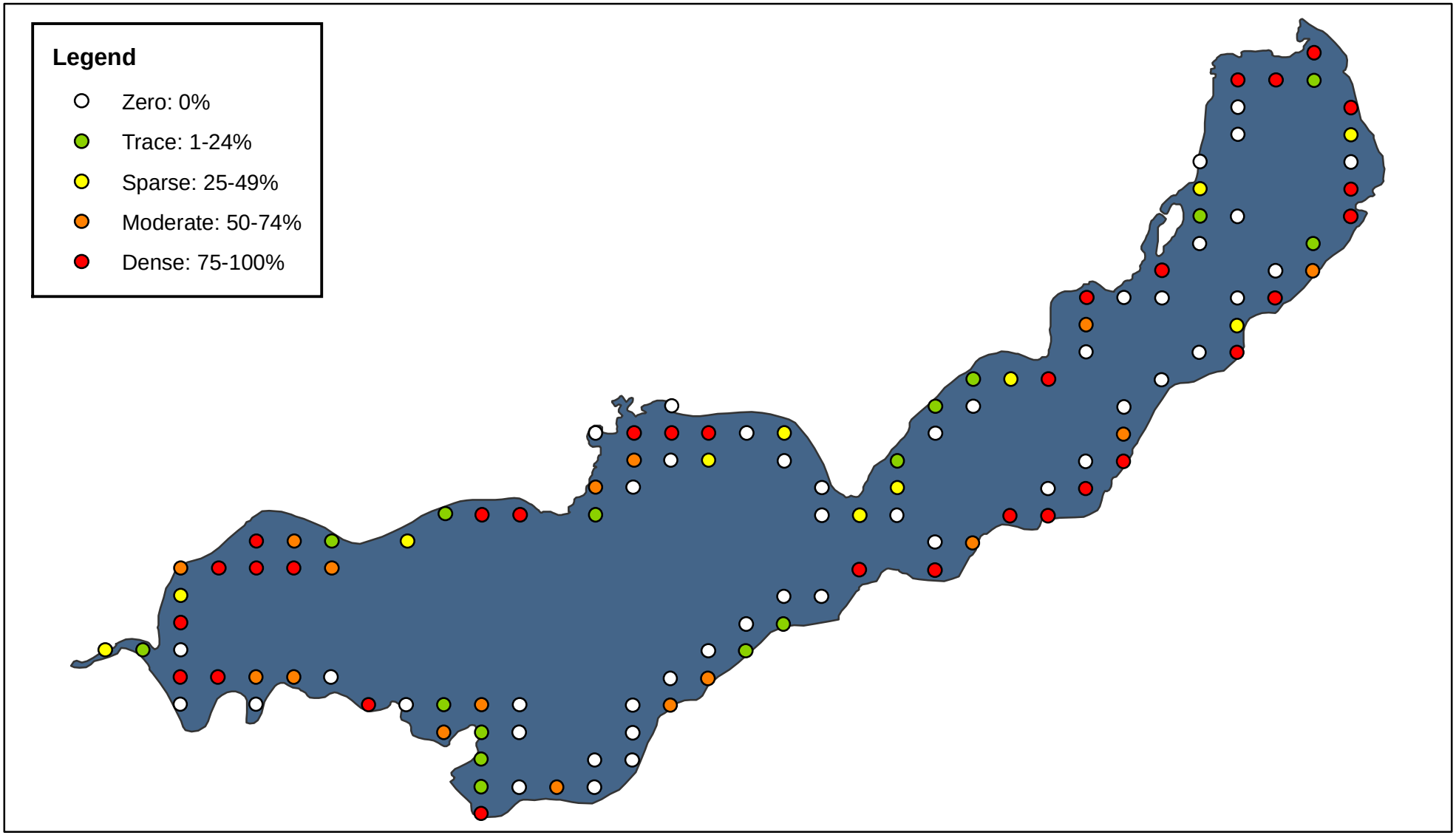

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

0 1,700 3,400 5,100
Feet

1:17,500

N

Map Date: 10/18/2021
Prepared by: AM
Office: Shrewsbury, MA

Overal Cover of Eurasian Watermilfoil

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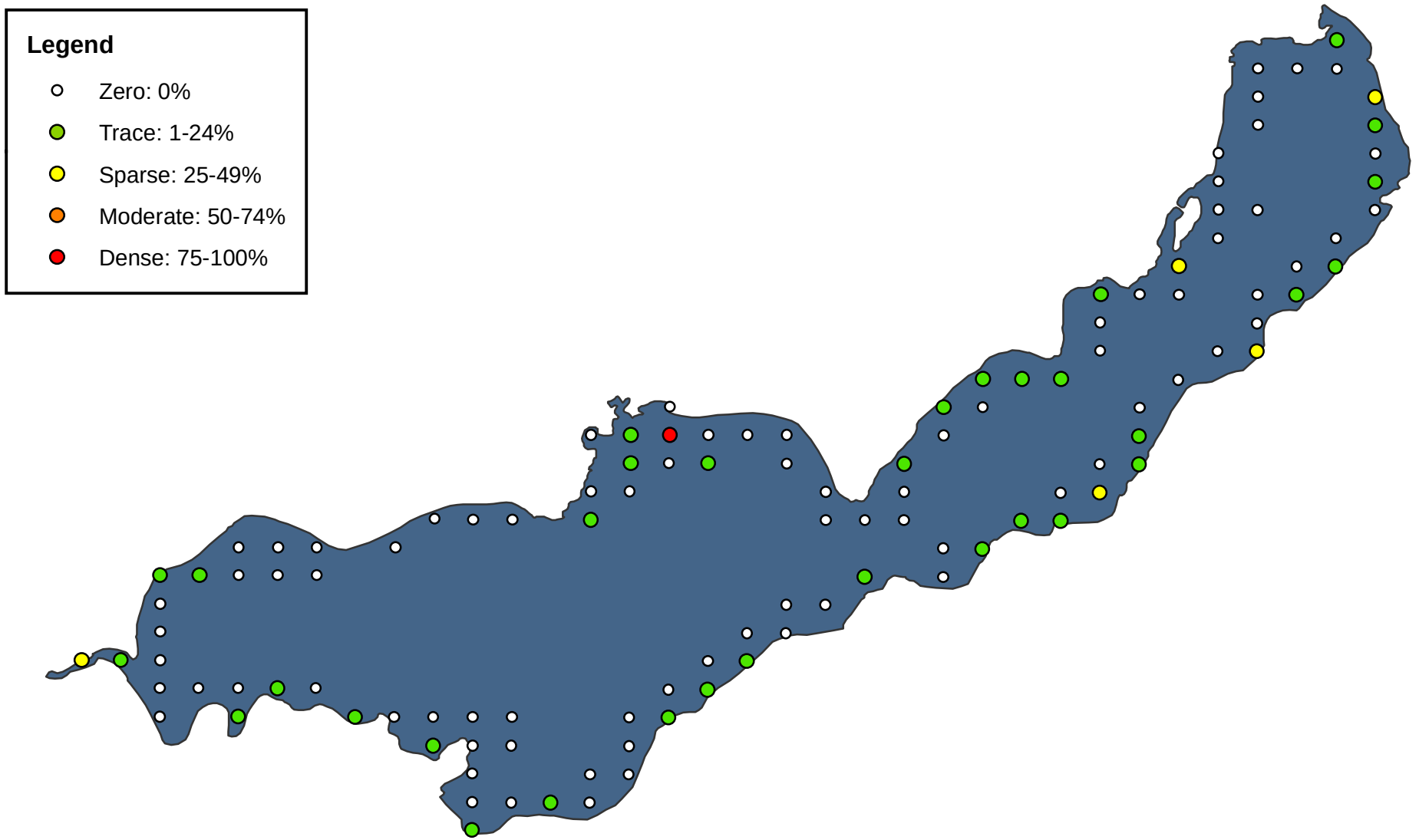

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

0 1,700 3,400 5,100
Feet

1:17,500

N

Map Date: 10/18/2021
Prepared by: AM
Office: Shrewsbury, MA

Fall 2021 Native Vegetation Distribution (1 of 4)

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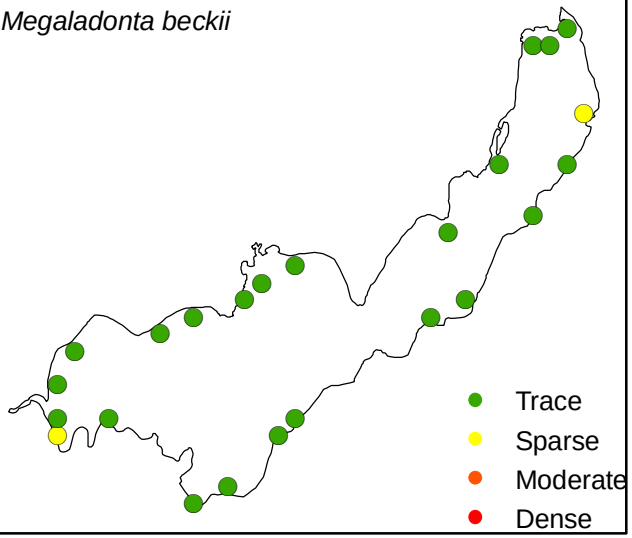
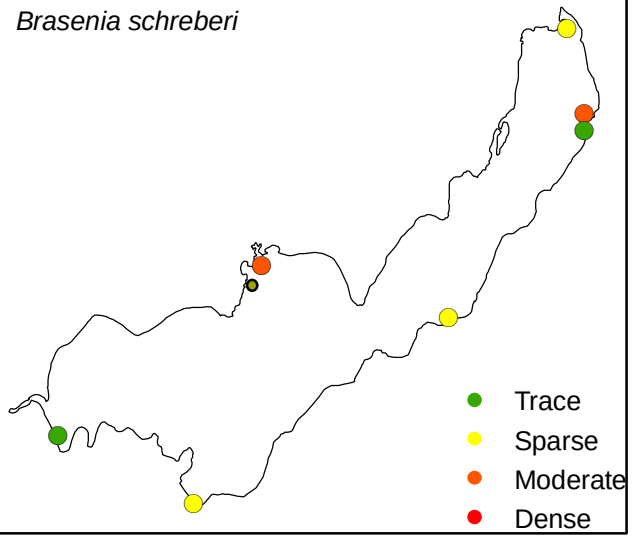
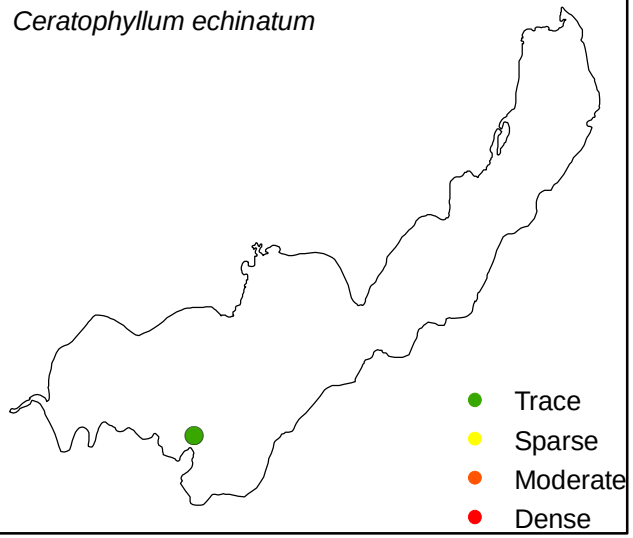
Megaladonta beckii



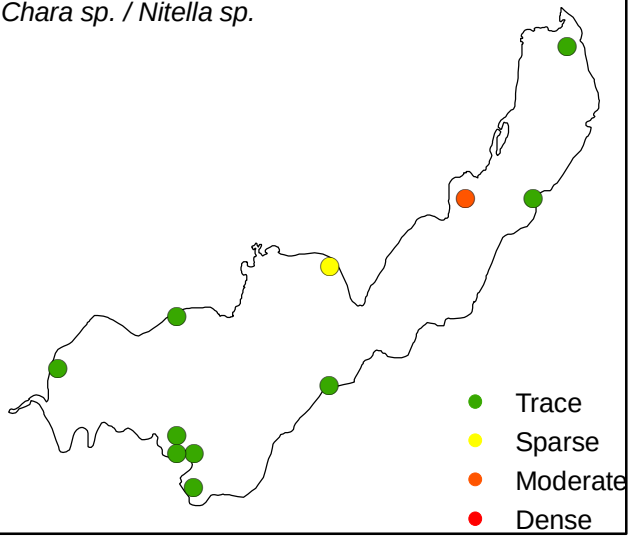
Brasenia schreberi



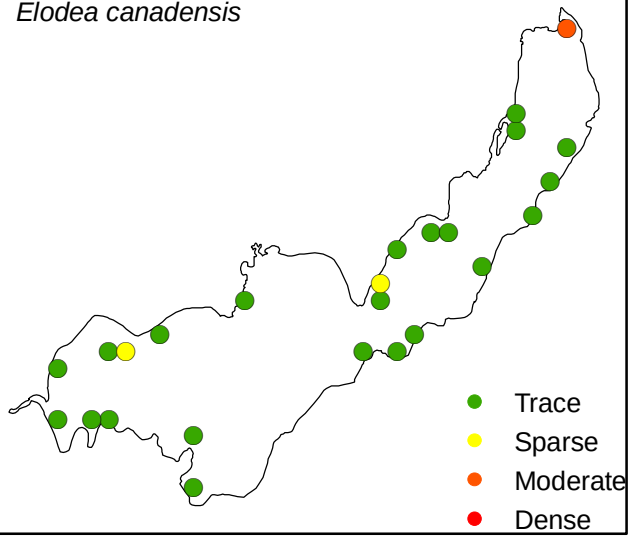
Ceratophyllum echinatum



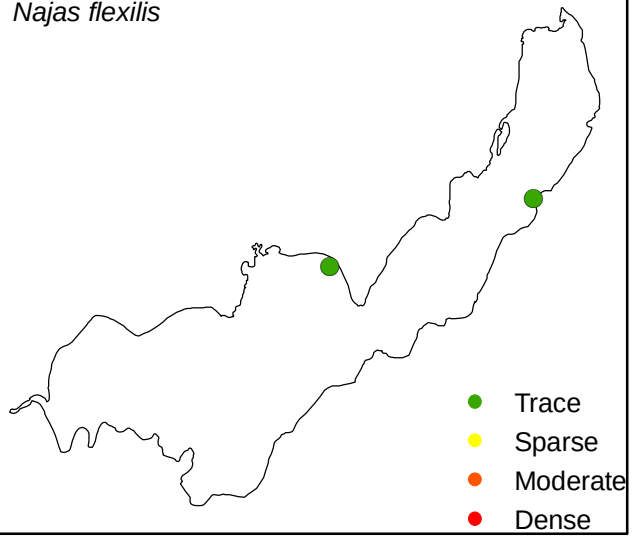
Chara sp. / Nitella sp.



Elodea canadensis



Najas flexilis



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 3,600 7,200 10,800
Feet

N

Map Date: 1214/21
Prepared by: AM
Office: Shrewsbury, MA

Fall 2021 Native Vegetation Distribution (2 of 4)

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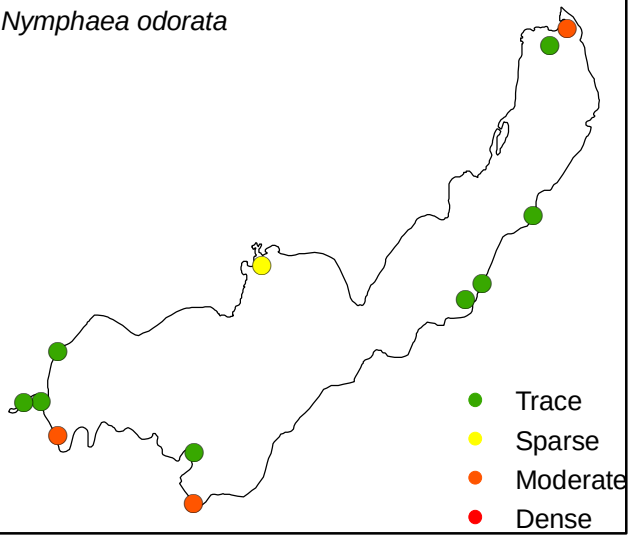
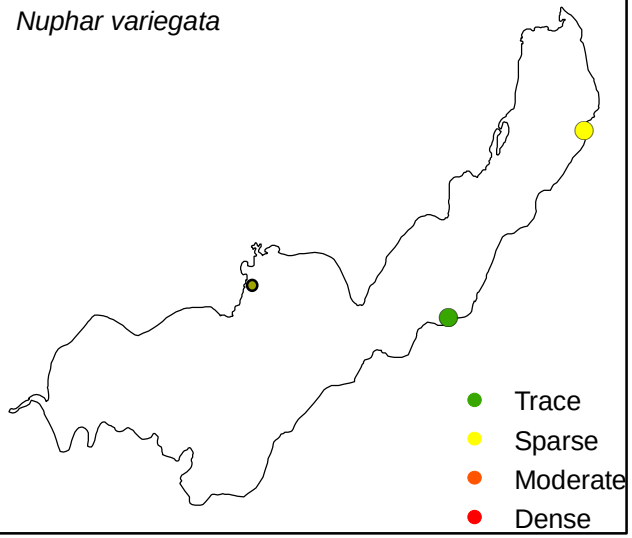
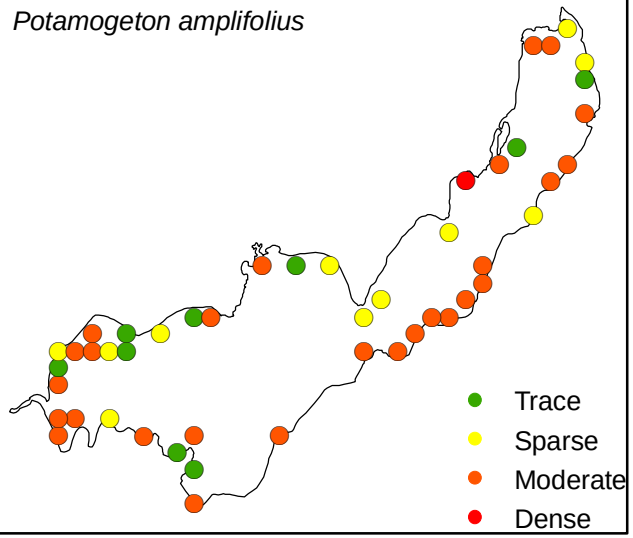
Nymphaea odorata



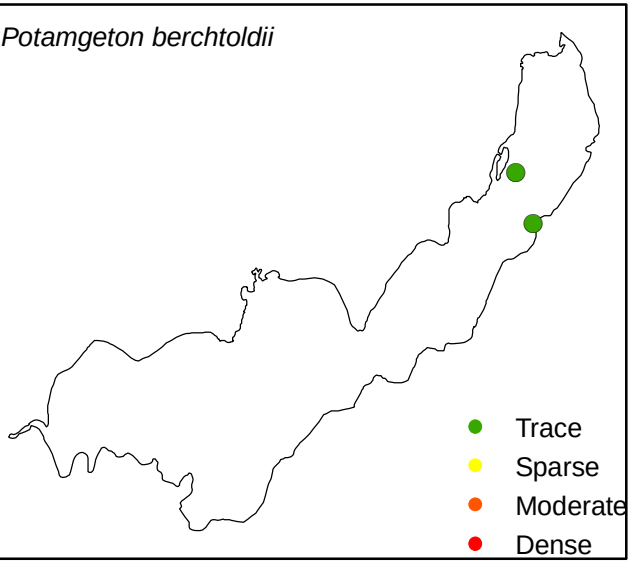
Nuphar variegata



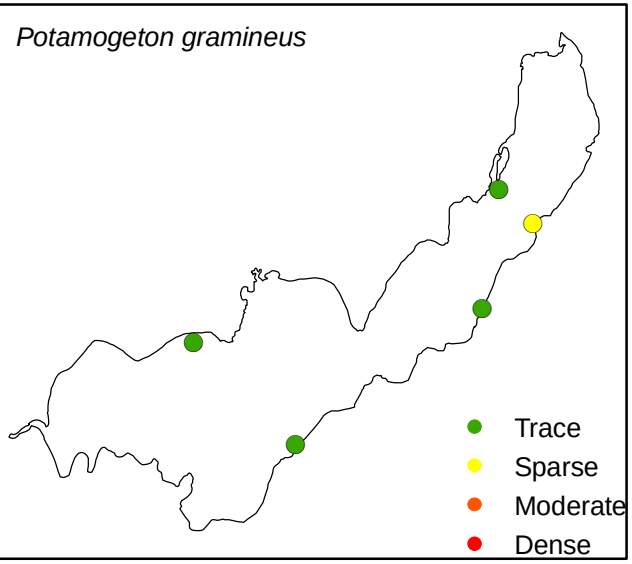
Potamogeton amplifolius



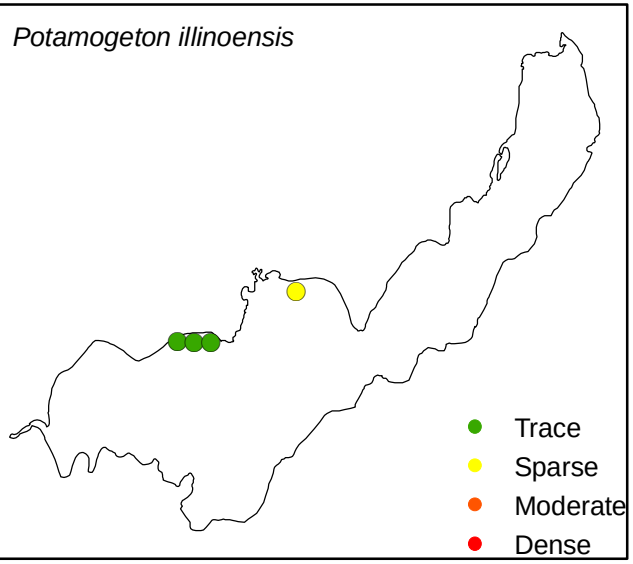
Potamgeton berchtoldii



Potamogeton gramineus



Potamogeton illinoensis



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 3,600 7,200 10,800
Feet

N

Map Date: 1214/21
Prepared by: AM
Office: Shrewsbury, MA

Fall 2021 Native Vegetation Distribution (3 of 4)

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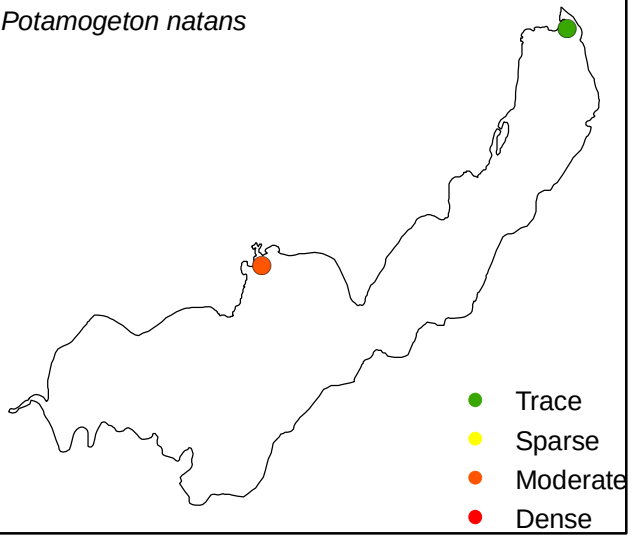
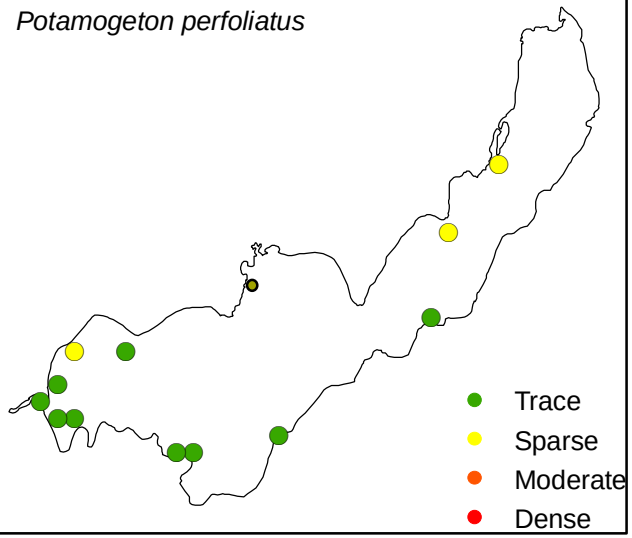
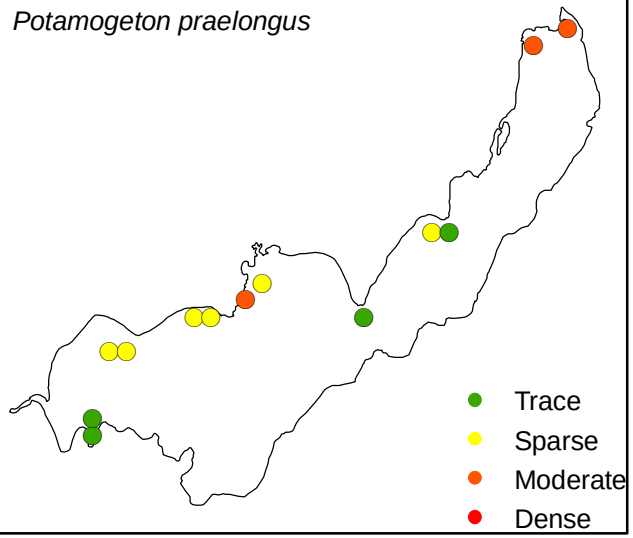
Potamogeton natans



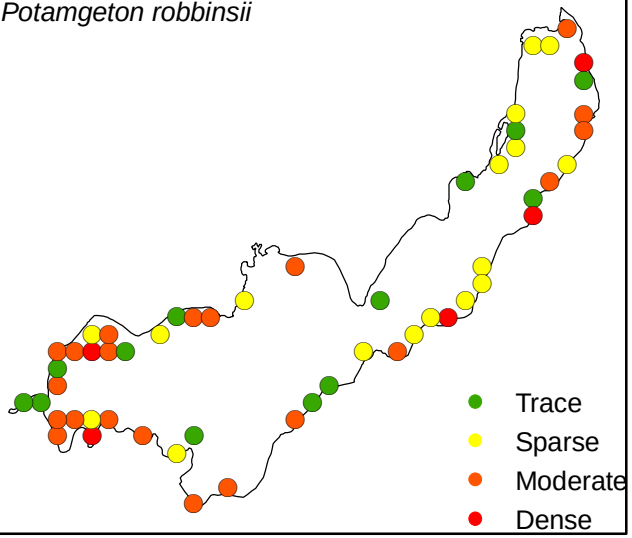
Potamogeton perfoliatus



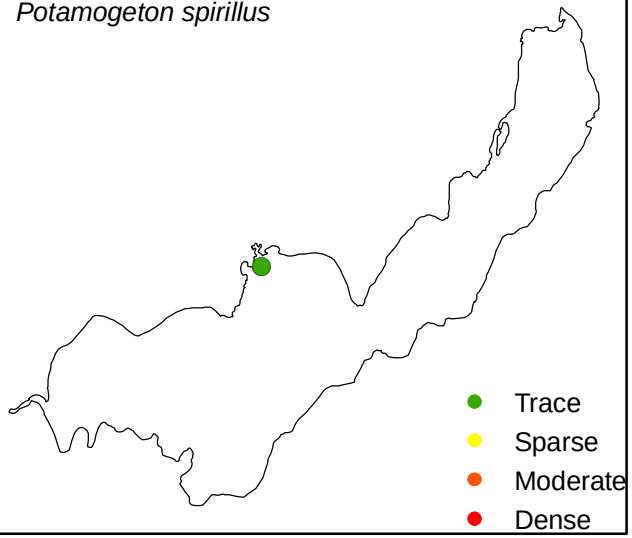
Potamogeton praelongus



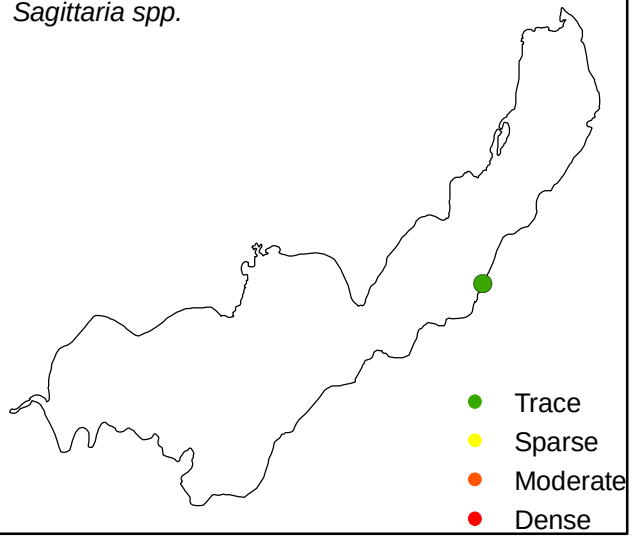
Potamgeton robbinsii



Potamogeton spirillus



Sagittaria spp.



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 3,600 7,200 10,800
Feet

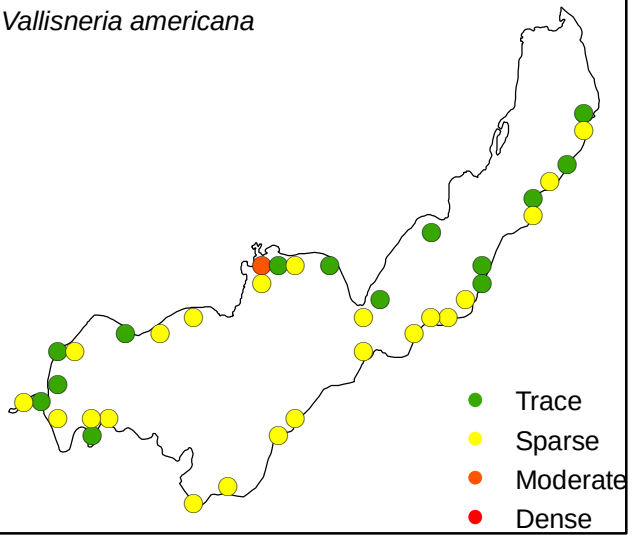
N

Map Date: 1214/21
Prepared by: AM
Office: Shrewsbury, MA

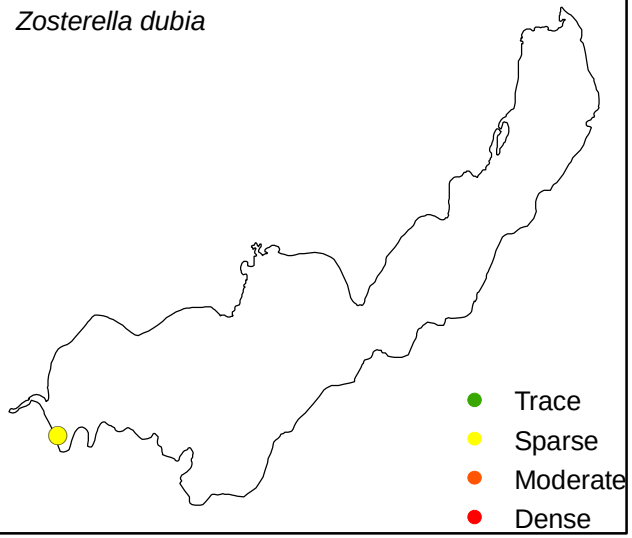
Fall 2021 Native Vegetation Distribution (4 of 4)

SOLITUDE LAKE MANAGEMENT
888.480.5253
solitudelakemanagement.com

Vallisneria americana



Zosterella dubia



Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

1:38,000

0 3,600 7,200 10,800
Feet

N

Map Date: 1214/21
Prepared by: AM
Office: Shrewsbury, MA

Potential 2022 Eurasian Watermilfoil Management Areas

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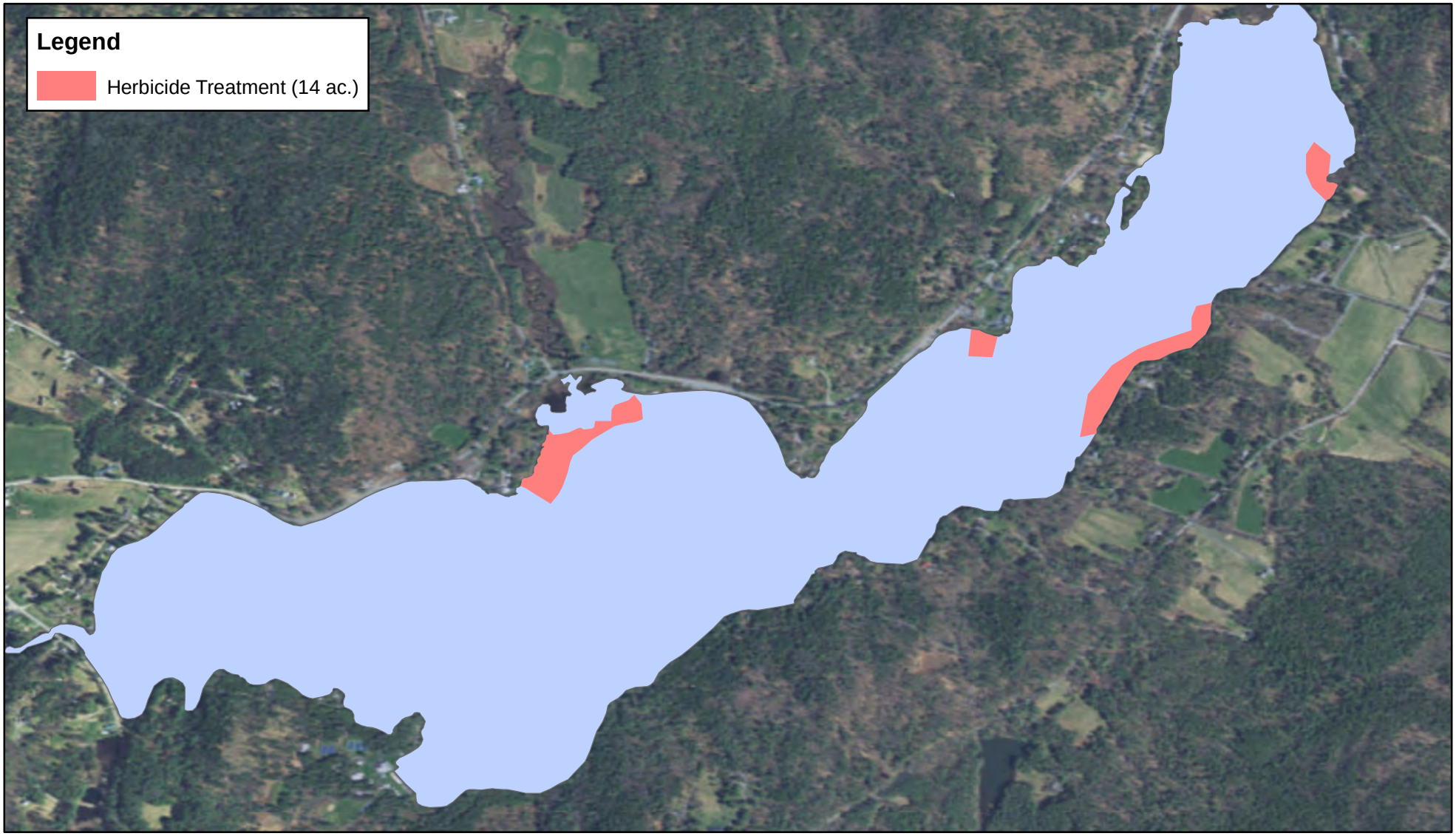

Lake Fairlee
Fairlee, Vermont
Orange County
43.8882° N, 72.2275° W

Lake Fairlee

0 1,500 3,000 4,500
Feet

1:17,000

N

Map Date: 12/14/21
Prepared by: AM
Office: Shrewsbury, MA

Survey Point	Latitude	Longitude	Depth (Feet)	Biovolume	Percent Cover All	Percent Cover EWM	Species Richness	Eurasian Watermilfoil	Slender Naiad	Watershield	White-stemmed Pondweed	Yellow Waterlily	White Waterlily	Tapegrass	Stonewort	Big-leaf Pondweed	Waterweed spp.	Clasping-leaf Pondweed	Water marigold	Robbin's Pondweed	Berchtold	Grassy Pondweed	Floating-leaf Pondweed	Arrowhead	Spiny Hornwort	Water Stargrass	Illinois Pondweed	Spiral-fruited Pondweed
1	43.89	-72.23	6	2	40	0	4		T					T	S	S												
2	43.89	-72.23	26	0	0	0	0																					
3	43.89	-72.22	7	0	0	0	0																					
4	43.89	-72.22	26	0	0	0	0																					
5	43.89	-72.22	14	2	35	0	3				T			S		S												
6	43.89	-72.22	20	0	0	0	0																					
7	43.89	-72.22	14	2	30	0	4							T		S	T			T								
8	43.89	-72.22	13	1	20	5	2	T									S											
9	43.89	-72.22	20	0	0	0	0																					
10	43.89	-72.22	10	4	15	5	2	T									T											
11	43.89	-72.22	30	0	0	0	0																					
12	43.89	-72.22	9	4	5	5	1	T																				
13	43.89	-72.22	11	3	35	5	4	T			S			T			T											
14	43.89	-72.22	11	4	80	15	6	T			T					S	T	S	T									
15	43.89	-72.22	13	0	0	0	0																					
16	43.89	-72.22	14	1	60	0	1								M													
17	43.89	-72.22	7	3	100	5	3	T								D				T								
18	43.89	-72.22	8	0	0	0	0																					
19	43.89	-72.22	23	0	0	0	0																					
20	43.89	-72.22	4	4	90	30	6	S								M		S	T	S		T						
21	43.90	-72.21	11	2	40	0	3									T				S	T							
22	43.90	-72.21	28	0	0	0	0																					

Survey Point	Latitude	Longitude	Depth (Feet)	Biovolume	Percent Cover All	Percent Cover EWM	Species Richness	Eurasian Watermilfoil	Slender Naiad	Watershield	White-stemmed Pondweed	Yellow Waterlily	White Waterlily	Tapegrass	Stonewort	Big-leaf Pondweed	Waterweed spp.	Clasping-leaf Pondweed	Water marigold	Robbin's Pondweed	Berchtold	Grassy Pondweed	Floating-leaf Pondweed	Arrowhead	Spiny Hornwort	Water Stargrass	Illinois Pondweed	Spiral-fruited Pondweed
23	43.90	-72.21	8	1	15	0	2										T			T								
24	43.90	-72.21	11	1	30	0	2										T			S								
25	43.90	-72.21	7	0	0	0	0																					
26	43.90	-72.21	30	0	0	0	0																					
27	43.90	-72.21	18	0	0	0	0																					
28	43.90	-72.21	8	3	100	0	4				M					M			T	S								
29	43.90	-72.21	9	4	100	0	5	T					T			M			T	S								
30	43.90	-72.21	2	4	100	20	9	T		S	M		M			S	M		T	M			T					
31	43.90	-72.21	13	1	10	0	1								T													
32	43.90	-72.21	8	4	80	25	3	S								S				D								
33	43.90	-72.21	10	3	25	5	3	T								T				T								
34	43.90	-72.21	19	0	0	0	0																					
35	43.90	-72.21	4	4	100	5	6	T		M				T		M			S	M								
36	43.90	-72.21	4	4	100		5	M		T		S		S						M								
37	43.90	-72.21	16	1	10	0	1										T											
38	43.89	-72.21	9	2	70	15	5	T						T		M			T	S								
39	43.89	-72.21	26	0	0	0	0																					
40	43.89	-72.21	10	3	90	10	5	T						S		M	T			M								
41	43.89	-72.21	28	0	0	0	0																					
42	43.89	-72.21	3	4	25	0	6		T					T	T					T	T	S						
43	43.89	-72.21	5	4	100	25	7	S					T	S		S	T		T	D								
44	43.89	-72.21	30	0	0	0	0																					

Survey Point	Latitude	Longitude	Depth (Feet)	Biovolume	Percent Cover All	Percent Cover EWM	Species Richness	Eurasian Watermilfoil	Slender Naiad	Watershield	White-stemmed Pondweed	Yellow Waterlily	White Waterlily	Tapegrass	Stonewort	Big-leaf Pondweed	Waterweed spp.	Clasping-leaf Pondweed	Water marigold	Robbin's Pondweed	Berchtold	Grassy Pondweed	Floating-leaf Pondweed	Arrowhead	Spiny Hornwort	Water Stargrass	Illinois Pondweed	Spiral-fruited Pondweed
45	43.89	-72.22	10	0	0	0	0																					
46	43.89	-72.22	30	0	0	0	1	D																				
47	43.89	-72.22	8	4	70	10	5	T						T		M	T			S								
48	43.89	-72.22	5	4	90	20	7	S					T	T		M				S		T		T				
49	43.89	-72.22	35	0	0	0	0																					
50	43.89	-72.22	6	4	100	40	6	S					T	S		M			T	S								
51	43.89	-72.22	30	0	0	0	0																					
52	43.89	-72.22	3	4	90	10	5			S		T		S		M				D								
53	43.89	-72.22	6	3	90	5	6	T						S		M		T	T	S								
54	43.89	-72.22	3	4	65	5	5	T						S		M	T			S								
55	43.89	-72.22	24	0	0	0	0																					
56	43.89	-72.22	7	3	100	0	3									M	T			M								
57	43.89	-72.22	6	3	80	10	5	T						S		M	T			S								
58	43.89	-72.22	14	0	0	0	0																					
59	43.89	-72.23	32	0	0	0	0																					
60	43.88	-72.23	9	1	20	0	2								T					T								
61	43.88	-72.23	0	0	0	0	0																					
62	43.88	-72.23	7	4	20	10	2	T												T								
63	43.88	-72.23	35	0	0	0	0																					
64	43.88	-72.23	6	4	65	15	5	T						S					T	M		T						
65	43.88	-72.23	36	0	0	0	0																					
66	43.88	-72.23	5	4	55	5	5	T						S		M		T	T									

Survey Point	Latitude	Longitude	Depth (Feet)	Biovolume	Percent Cover All	Percent Cover EWM	Species Richness	Eurasian Watermilfoil	Slender Naiad	Watershield	White-stemmed Pondweed	Yellow Waterlily	White Waterlily	Tapegrass	Stonewort	Big-leaf Pondweed	Waterweed spp.	Clasping-leaf Pondweed	Water marigold	Robbin's Pondweed	Berchtold	Grassy Pondweed	Floating-leaf Pondweed	Arrowhead	Spiny Hornwort	Water Stargrass	Illinois Pondweed	Spiral-fruited Pondweed
67	43.88	-72.23	34	0	0	0	0																					
68	43.88	-72.23	11	0	0	0	0																					
69	43.88	-72.23	13	0	0	0	0																					
70	43.88	-72.23	38	0	0	0	0																					
71	43.88	-72.23	16	0	0	0	0																					
72	43.88	-72.23	8	1	70	5	4	T						S					T	M								
73	43.88	-72.23	9	0	0	0	0																					
74	43.88	-72.23	3	4	85	10	7	T		S			M	S		M			T	M								
75	43.88	-72.23	12	1	15	0	2								T		T											
76	43.88	-72.23	11	1	10	0	1									T												
77	43.88	-72.23	31	0	0	0	0																					
78	43.88	-72.23	34	0	0	0	0																					
79	43.88	-72.23	5	4	10	0	3						T		T			T										
80	43.88	-72.23	13	2	50	0	4									M	T			T					T			
81	43.88	-72.24	8	3	55	20	5	S							T	T		T		S								
82	43.88	-72.24	17	1	15	0	1								T													
83	43.88	-72.24	6	0	0	0	0																					
84	43.88	-72.24	6	4	85	15	3	T								M				M								
85	43.88	-72.24	22	0	0	0	0																					
86	43.88	-72.24	8	3	60	20	6	S						S		S	T		T	M								
87	43.88	-72.24	6	4	90	20	4	T			T			T						D								
88	43.88	-72.24	9	2	60	0	4				T			S			T			S								

Survey Point	Latitude	Longitude	Depth (Feet)	Biovolume	Percent Cover All	Percent Cover EWM	Species Richness	Eurasian Watermilfoil	Slender Naiad	Watershield	White-stemmed Pondweed	Yellow Waterlily	White Waterlily	Tapegrass	Stonewort	Big-leaf Pondweed	Waterweed spp.	Clasping-leaf Pondweed	Water marigold	Robbin's Pondweed	Berchtold	Grassy Pondweed	Floating-leaf Pondweed	Arrowhead	Spiny Hornwort	Water Stargrass	Illinois Pondweed	Spiral-fruited Pondweed
89	43.88	-72.24	7	3	80	0	3									M		T		M								
90	43.88	-72.24	6	4	90	25	7	S		T			M			M			S	M						S		
91	43.88	-72.24	6	3	100	15	7	T						S		M	T	T	T	M								
92	43.88	-72.24	5	0	0	0	0																					
93	43.88	-72.24	6	4	15	5	5	T					T	T				T		T								
94	43.88	-72.25	6	4	40	25	4	S					T	S						T								
95	43.88	-72.24	7	3	90	0	5							T		M		T	T	M								
96	43.89	-72.24	6	2	30	0	4								T	T	T			T								
97	43.89	-72.24	4	3	60	5	5	T					T	T		S				M								
98	43.89	-72.24	5	4	100	5	6	T						S		M		S	T	M								
99	43.89	-72.24	8	2	100	0	2									M				D								
100	43.89	-72.24	6	2	95	0	2									M				S								
101	43.89	-72.24	10	2	80	0	4				S					S	T			M								
102	43.89	-72.24	8	2	50	0	1													M								
103	43.89	-72.24	11	3	70	0	5				S					T	S	T		T								
104	43.89	-72.24	5	1	10	0	2							T		T												
105	43.89	-72.24	7	2	45	0	5							S		S	T		T	S								
106	43.89	-72.24	6	4	20	0	3								T					T							T	
107	43.89	-72.23	8	3	100	0	7				S			S		T			T	M		T					T	
108	43.89	-72.23	6	3	80	0	4				S					M				M							T	
109	43.89	-72.23	10	3	10	10	1	T																				
110	43.89	-72.23	5	3	65	0	4				M						T		T	S								

Survey Point	Latitude	Longitude	Depth (Feet)	Biovolume	Percent Cover All	Percent Cover EWM	Species Richness	Eurasian Watermilfoil	Slender Naiad	Watershield	White-stemmed Pondweed	Yellow Waterlily	White Waterlily	Tapegrass	Stonewort	Big-leaf Pondweed	Waterweed spp.	Clasping-leaf Pondweed	Water marigold	Robbin's Pondweed	Berchtold	Grassy Pondweed	Floating-leaf Pondweed	Arrowhead	Spiny Hornwort	Water Stargrass	Illinois Pondweed	Spiral-fruited Pondweed
111	43.89	-72.23	22	0	0	0	0																					
112	43.89	-72.23	21	0	0	0	0																					
113	43.89	-72.23	5	3	55	10	4	T			S			S					T									
114	43.89	-72.23	0	0	0	0	0																					
115	43.89	-72.23	2	4	100	10	7	T		M			S	M		M							M					T
116	43.89	-72.23	2	4	100	90	2	D						T														
117	43.89	-72.23	0	0	0	0	0																					
118	43.89	-72.23	5	4	100	0	5							S		T			T	M							S	
119	43.89	-72.23	8	0	0	0	0																					
120	43.89	-72.23	32	0	0	0	0																					

Ben McLaughlin, Chairman of the Board
Lake Fairlee Association
Ben,

Here is information about our activities concerning Phosphate in Lake Fairlee.

In 2019 the Board became aware of the rising phosphate levels in the lake via the Vermont Score Card. The rate of increase in phosphate levels was more rapid than in similar lakes around us. The WQAC (Water Quality Action Committee) was formed as a voluntary adjunct of the Lake Fairlee Association Board. Five local residents made ourselves informed about the issues and science to address this situation presented by these new changes in our lake ecology. From the onset several consultants from the VDEC met with us. Below is the combined plan for the WQAC and VDEC (Danielle Owczariski) from 7/17/19

1. Establish a lay monitor to measure in-lake summer phosphorus trends - volunteer
2. Establish a cyanobacteria monitor to track harmful algae bloom - volunteer
3. Establish a 3-5 year tributary monitoring program to track external sources of phosphorus in the surrounding watershed - volunteer
4. Collect spring and summer depth profiles to track internal loading - VDEC
5. Collect spring runoff total phosphorus - VDEC
6. Conduct biological monitoring of priority tributaries - VDEC
7. Initiate Lake Wise assessments around the shoreline within 250-ft - Lake Fairlee Committee, VDEC & volunteers

9. Hold a Septic Social - VDEC and Lake Fairlee Committee
10. Develop a Lake Watershed Action Plan to synthesize current water quality and assessment data, identify significant sources of phosphorus that are contributing to increased total phosphorus trends, and list a number of priority actions to address those sources. - Lake Fairlee Committee, VDEC, Watershed partner, towns, volunteers, consultant
11. Implement practices - Lake Fairlee Committee, VDEC, Watershed partner, towns, volunteers
12. Continue monitoring to track response - VDEC and volunteer monitors

Since then numbers 1,2,3, and 7 have been accomplished. (8) For road assessment we have met with two town managers for the Town of Thetford about mud runoff from Robinson Hill Road. No further action has occured. (10) In 2020 Lake Fairlee Phosphate was put as a priority item on the "2020 Basin 14 Tactical Basin Plan"

(11) In 2020 the Lake Fairlee Association paid (VAIL) for phosphate sampling in 5 tributaries 5 times. Data implicated one tributary for further study. In 2020 funding from the "LaRosa Partnership Program" is allowing us to sample 5 tributary sites of interest 8 times for Nitrate, Chloride and Phosphate.

This study is ongoing and is helped by a Rubenstein Summer Intern from UVM partly paid for by the LFA.

In 2021 our planning and implementation of studies has been greatly assisted by Oliver Pierson, Lakes and Ponds Program Manager, VDEC.

The "Lake wise'" and other education programs are well described on the Lake Fairlee Association www site: https://www.lakefairleevt.org/

Respectively submitted.
Dale Gephart MD,
Chair WQAC – Lake Fairlee Association

Permittee Information	
Permittee: Lake Fairlee Association Co-permittee: SOLitude Lake Management Permit Number: 3382-ANC-C	Control Activity: Pesticide (Herbicide – SePRO ProcellaCOR® EC) Waterbody: Lake Fairlee, Fairlee, West Fairlee, and Thetford

a. Specific Conditions

Based upon the Findings contained in this permit, the Secretary of the Agency of Natural Resources (Secretary) has determined that the proposed aquatic nuisance control activity will comply with 10 V.S.A. § 1455 and is hereby approved under the following conditions.

1. Pesticide Use. The use of SePRO ProcellaCOR® EC EPA Registration Number 67690-80 (treatment), formulation active ingredient 2.7% florpyrauxifen-benzyl, is authorized to target Eurasian watermilfoil, *Myriophyllum spicatum*, in the waters of Lake Fairlee, Fairlee, West Fairlee, and Thetford. Only SePRO ProcellaCOR® EC shall be used in the waterbody over the course of one calendar year while there is active Eurasian watermilfoil growth. A treatment shall only occur on a Monday, Tuesday, Wednesday, or Thursday. This pesticide shall be registered with the U.S. Environmental Protection Agency and the Vermont Agency of Agriculture, Food and Markets at the time of use and handled, applied, and disposed of in conformance with all state and federal regulations.
2. Certified Applicator. All applicators of the authorized pesticide shall be certified by the Vermont Agency of Agriculture, Food and Markets in Category Five – Aquatic Pest Control.
3. Agency Notification. Notification shall be provided at least 30 days in advance of the scheduled treatment date to the Secretary of the Agency of Natural Resources and to the Agency of Agriculture, Food & Markets to coordinate pesticide use inspection at the time of treatment. The permittee shall contact Kanika Gandhi, Agrichemical Section Chief, of the Agency of Agriculture, Food & Markets at 802-461-5040 or Kanika.Gandhi@vermont.gov, or her replacement, to coordinate.
4. Annual Request & Approval of Treatment Locations. A treatment shall only occur in locations that have been approved annually in writing by the Secretary. Prior to a treatment, the permittee and co-permittee (if applicable) shall submit a request to the Secretary with proposed annual treatment locations. Requests may be submitted to the Secretary over the growing season as needed. A request shall include:
   A. A map identifying the acreage of the waterbody, acreage of the littoral zone of the waterbody, the proposed treatment date(s), the acreage and treatment concentration(s) at the proposed treatment location(s), and all other proposed locations and acreages for permitted non-chemical aquatic nuisance control activities (total control area) when applicable.
   B. A description of the population densities for Eurasian watermilfoil and the non-target native species that are controlled or sensitive to ProcellaCOR® EC (as identified in finding c.6.) within each proposed treatment location (condition a.12.).
   C. A map of the locations of wetlands as identified by the ANR Atlas or as defined by a dominance (>50% surface area coverage) of woody, emergent, or floating leaved vegetation anchored in sediment located in areas up to 6.5 feet deep. If determined necessary, a Wetlands Permit or Approval, per 10 V.S.A. § 914, shall be obtained prior to commencement or continuance of the control activity.
   D. A map of proposed treatment concentration monitoring locations.
5. Annual Control Area. The total control area authorized by this permit and any additional authorizations shall not exceed 40% of the littoral zone of Lake Fairlee over the course of one calendar year, unless approved in

writing by the Secretary. The same treatment location shall not be targeted with the same authorized pesticide for more than two consecutive years.

6. Treatment Plan. Treatment(s) shall be carried out in accordance with the "PROCELLACOR™ EC HERBICIDE TREATMENT PLAN" as identified in the Approved Application. The treatment plan shall be updated as necessary to minimize potential adverse impacts on the resource and to ensure compliance with this permit. All updates to the treatment plan shall be submitted to the Secretary for approval.

7. Public Informational Notification. A public informational notification (notification) shall be posted and provided to the public at least 30 days in advance of the scheduled treatment date. A webpage shall be made available to the public for posting a digital copy of the notification and for additional information on the authorized treatment. Postings of the physical and digital copies of the notification shall remain posted for no less than 30 days after the treatment occurred. If there are changes to the information on the notification, the notification shall be updated and reposted.

   A. The notification shall include:

      i. A map of the annually approved treatment location(s).

      ii. The scheduled treatment date(s).

      iii. The authorized pesticide to be used.

      iv. The name(s), address(es), and telephone number(s) for all permittees.

      v. The webpage made available to the public for information on the authorized treatment.

      vi. A summary of the Water Use Advisories & Recommendations (condition a.9.).

      vii. A statement identifying that the permittee shall supply potable water upon request to those who depend upon the treated waterbody or its outlet stream(s) (within one mile of the effluent) for domestic use to prepare food or drink on the day of treatment.

      viii. A statement informing all property owners that if their property is leased, rented, or used at any time during treatment and/or while the use advisories are in effect, the property owner is responsible for informing all transient users.

   B. The notification shall be provided to the Secretary, the municipal offices of Fairlee, West Fairlee, and Thetford, all property owners (including commercial camps) that abut Lake Fairlee, and all property owners that abut the waters receiving effluent up to one mile downstream of Lake Fairlee's outlet by a method that provides proof of notification.

   C. Physical copies of the notification shall be posted:

      i. In locations visible to vehicle traffic, shoreline property owners, and potential lake users along all public roadways within 1,000 feet of the waterbody.

      ii. On weather resistant material and at least 8½ inches by 11 inches in size.

      iii. At all public access points to the waterbody, including all public boat launches, public beaches, or other similar public locations providing access to the waterbody.

   D. The website made available to the public shall include a digital copy of the notification, this permit, the Approved Application, the SePRO ProcellaCOR® EC Specimen Label, the SePRO ProcellaCOR® EC Safety Data Sheet, and the status of the Water Use Advisories & Recommendations (condition a.9.).

8. Treatment Concentration Monitoring. Water samples shall be collected at each of the approved monitoring locations (condition a.4.D.) to determine the concentration of florpyrauxifen-benzyl after completion of each treatment. The results shall be submitted to the Secretary within 24 hours of the permittee receiving the results and be posted to the webpage as required under condition a.7. of this permit.
    A. Water samples shall be chemically tested 48 hours after completion of each treatment. If samples indicate that florpyrauxifen-benzyl concentrations are greater than 2 parts per billion (ppb), monitoring shall continue after an additional 24-hour period. This monitoring process shall proceed until all monitoring locations are less than or equal to 2 ppb florpyrauxifen-benzyl, or if this process is authorized to be discontinued by the Secretary.
    B. The Secretary may require additional monitoring, including additional monitoring locations or the frequency of monitoring, if determined necessary.
    C. Samples shall be analyzed using a methodology with a minimum detection limit of at least 1 ppb florpyrauxifen-benzyl.
9. Water Use Advisories & Recommendations. On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment. Additional advisories and recommendations related to irrigation and the use of treated waters that are listed under the following sections of the ProcellaCOR® EC Specimen Label shall be posted to the webpage as required under a.7. of this permit: *Use Precautions*, *Use Restrictions*, *Application to Waters Used for Irrigation on Turf and Landscape Vegetation*, *Residential and other Non-Agricultural Irrigation*, and *TABLE 1: Non-agricultural irrigation following in-water application*.
10. Potable Water. On the day of treatment, the permittee shall supply potable water upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink.
11. Treatment Report. A treatment report shall be submitted to the Secretary within one week of each treatment and include the following:
    A. Date, time, and duration of treatment.
    B. Herbicide manufacturer, trade name, and formulation used.
    C. Total amount of the herbicide applied.
    D. Total surface area of the herbicide treatment.
    E. Target herbicide concentration and related calculations.
    F. Herbicide treatment technique and equipment used.
    G. Weather and lake conditions at time of herbicide treatment.
12. Aquatic Plant Surveys. Aquatic plant surveys shall be completed as follows:
    A. A pre-treatment quantitative aquatic plant survey shall be completed in the year prior to a proposed treatment.
    B. A pre-treatment qualitative aquatic plant population density survey shall be completed within the proposed treatment location(s) prior to and during the year of a proposed treatment to assess

populations of Eurasian watermilfoil and the non-target native species that are controlled or sensitive to ProcellaCOR® EC (as identified in finding c.6.).

C. A post-treatment quantitative aquatic plant survey shall be completed after a treatment in the year a treatment took place.

D. A post-treatment quantitative aquatic plant survey shall be completed in the year following a treatment.

E. Quantitative aquatic plant surveys (i.e., condition a.12.A., a.12.C., a.12.D.) shall:

i. Be completed from July 1st through September 30th.

ii. Be completed using the point-intercept rake-toss methodology using a grid size of no greater than 80 meters between each point within the littoral zone, or as approved by the Secretary.

iii. Have the following data collected at each point-intercept:

1. Latitude and longitude
2. Depth
3. Aquatic plant species that are present
4. A measure of abundance of each aquatic plant species that is present

13. Annual Report. An annual report shall be submitted to the Secretary on the year of treatment and one year thereafter by December 31st and shall include:

A. A summary of treatment concentration monitoring when applicable.

B. Aquatic plant survey(s) (condition a.12.). Presentation of aquatic plant survey data shall include a map depicting all survey points and maps of each aquatic plant species present at each point-intercept with a representation of its abundance. Quantitative aquatic plant survey data (a.12.E.) shall be submitted via a spreadsheet (e.g., Microsoft Excel).

C. A map of the treatment location(s) and all other locations where additional non-chemical aquatic nuisance control activities occurred that year when applicable.

D. A map of the potential future treatment location(s) and all other proposed locations for additional aquatic nuisance control activities when applicable.

E. A summary of the control activity, including a status of aquatic plant re-growth in treatment locations.

14. Pesticide Minimization Measures. Beginning the first calendar year of a treatment until expiration of this permit, the permittee shall implement pesticide minimization measures annually. Pesticide minimization measures shall include one or a combination of Eurasian watermilfoil non-chemical control projects and/or efforts that reduce the likelihood of Eurasian watermilfoil populations from developing. Should pesticide minimization measures not be completed over a calendar year, or the Secretary has determined that pesticide minimization measures were insufficient at achieving the purpose of pesticide minimization, the permittee shall submit a pesticide minimization compliance plan to be approved by the Secretary prior to any additional proposed use of pesticide under this permit.

15. Pesticide Minimization Annual Report. Beginning the first calendar year of a treatment until expiration of this permit, the permittee shall submit an annual pesticide minimization report to the Secretary by December 31st and shall include:

A. A summary of pesticide minimization measures completed during the current calendar year.

B. A summary of proposed pesticide minimization measures to be completed over the following calendar year.

b. Standard Conditions

1. Co-Permittee Status. Any individual or entity other than the permittee that is engaging in the permitted jurisdictional activity shall notify the Secretary to obtain co-permittee status prior to any such work. Notification of the addition or termination of co-permittee status shall occur using a form provided by the Secretary. A co-permittee shall be subject to all terms and conditions in this permit.

2. Aquatic Species Spread Prevention. Prior to any control activity occurring, all equipment, including but not limited to boats, trailers, vehicle, and gear, that has been in or on any other waterbody, shall be decontaminated in accordance with the *Voluntary Guidelines to Prevent the Spread of Aquatic Invasive Species through Recreational Activities*, Aquatic Nuisance Species Task Force, November 2013, or its replacement.

3. Modification. This permit may be modified or amended upon request by the permittee or by the Secretary. If the Secretary determines that modification is appropriate, only the conditions subject to modification shall be reopened. Any modification under this condition shall be pursuant to 10 V.S.A. Chapter 170 and any rules adopted thereunder.

4. Notice of Termination. The permittee may terminate the control activity as approved by this permit by submitting a notice of termination. The notice of termination shall include, at a minimum, the permit number for which termination is sought; the basis for the notice; the permittee's name and contact information; and a signed and dated certification statement by an authorized representative of the permittee confirming the notice of termination.

5. Rare, Threatened, or Endangered Species. Encounters with any rare, threatened, or endangered species shall be reported to the Secretary immediately. If determined necessary by the Secretary, an Endangered & Threatened Species Taking Permit, per 10 V.S.A. § 5408, shall be obtained prior to commencement or continuance of the control activity.

6. Duty to Comply and Enforcement. The permittee(s) shall comply with all terms and conditions of this permit. Any permit noncompliance shall constitute a violation of 10 V.S.A. § 1455 and may be cause for any enforcement action and revocation, modification, or suspension of the permit. It shall not be a defense for the permittee(s) in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

7. Twenty-Four Hour Non-compliance Reporting. Unless provided otherwise by this permit, the permittee shall report any noncompliance which may endanger public health or the environment. Any such information shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance, its cause; the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; as well as steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

8. Reporting & Correspondence. All requisite correspondence directed to the Secretary pertaining to this permit, including notifications, surveys and reports, shall be submitted via email to ANR.WSMDShoreland@vermont.gov or mailed to the following address:

   Lake & Shoreland Permitting
   Watershed Management Division

1 National Life Drive, Davis 3
Montpelier, VT 05620-3522

9. Compliance with Other Regulations. This permit does not relieve the permittee from obtaining all other approvals and permits prior to commencement of activity, or from the responsibility to comply with all other applicable federal, state, and local laws or regulations. In accordance with Fish and Wildlife Board Rule 641, adopted pursuant to 10 V.S.A. § 4145(a), a Special Use Permit from the Commissioner of Fish and Wildlife is required if a Vermont Department of Fish & Wildlife Access Area is used for the access of equipment or removal of aquatic plants associated with conducting an authorized control activity under this permit.

10. Duty to Reapply. If the authorized activity is anticipated to continue after the expiration date of this permit, the permittee shall reapply for coverage under a new permit at least 75 days prior to the expiration date of this permit.

11. Access to Property. By acceptance of this permit, the permittee agrees to allow representatives of the state of Vermont, at reasonable times and upon presentation of credentials, to enter upon the permittee's property, or to otherwise access the authorized control activity, to inspect to determine compliance with this permit.

12. Legal Responsibilities for Damages. The Secretary, by issuing this individual permit, accepts no legal responsibility for any damage direct or indirect of whatever nature and by whoever suffered arising out of the approved activity.

13. Reopener. If after granting this permit the Secretary determines that there is evidence indicating that an authorized activity does not comply with the requirements of 10 V.S.A. Chapter 50, the Secretary may reopen and modify this permit to include different limitations and requirements.

14. Revocation. This permit is subject to the conditions and specifications herein and may be suspended or revoked at any time for cause including: failure by the permittee to disclose all relevant facts during the application process which were known at that time; misrepresentation of any relevant fact at any time; non-compliance with the conditions and specifications of the permit; or a change in the factors associated with the control activity such that the Secretary can no longer make all applicable findings.

15. Rights and Privileges. This permit does not authorize any damage to public or private property or invasion of private rights or the violation of federal, state, or local laws or regulations. In addition, this permit does not convey any title or interest to the lands lying under public waters or waters affected.

16. Appeals. Pursuant to 10 V.S.A. Chapter 220 and the Vermont Rules for Environmental Court Proceedings, any appeal of this decision must be filed with the clerk of the Environmental Division of the Superior Court within 30 days of the date of the decision. An aggrieved person shall not appeal this permit unless the person submitted to the Secretary a written comment during the applicable public comment period or an oral comment at the public meeting conducted by the Secretary. Absent a determination of the Environmental judge to the contrary, an aggrieved person may only appeal issues related to the person's comments to the Secretary as prescribed by 10 V.S.A. § 8504(d)(2). The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Division; and must be signed by the appellant or the appellant's attorney. The appeal must give the address or location and description of the property, project, or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings available at www.vermontjudiciary.org. The

address for the Environmental Division is: 32 Cherry Street; 2nd Floor, Suite 303; Burlington, VT 05401 Telephone #: 802-951-1740.

c. Findings

1. Jurisdiction - 10 V.S.A. § 1455(a). Within waters of the State, no person may use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, unless that person has been issued a permit by the Secretary. The control activity, as described in permit application #3382-ANC-C, involves the targeted use of a pesticide, SePRO ProcellaCOR® EC, to control Eurasian watermilfoil, *Myriophyllum spicatum*, within the waters of Lake Fairlee in Fairlee, Thetford, and West Fairlee. Therefore, the Secretary has jurisdiction under 10 V.S.A. Chapter 50.

2. Application Receipt & Review. An Aquatic Nuisance Control Individual Permit application submitted by the Lake Fairlee Association (permittee) and SOLitude Lake Management (co-permittee) was received on March 24, 2021. Upon receipt of the application, the Secretary proceeded in accordance with the permit process as identified under 10 V.S.A. Chapter 170 and it was reviewed in accordance with the Department of Environmental Conservation's Permit Application Review Guidance, adopted March 14, 2019.

   The Secretary can issue an Aquatic Nuisance Control permit for the use of pesticides in waters of the State for the control of nuisance aquatic plants pursuant to 10 V.S.A. § 1455 (d) if the following findings can be made:

   (1) there is no reasonable non-chemical alternative available;

   (2) there is acceptable risk to the non-target environment;

   (3) there is negligible risk to public health;

   (4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and

   (5) there is a public benefit to be achieved from the application of a pesticide or, in the case of a pond located entirely on a landowner's property, no undue adverse effect upon the public good.

   The Secretary has determined that findings c.5.-c.9. can be made. Therefore, the Secretary shall issue a permit for the use of pesticides in waters of the State for the control of nuisance aquatic plants.

3. Background; Aquatic Nuisance Control Permit History. Lake Fairlee is a 468-acre waterbody that drains into an unnamed tributary of the Ompompanoosuc River. Eurasian watermilfoil was first confirmed in Lake Fairlee in 1995. Permitted control methods for Eurasian watermilfoil in Lake Fairlee include bottom barriers, powered mechanical devices (diver assisted suction harvesting - DASH), and herbicides. The following is a summary of those Aquatic Nuisance Control permits (permits with no identified expiration date have expired). Permits and records containing additional detail on these control activities may be made available upon request.

   Bottom barriers: 1999-B03 and 2002-B03

   Herbicides: 2009-C08 and 2015-C03

   Powered Mechanical Devices: 2004-H06 and 3123-ANC-H (expires 10/27/2030)

4. Control Activity Purpose. The purpose of the control activity is to use ProcellaCOR® EC as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Fairlee.

5. No Reasonable Non-Chemical Alternative Available – 10 V.S.A. 1455(d)(1). The Secretary identified a potentially reasonable approach for addressing a well-established lake-wide population of Eurasian watermilfoil. Baseline assumptions regarding the proposed control activity were made to outline a reasonable approach for controlling Eurasian watermilfoil as well as identifying ecological and water quality characteristics for this waterbody:

   - The control activity proposes to target specific locations (spot treatments) of dense populations of the aquatic invasive species Eurasian watermilfoil.
   - Eurasian watermilfoil has been established in Lake Fairlee since at least 1995.
   - The Eurasian watermilfoil population has spread throughout the lake, is a well-established population, and eradication is a highly unlikely outcome from control efforts.
   - Non-chemical control methods targeting Eurasian watermilfoil have been used in Lake Fairlee.
   - ProcellaCOR® EC (active ingredient florpyrauxifen-benzyl) is expected to dissipate rapidly to a reduced concentration in Lake Fairlee due to its rapid photolysis and aerobic aquatic metabolism. The outlet of Lake Fairlee flows into an unnamed tributary of the Ompompanoosuc River. Due to its rapid degradation, it is anticipated that reduced concentrations of ProcellaCOR® EC will flow downstream until complete breakdown of the pesticide occurs.
   - As identified in the Vermont Lake Score Card (FAIRLEE – data through 2020), Lake Fairlee's trend score is poor, its Vermont Water Quality Standards status is stressed from nutrients and phosphorus, and it has a "moderately disturbed" watershed score. Mean spring total phosphorus is 12.2 ug/L, mean summer total phosphorus is 15.6 ug/L, mean summer chlorophyll a is 4.7 ug/L, and mean summer Secchi depth is 6.1 meters. The mean spring total phosphorus concentration trend is significantly increasing; the mean summer total phosphorus concentration trend is highly significantly increasing; and the mean summer Secchi depth trend is significantly decreasing. This data supports the likelihood of the presence of elevated biological productivity within Lake Fairlee, which may result in dense aquatic plant populations, including Eurasian watermilfoil.
   - As identified in the Vermont Lake Score Card, the Vermont Inland Lake Shoreland and Habitat Score/USEPA National Lake Assessment Score ranks Lake Fairlee as being in poor condition. This ranking is a measure of human activity within 15 meters of the lake's shoreline at ten (10) random sites around the lake; it reflects how extensively a lake's shoreland is developed. Those locations of significant development reduce the natural resiliency of the waterbody and increases potential adverse impacts to the biological, chemical, and physical integrity of the waterbody.

   The use of a pesticide for targeted spot treatments is a reasonable approach to manage Eurasian watermilfoil in Lake Fairlee given the baseline assumptions. This management approach can target limited locations within the littoral zone where public good uses, such as boating, fishing, or swimming, are impacted by this species. This targeted spot treatment approach can be limited to specific areas to minimize potential adverse impacts on native aquatic plant species that may be sensitive to the pesticide. The Secretary will assess the proposed treatment locations targeted by a spot treatment to ensure the use of pesticide will be focused to areas of dense Eurasian watermilfoil growth only where non-chemical control methods may be unreasonable due to the size or density of the Eurasian watermilfoil population or the potential non-target impacts associated with conducting a non-chemical control activity.

   The Secretary has determined there is no reasonable non-chemical alternative available.

6. Acceptable Risk to the Non-Target Environment – 10 V.S.A. 1455(d)(2). The Secretary considers the following as the non-target environment:

   - Aquatic plants and animals within the waterbody proposed for treatment and waters up to one mile downstream of the waterbody.
   - Wetlands within the waterbody proposed for treatment and wetlands within the outlet waters up to one mile downstream of the waterbody.
   - Human use of waters treated with the pesticide. This includes, hydroponic farming, greenhouse and nursery plants, and all locations irrigated with waters treated with ProcellaCOR® EC.
   - The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact. The concept of ecological integrity is identified in the Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy.

   For determining what might be considered an acceptable risk to the non-target environment from a proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment:

   - A control activity for Eurasian watermilfoil will have an impact on the ecological integrity of the waterbody as the non-target environment cannot be avoided completely.
   - Rare aquatic plant species have been recorded as being present in Lake Fairlee. Species observed include prickly hornwort (S2S3), *Ceratophyllum echinatum*; Nuttall's waterweed (S3), *Elodea nuttallii*; Vasey's Pondweed (S2), *Potamogeton vaseyi*; marsh mermaidweed (S2S3), *Proserpinaca palustris*; humped bladderwort (S3), *Utricularia gibba*; and lesser bladderwort (S3), *Utricularia minor*. Those species are not listed as being controlled by ProcellaCOR® EC as identified on the product label. However, *Ceratophyllum echinatum* is a close relative to a native non-target species that is listed as being controlled by ProcellaCOR® EC (*Ceratophyllum demersum*). Additionally, *Proserpinaca palustris* is within the same Family as Eurasian watermilfoil (Haloragaceae). Therefore, there is the potential that *Ceratophyllum echinatum* and *Proserpinaca palustris* may be negatively impacted by ProcellaCOR® EC.
   - Native aquatic plants controlled by ProcellaCOR® EC as identified on the product label have been recorded as being present in Lake Fairlee. This includes watershield, *Brasenia schreberi*, last observed in 2021 with a 6% frequency of occurrence for the 120 survey points within Lake Fairlee at various densities scattered throughout the lake; and coontail, *Ceratophyllum demersum*, last observed in 2020 with a <1% frequency of occurrence for the 120 survey points within Lake Fairlee at a trace density along the western half of the southern shoreline. In previous correspondence with the co-permittee, it was identified that season long and sometimes multi-season control of *Brasenia schreberi* can be achieved from a treatment concentration of 4 Prescription Dose Units (PDU). Protection of *Brasenia schreberi* can occur using a 2 PDU or less range, although impacts may be observed at that concentration that last a few weeks before plants start to recover. The product label identifies *Ceratophyllum demersum* as being less sensitive to ProcellaCOR® EC and that a higher application rate may be required to control it. The applicant identified that *Ceratophyllum demersum* will most likely only be impacted at a treatment concentration of greater than 4 PDU. The applicant also identified that white water lily, Ny*mphaea odorata*, and yellow water lily, *Nuphar variegata*, may also be sensitive (not controlled/sublethal) to ProcellaCOR® EC based on treatments conducted in previous years. Impacts to those species include slight discoloration, slight stem twisting, and leaf curling. However, plants grew out of those impacts after a period of several weeks after a treatment.

Nymphaea odorata and *Nuphar variegata* were last observed in 2021. In 2021, *Nymphaea odorata* population densities were observed as trace to dense and dispersed throughout the waterbody with a 10% frequency of occurrence for the survey points within Lake Fairlee. In 2021, *Nuphar variegata* population densities were observed as trace to moderate and dispersed throughout the waterbody with a 2% frequency of occurrence for the survey points within Lake Fairlee.

- The outlet of Lake Fairlee flows into an unnamed tributary of the Ompompanoosuc River. It is anticipated that reduced concentrations of ProcellaCOR® EC will flow downstream until complete breakdown of the pesticide occurs. The species composition within the unnamed tributary is not specifically known.
- Mapped Class II wetlands are located at the Blood Brook inlet, the Middle Brood inlet, an unnamed inlet along the northeastern shore, and the outlet. The Middle Brook inlet was surveyed by the Secretary on 6/5/2020 for rare aquatic plant species. During that survey, dense populations of *Proserpinaca palustris* were observed along the shoreline of the wetland growing out to approximately 1.5 feet deep. Scattered *Ceratophyllum echinatum*, *Elodea nuttallii*, and *Utricularia minor* populations were also found within this wetland along with robust growth of other native aquatic plant species with trace amounts of Eurasian watermilfoil. Additional wetlands may be present as defined by a dominance (>50% surface area coverage) of woody, emergent, or floating leaved vegetation anchored in sediment located in areas up to 6.5 feet deep. Examples of wetland vegetation include willow and alder shrubs, cattails, emergent bur-reed, emergent arrowhead/*Sagittaria* sp., and watershield/white water lily pads/spatterdock/floating leaved pondweeds. Provided only Eurasian watermilfoil is targeted, the control activity would be an Allow Use (6.18) under the Vermont Wetland Rules.
- Lake Fairlee and its waters are public, and it is reasonable to assume that all public waters may be used for irrigation.
- As identified in the ProcellaCOR® EC Safety Data Sheet, the product is practically non-toxic to fish on an acute basis and the material is slightly toxic to aquatic invertebrates on an acute basis. Review of ecotoxicity studies based on the maximum label rate of 50 parts per billion, indicates parent compound and degradates show toxicity levels are well above the application rates used in aquatic environments. Therefore, the potential for acute risk to fish, invertebrates, amphibians, birds, and mammals is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.
- Based on a bathymetry survey completed by the Secretary on 8/22/2018, Lake Fairlee is 467.7 acres, and the littoral zone covers approximately 151.7 acres, which is 32.4% of the total lake surface area. The littoral zone is the area of the lake that supports rooted aquatic vegetation.
- Approximately 20.9 acres are proposed to be treated with ProcellaCOR® EC in 2021, which is 4.5% of the total lake surface area and 13.8% of the littoral zone of Lake Fairlee. If a treatment is proposed during a year this permit is active, the final annual treatment area will be determined annually in accordance with condition a.4. of this permit.

The presence of aquatic vegetation is required for fish and wildlife habitat. Generally, Eurasian watermilfoil has been identified as providing poor fish and wildlife habitat compared with native aquatic vegetation. The removal of Eurasian watermilfoil promotes native plant biodiversity, which improves the biological integrity of the lake over time. However, Eurasian watermilfoil may provide beneficial structural habitat in the absence of other aquatic vegetation. As a measure to reduce potential non-target impacts on the ecological integrity of Lake Fairlee, no more than 40% of the littoral zone may be targeted by aquatic plant

management activities annually. For any requests that propose managing more than 40% of the littoral zone, including a combination of chemical and non-chemical control methods, the permittee must demonstrate a need where the potential adverse effects on the non-target environment are outweighed by the tangible benefits.

It is not anticipated that the non-target aquatic plants and animals within Lake Fairlee, the waters downstream of Lake Fairlee, or the wetlands will be adversely impacted by applying ProcellaCOR® EC in accordance with this permit and the Approved Application. The current treatment application rate is proposed to be up to 4 PDUs (maximum application rate is 25 PDUs), which is within the application rate for targeting Eurasian watermilfoil as identified in the ProcellaCOR® EC specimen label (Table 5). For aquatic plant species that are known to be controlled by ProcellaCOR® EC, aquatic plant species closely related to species controlled by ProcellaCOR® EC, or for species that may be sensitive to ProcellaCOR® EC, proposed treatments will need to be designed to avoid potential impacts to known locations of those populations. The native non-target species that may be negatively impacted by a ProcellaCOR® EC treatment that are in Lake Fairlee (*Brasenia schreberi, Ceratophyllum demersum, Ceratophyllum echinatum, Nuphar variegata, Nymphaea odorata, and Proserpinaca palustris)* are often located within wetlands or wetland buffers. As previously observed by the Secretary on 6/5/2020, the Middle Brook inlet wetland contains all of these species. Due to this potential negative impact on native non-target aquatic plant species, a proposed ProcellaCOR® EC treatment should not exceed treatment concentrations where there is the potential for negative impacts (e.g., no greater than 2 PDU for locations with *Brasenia schreberi* or 4 PDU for locations with *Ceratophyllum demersum*) and treatment locations should avoid being within a wetland, 50 foot wetland buffer, or locations with known populations of these native non-target species, unless it can be determined that the overall lake-wide population of a sensitive species will not be significantly impacted.

For each treatment, a pre-treatment quantitative aquatic plant survey will be completed during the year prior to a proposed treatment and a pre-treatment qualitative aquatic plant survey for Eurasian watermilfoil and the non-target native species that are controlled or sensitive to ProcellaCOR® EC will be completed during the year of a proposed treatment within the proposed treatment location(s). Following a treatment, a post-treatment quantitative aquatic plant survey will be conducted to assess how aquatic plant populations respond to control activities during the year of treatment and the year following the last treatment. Quantitative aquatic plant surveys will be completed during the aquatic plant growing season (July 1st through September 30th) and completed using the point-intercept rake-toss methodology. The Secretary will assess those surveys to ensure the acceptable risk to the non-target environment finding can continue to be met.

While there are recommended use restrictions identified on the product label for hydroponic farming, greenhouse, nursery plants, and irrigation of landscape vegetation, use restrictions are limited and will likely be temporary as ProcellaCOR® EC is expected to dissipate rapidly in Lake Fairlee due to its rapid photolysis and aerobic aquatic metabolism.

The permittee is required to submit an annual request for proposed treatment locations and may not conduct the treatment until receiving approval from the Secretary. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the non-target environment, the findings made in this permit to authorize the use of ProcellaCOR® EC may be reviewed annually upon receiving the annual request.

The use of ProcellaCOR® EC will only occur while Eurasian watermilfoil is actively growing, which is typically between mid-June through mid-September. ProcellaCOR® EC is absorbed through submersed plant shoots and leaves when used in water. There is the potential that treatments scheduled earlier in the year may be more protective of non-target native aquatic plants as Eurasian watermilfoil often begins actively growing

before non-target native aquatic plants. Targeting Eurasian watermilfoil with ProcellaCOR® EC earlier in the season may also result in requiring a reduced amount of the pesticide to be effective at controlling Eurasian watermilfoil. As Eurasian watermilfoil biomass may be reduced earlier in the year before non-target native aquatic plants begin fully growing, the reduction of that biomass may allow for an increase in available light for non-target native aquatic plants. This may temporarily increase the competitive advantage for those non-target native aquatic plants to exist for a longer period within the treatment location before Eurasian watermilfoil recolonizes the area, thus potentially reducing the frequency of using a pesticide.

The Secretary has determined that there is an acceptable risk to the non-target environment.

7. Public Health – 10 V.S.A. 1455(d)(3). At the request of the Secretary, the Vermont Department of Health (VDH), Radiological and Toxicological Sciences Division reviewed the risk of the proposed activity to public health, in which it examined potential concerns for public health that may be associated with exposure to ProcellaCOR® EC. Based on VDH's review of the confidential statement of formulation, it is reasonable to conclude that human exposure to the inert compounds contained in ProcellaCOR® EC at the concentrations that would result under the conditions proposed by the applicants, is not likely to result in an increase in the level of concern for public health. Thus, the proposed treatment of Lake Fairlee with ProcellaCOR® EC is expected to result in negligible risk to public health, from both the active and inert compounds in ProcellaCOR® EC.

   VDH recommends public notification of property owners and residents of the treated waterbody area as well as commercial camps and parents whose children are attending camps which use the treated waterbody and/or waters within one contiguous water mile of the treated waterbody should occur 30 days prior to application. Waterbody access areas as well as any nearby campgrounds should be posted for public awareness.

   To minimize unnecessary pesticide exposure to the public over a weekend, treatments will occur on a Monday, Tuesday, Wednesday, or Thursday only. On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. The permittee will supply potable water upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink on the day of treatment.

   The Secretary has determined that there is negligible risk to public health.

8. Long-range Management Plan – 10 V.S.A. 1455(d)(4). Aquatic invasive species are considered stressors on Vermont's surface waters. Eurasian watermilfoil, an aquatic invasive species, has spread throughout Lake Fairlee, is well-established, and eradication is a highly unlikely outcome from control efforts. Eurasian watermilfoil is and will continue to be a part of the aquatic environment of Lake Fairlee for the foreseeable future. As a result, a targeted use of chemical and non-chemical control methods as a part of an integrated pest management plan to control nuisance levels of Eurasian watermilfoil that are impacting public good uses has been developed.

   The permittee will update the "PROCELLACOR™ EC HERBICIDE TREATMENT PLAN" in the Approved Application as needed to ensure the plan is implemented to achieve the control activity purpose, promote the public good, be protective of the water resource, and include pesticide minimization measures. Review of and updates to this plan or any other sections of the Approved Application will be assessed in conjunction with the baseline biological, chemical, and physical characteristics of the waterbody and watershed to set expectations for what the control activity may achieve. Potential updates to the plan will incorporate the following review:

- Identify the aquatic nuisance problem, the area(s) with the aquatic nuisance problem, and characterize the extent of the problem, including, for example, water use goals not attained (e.g., wildlife habitat, fisheries, native vegetation, and recreation).
- Identify locations of species that may be sensitive to a control activity.
- Identify locations where wetlands may be present.
- Identify an action threshold to determine when a control activity may be appropriate.
- Identify possible factors causing or contributing to the aquatic nuisance problem.
- Review the past management history of the aquatic nuisance.
- Develop an integrated pest management plan that incorporates short and long-term goals, anticipated levels of control, expectations achieved by a control activity, and whether a control activity will need to occur in perpetuity to maintain anticipated levels of control.
- Develop management alternatives, such as no action, prevention, mechanical or physical methods, cultural methods, biological control agents, or the targeted use of pesticides, to identify how different control activities may reach the goals of the integrated pest management plan. Management alternatives should be compatible with other water uses, not adversely affect natural lake functions, have a known and understood mechanism of control, be documented as low risk to natural ecosystem functions, and are predictable and repeatable in efficacy and outcome.
- Develop methods for evaluating the efficiency of the integrated pest management plan to act as a feedback loop for determining how future control efforts should proceed.
- Implement watershed and shoreline management strategies to address sources of phosphorus and to promote the long-term stability and resilience of the waterbody to help reduce the likelihood of nuisance populations from developing.

As a means to ensure that the permittee is actively implementing their long-range management plan that incorporates a schedule of pesticide minimization, the permittee will need to implement pesticide minimization measures annually and report to the Secretary on those effort. Pesticide minimization measures must include one or a combination of Eurasian watermilfoil non-chemical control projects and/or efforts that reduce the likelihood of Eurasian watermilfoil populations from developing.

The Secretary has determined that a long-range management plan has been developed that incorporates a schedule of pesticide minimization by utilizing an integrated pest management plan.

9. Public Benefit – 10 V.S.A. 1455(d)(5). The Secretary considered the following criteria in determining whether there is a public benefit to be achieved from the application of the pesticide:

    - Whether carrying out the control activity produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
        - Assessment: Tangible benefits to public good uses are likely to be associated with the temporary decrease in the frequency of occurrence and biomass of Eurasian watermilfoil. This temporary decrease is anticipated to benefit boating and swimming within the treatment locations. It remains undetermined as to whether the control activity will produce a tangible short or long-term benefit to fishing. The presence of aquatic vegetation is required for fish and wildlife habitat. Generally, Eurasian watermilfoil has been identified as providing poor fish and wildlife habitat compared with native aquatic vegetation. However, Eurasian watermilfoil may provide beneficial structural habitat in the absence of other aquatic

vegetation. To reduce the potential impact to fishing as a result of impacts to fish and wildlife habitat from aquatic plant management, no more than 40% of the littoral zone may be targeted by aquatic plant management activities.

- Whether the potential cumulative impacts from carrying out the control activity adversely affect the water resource and the public that utilizes that resource.
    - Assessment: Additional cumulative impacts were considered that relate to the water resource and how the public may utilize that resource. The Secretary has determined that the cumulative impacts from carrying out the control activity are not anticipated to affect the water resource and the public that utilizes that resource.
        - On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. Potable water will be supplied by the permittee upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink. Within four weeks after a treatment, it is anticipated that all treated Eurasian watermilfoil will be controlled and no longer present within a treatment area. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment to avoid any potential contamination of compost. Additional advisories and recommendations related to irrigation and the use of treated waters are listed under the following sections of the ProcellaCOR® EC Specimen Label: *Use Precautions*, *Use Restrictions*, *Application to Waters Used for Irrigation on Turf and Landscape Vegetation*, *Residential and other Non-Agricultural Irrigation*, and *TABLE 1: Non-agricultural irrigation following in-water application*. Treatment concentration monitoring will occur to assess concentrations of ProcellaCOR® EC (active ingredient florpyrauxifen-benzyl) within Lake Fairlee and waters downstream to inform the public when the herbicide is no longer detectable and when potential irrigation restrictions no longer apply. Impacts on the public that utilize the water resource are anticipated to be temporary and minor as it is expected that ProcellaCOR® EC will dissipate rapidly to a reduced concentration in Lake Fairlee and waters downstream due to its rapid photolysis and aerobic aquatic metabolism.
        - Lake Fairlee is currently a waterbody that is dominated by aquatic plants within the littoral zone as opposed to being dominated by algal species. Aquatic plants utilize the available nutrients in this waterbody, thereby limiting the available nutrients for algal species. To maintain this current aquatic plant dominated clear water steady state and to prevent algal species from becoming dominant and potentially impacting the water resource and the public that utilizes that resource, no more than 40% of the littoral zone may be targeted by aquatic plant management activities.
        - Treating dense populations of Eurasian watermilfoil with ProcellaCOR® EC (a spot treatment herbicide with relatively short exposure times) will rapidly increase the biological oxygen demand as the Eurasian watermilfoil decomposes, which may deplete concentrations of dissolved oxygen and result in anoxia. Anoxia has the potential to result in a die-off of aquatic animals, which if that were to happen, it would negatively impact the water resource and potentially impact how the public utilize that resource. To reduce this potential impact, treatment locations within the

littoral zone will be limited so that no more than 40% of the littoral zone is targeted annually for aquatic plant management activities.

- Lake Fairlee is not located within a Groundwater Source Protection Area or a Surface Water Source Protection Area. It is anticipated that there will be no impact on Surface Water or Groundwater Source Protection Areas.
- There is no Vermont State Park located along the shores of Lake Fairlee. Water use advisories and recommendations will not impact the operations of a Vermont State Park.

- Whether measures to reduce impacts on the water resource have been taken.
  - Assessment: The control activity proposed to control Eurasian watermilfoil only, which is an aquatic invasive species. The target concentration of ProcellaCOR® EC used will be in accordance with the PDUs per acre-foot of water for Eurasian watermilfoil as identified in the specimen label (Table 5). Treatment locations should avoid wetlands, wetland buffer, or locations with known populations of native non-target species that are either controlled by, related to a species that is controlled by, or sensitive to ProcellaCOR® EC unless it can be determined that the overall lake-wide population of the native non-target species in question will not be significantly impacted. The treatment is proposed to be a spot treatment with relatively short exposure times (hours to several days). Treatments will occur during a time of year with actively growing Eurasian watermilfoil. To prevent resistance to ProcellaCOR® EC, the same treatment area will not be targeted for more than two consecutive years with ProcellaCOR® EC. The permittee is required to submit an annual request for proposed treatment locations and may not conduct the treatment until receiving approval from the Secretary. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the resource or public good that may have resulted from a treatment, the findings made in this permit to authorize the use of ProcellaCOR® EC may be reviewed annually upon receiving the annual request.
- Whether the control activity is excessive for the stated purpose.
  - Assessment: The use of ProcellaCOR® EC, a spot treatment herbicide with relatively short exposure times, as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Fairlee is not considered excessive for the stated purpose.

Based upon review of the public good criteria, the Secretary has determined that the tangible benefits to the public good outweigh the potential negative impacts. The Secretary finds that there is a public benefit to be achieved from the application of a pesticide.

10. References.

SePRO ProcellaCOR® EC Specimen Label

SePRO ProcellaCOR® EC Safety Data Sheet

USEPA, 2017. Florpyrauxifen-benzyl Environmental Fate and Ecological Risk Assessment for the Section 3 New Chemical Registration. https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0560-0011

Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management. 2017. https://fortress.wa.gov/ecy/publications/documents/1710020.pdf

USEPA Docket on ProcellaCOR: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2016-0560

d. Authorization

By delegation from the Secretary, the Vermont Department of Environmental Conservation has made a determination that the above activity qualifies for an individual aquatic nuisance control permit. The Permittees are authorized per 10 V.S.A. § 1455(i) subject to the conditions herein specified.

This permit shall be effective on the day of signing and expire five years thereafter.

Peter Walke, Commissioner
Department of Environmental Conservation

By: _____
Oliver Pierson, Program Manager
Lakes & Ponds Management and Protection Program
Watershed Management Division

Aquatic Nuisance Control Individual Permit
Under 10 V.S.A. § 1455

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Permittee Information	
Permittee: Lake Iroquois Association & the Lake Iroquois Recreation District Co-permittee: SOLitude Lake Management Permit Number: 3038-ANC-C	Control Activity: Pesticide (Herbicide – SePRO ProcellaCOR® EC) Waterbody: Lake Iroquois, Hinesburg, Richmond, and Williston

a. Specific Conditions

Based upon the Findings contained in this permit, the Secretary of the Agency of Natural Resources (Secretary) has determined that the proposed aquatic nuisance control activity will comply with 10 V.S.A. § 1455 and is hereby approved under the following conditions.

1. Pesticide Use. The use of SePRO ProcellaCOR® EC EPA Registration Number 67690-80 (treatment), formulation active ingredient 2.7% florpyrauxifen-benzyl, is authorized to target Eurasian watermilfoil, *Myriophyllum spicatum*, in the waters of Lake Iroquois, Hinesburg, Richmond, and Williston. Only SePRO ProcellaCOR® EC shall be used in the waterbody over the course of one calendar year. A treatment shall only occur on a Monday, Tuesday, Wednesday, or Thursday. This pesticide shall be registered with the U.S. Environmental Protection Agency and the Vermont Agency of Agriculture, Food and Markets at the time of use and handled, applied, and disposed of in conformance with all state and federal regulations.
2. Certified Applicator. All applicators of the authorized pesticide shall be certified by the Vermont Agency of Agriculture, Food and Markets in Category Five – Aquatic Pest Control.
3. Agency Notification. Notification shall be provided at least 30 days in advance of the scheduled treatment date to the Secretary of the Agency of Natural Resources and to the Agency of Agriculture, Food & Markets to coordinate pesticide use inspection at the time of treatment. The permittee shall contact Erica Cummings, Agrichemical Research and Policy Specialist, of the Agency of Agriculture, Food & Markets at 802-917-2073 or erica.cummings@vermont.gov, or her replacement, to coordinate.
4. Annual Request & Approval of Treatment Locations. A treatment shall only occur in locations that have been approved annually in writing by the Secretary. Prior to a treatment, the permittee and co-permittee (if applicable) shall submit a request to the Secretary with proposed annual treatment locations. Requests may be submitted to the Secretary over the growing season as needed. A request shall include:
    A. A map identifying the acreage of the waterbody, acreage of the littoral zone of the waterbody, the proposed treatment date(s), the proposed treatment location(s) with the associated acreage, and all other proposed locations and acreages for permitted non-chemical aquatic nuisance control activities (total control area) when applicable.
    B. A description of Eurasian watermilfoil and non-target aquatic plant species densities within each proposed treatment location.
    C. A map of the locations of wetlands as identified by the ANR Atlas or as defined by a dominance (>50% surface area coverage) of woody, emergent, or floating leaved vegetation anchored in sediment located in areas up to 6.5 feet deep. If determined necessary, a Wetlands Permit or Approval, per 10 V.S.A. § 914, shall be obtained prior to commencement or continuance of the control activity.
    D. A map of proposed treatment concentration monitoring locations.
5. Annual Control Area. The total control area authorized by this permit and any additional authorizations shall not exceed 40% of the littoral zone of Lake Iroquois over the course of one calendar year, unless approved in

writing by the Secretary. The same treatment location shall not be targeted with the same authorized pesticide for more than two consecutive years.

6. Treatment Plan. Treatment(s) shall be carried out in accordance with the "PROCELLACOR™ EC HERBICIDE TREATMENT PLAN" as identified in the Approved Application. The treatment plan shall be updated as necessary to minimize potential adverse impacts on the resource and to ensure compliance with this permit. All updates to the treatment plan shall be submitted to the Secretary for approval.

7. Public Informational Notification. A public informational notification (notification) shall be posted and provided to the public at least 30 days in advance of the scheduled treatment date. A webpage shall be made available to the public for posting a digital copy of the notification and for additional information on the authorized treatment. Postings of the physical and digital copies of the notification shall remain posted for no less than 30 days after the treatment occurred. If there are changes to the information on the notification, the notification shall be updated and reposted.

   A. The notification shall include:

      i. A map of the annually approved treatment location(s).

      ii. The scheduled treatment date(s).

      iii. The authorized pesticide to be used.

      iv. The contact name(s), address(es), and telephone number(s) for all permittees.

      v. The webpage made available to the public for information on the authorized treatment.

      vi. A summary of the Water Use Advisories & Recommendations (condition a.9.).

      vii. A statement identifying that the permittee shall supply potable water upon request to those who depend upon the treated waterbody or its outlet stream(s) (within one mile of the effluent) for domestic use to prepare food or drink on the day of treatment.

      viii. A statement informing all property owners that if their property is leased, rented, or used at any time during treatment and/or while the use advisories are in effect, the property owner is responsible for informing all transient users.

   B. The notification shall be provided to the Secretary, the municipal offices of Hinesburg, Richmond, and Williston, all property owners (including commercial camps) that abut Lake Iroquois, and all property owners that abut the waters receiving effluent up to one mile downstream of Lake Iroquois's outlet by a method that provides proof of notification.

   C. Physical copies of the notification shall be posted:

      i. In locations visible to vehicle traffic, shoreline property owners, and potential lake users along all public roadways within 1,000 feet of the waterbody.

      ii. On weather resistant material and at least 8½ inches by 11 inches in size.

      iii. At all public access points to the waterbody, including all public boat launches, public beaches, or other similar public locations providing access to the waterbody.

   D. The website made available to the public shall include a digital copy of the notification, this permit, the Approved Application, the SePRO ProcellaCOR® EC Specimen Label, the SePRO ProcellaCOR® EC Safety Data Sheet, and the status of the Water Use Advisories & Recommendations (condition a.9.).

8. Treatment Concentration Monitoring. Water samples shall be collected at each of the approved monitoring locations (condition a.4.D.) to determine the concentration of florpyrauxifen-benzyl after completion of each treatment. The results shall be submitted to the Secretary within 24 hours of the permittee receiving the results and be posted to the webpage as required under condition a.7. of this permit.
    A. Water samples shall be chemically tested 48 hours after completion of each treatment. If samples indicate that florpyrauxifen-benzyl concentrations are greater than 2 parts per billion (ppb), monitoring shall continue after an additional 24-hour period. This monitoring process shall proceed until all monitoring locations are less than or equal to 2 ppb florpyrauxifen-benzyl, or if this process is authorized to be discontinued by the Secretary.
    B. The Secretary may require additional monitoring, including additional monitoring locations or the frequency of monitoring, if determined necessary.
    C. Samples shall be analyzed using a methodology with a minimum detection limit of at least 1 ppb florpyrauxifen-benzyl.
9. Water Use Advisories & Recommendations. On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment. Additional advisories and recommendations related to irrigation and the use of treated waters that are listed under the following sections of the ProcellaCOR® EC Specimen Label shall be posted to the webpage as required under a.7. of this permit: *Use Precautions*, *Use Restrictions*, *Application to Waters Used for Irrigation on Turf and Landscape Vegetation*, *Residential and other Non-Agricultural Irrigation*, and *TABLE 1: Non-agricultural irrigation following in-water application*.
10. Potable Water. On the day of treatment, the permittee shall supply potable water upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink.
11. Treatment Report. A treatment report shall be submitted to the Secretary within one week of each treatment and include the following:
    A. Date, time, and duration of treatment.
    B. Herbicide manufacturer, trade name, and formulation used.
    C. Total amount of the herbicide applied.
    D. Total surface area of the herbicide treatment.
    E. Target herbicide concentration and related calculations.
    F. Herbicide treatment technique and equipment used.
    G. Weather and lake conditions at time of herbicide treatment.
12. Aquatic Plant Surveys. For each treatment, a quantitative aquatic plant survey shall be conducted pre-treatment during the year of treatment, post treatment during the year of treatment, and the year following the last treatment. All aquatic plant surveys shall be completed using the point-intercept rake-toss methodology or an alternate method approved by the Secretary. All aquatic plant surveys shall include the date the survey was completed, a map depicting the survey points, and a description of all aquatic plant species present at each point and their relative abundance. All survey data shall be reported in a similar format to prior years and include a digital submission of data collected at each point-intercept.

13. Annual Report. An annual report shall be submitted to the Secretary on the year of treatment and one year thereafter by December 31st and shall include:
    A. A summary of the treatment concentration monitoring when applicable.
    B. Aquatic plant survey(s) (condition a.12.).
    C. A map of the treatment location(s) and all other locations where additional non-chemical aquatic nuisance control activities occurred that year when applicable.
    D. A map of the potential future treatment location(s) and all other proposed locations for additional aquatic nuisance control activities when applicable.
    E. A summary of the status of aquatic plant re-growth in treatment locations.
14. Pesticide Minimization Measures. Beginning the first calendar year of a treatment until expiration of this permit, the permittee shall implement pesticide minimization measures annually. Pesticide minimization measures shall include one or a combination of Eurasian watermilfoil non-chemical control projects and/or efforts that reduce the likelihood of Eurasian watermilfoil populations from developing. Should pesticide minimization measures not be completed over a calendar year or the Secretary has determined that pesticide minimization measures were insufficient at achieving the purpose of pesticide minimization, the permittee shall submit a pesticide minimization compliance plan to be approved by the Secretary prior to any additional proposed use of pesticide under this permit.
15. Pesticide Minimization Annual Report. Beginning the first calendar year of a treatment until expiration of this permit, the permittee shall submit an annual pesticide minimization report to the Secretary by December 31st and shall include:
    A. A summary of pesticide minimization measures completed during the current calendar year.
    B. A summary of proposed pesticide minimization measures to be completed over the following calendar year.

b. Standard Conditions

1. Co-Permittee Status. Any individual or entity other than the permittee that is engaging in the permitted jurisdictional activity shall notify the Secretary to obtain co-permittee status prior to any such work. Notification of the addition or termination of co-permittee status shall occur using a form provided by the Secretary. A co-permittee shall be subject to all terms and conditions in this permit.
2. Aquatic Species Spread Prevention. Prior to any control activity occurring, all equipment, including but not limited to boats, trailers, vehicle, and gear, that has been in or on any other waterbody, shall be decontaminated in accordance with the *Voluntary Guidelines to Prevent the Spread of Aquatic Invasive Species through Recreational Activities*, Aquatic Nuisance Species Task Force, November 2013, or its replacement.
3. Modification. This permit may be modified or amended upon request by the permittee or by the Secretary. If the Secretary determines that modification is appropriate, only the conditions subject to modification shall be reopened. Any modification under this condition shall be pursuant to 10 V.S.A. Chapter 170 and any rules adopted thereunder.
4. Notice of Termination. The permittee may terminate the control activity as approved by this permit by submitting a notice of termination. The notice of termination shall include, at a minimum, the permit number for which termination is sought; the basis for the notice; the permittee's name and contact

information; and a signed and dated certification statement by an authorized representative of the permittee confirming the notice of termination.

5. Rare, Threatened, or Endangered Species. Encounters with any rare, threatened, or endangered species shall be reported to the Secretary immediately. If determined necessary by the Secretary, an Endangered & Threatened Species Taking Permit, per 10 V.S.A. § 5408, shall be obtained prior to commencement or continuance of the control activity.

6. Duty to Comply and Enforcement. The permittee(s) shall comply with all terms and conditions of this permit. Any permit noncompliance shall constitute a violation of 10 V.S.A. § 1455 and may be cause for any enforcement action and revocation, modification, or suspension of the permit. It shall not be a defense for the permittee(s) in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

7. Twenty-Four Hour Non-compliance Reporting. Unless provided otherwise by this permit, the permittee shall report any noncompliance which may endanger public health or the environment. Any such information shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance, its cause; the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; as well as steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

8. Reporting & Correspondence. All requisite correspondence directed to the Secretary pertaining to this permit, including notifications, surveys and reports, shall be submitted via email to ANR.WSMDShoreland@vermont.gov or mailed to the following address:

   Lake & Shoreland Permitting
   Watershed Management Division
   1 National Life Drive, Davis 3
   Montpelier, VT 05620-3522

9. Compliance with Other Regulations. This permit does not relieve the permittee from obtaining all other approvals and permits prior to commencement of activity, or from the responsibility to comply with all other applicable federal, state, and local laws or regulations. In accordance with Fish and Wildlife Board Rule 641, adopted pursuant to 10 V.S.A. § 4145(a), a Special Use Permit from the Commissioner of Fish and Wildlife is required if a Vermont Department of Fish & Wildlife Access Area is used for the access of equipment or removal of aquatic plants associated with conducting an authorized control activity under this permit.

10. Duty to Reapply. If the authorized activity is anticipated to continue after the expiration date of this permit, the permittee shall reapply for coverage under a new permit at least 75 days prior to the expiration date of this permit.

11. Access to Property. By acceptance of this permit, the permittee agrees to allow representatives of the state of Vermont, at reasonable times and upon presentation of credentials, to enter upon the permittee's property, or to otherwise access the authorized control activity, to inspect to determine compliance with this permit.

12. Legal Responsibilities for Damages. The Secretary, by issuing this individual permit, accepts no legal responsibility for any damage direct or indirect of whatever nature and by whoever suffered arising out of the approved activity.

13. Reopener. If after granting this permit the Secretary determines that there is evidence indicating that an authorized activity does not comply with the requirements of 10 V.S.A. Chapter 50, the Secretary may reopen and modify this permit to include different limitations and requirements.

14. Revocation. This permit is subject to the conditions and specifications herein and may be suspended or revoked at any time for cause including: failure by the permittee to disclose all relevant facts during the application process which were known at that time; misrepresentation of any relevant fact at any time; non-compliance with the conditions and specifications of the permit; or a change in the factors associated with the control activity such that the Secretary can no longer make all applicable findings.

15. Rights and Privileges. This permit does not authorize any damage to public or private property or invasion of private rights or the violation of federal, state, or local laws or regulations. In addition, this permit does not convey any title or interest to the lands lying under public waters or waters affected.

16. Appeals. Pursuant to 10 V.S.A. Chapter 220 and the Vermont Rules for Environmental Court Proceedings, any appeal of this decision must be filed with the clerk of the Environmental Division of the Superior Court within 30 days of the date of the decision. An aggrieved person shall not appeal this permit unless the person submitted to the Secretary a written comment during the applicable public comment period or an oral comment at the public meeting conducted by the Secretary. Absent a determination of the Environmental judge to the contrary, an aggrieved person may only appeal issues related to the person's comments to the Secretary as prescribed by 10 V.S.A. § 8504(d)(2). The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Division; and must be signed by the appellant or the appellant's attorney. The appeal must give the address or location and description of the property, project, or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings available at www.vermontjudiciary.org. The address for the Environmental Division is: 32 Cherry Street; 2nd Floor, Suite 303; Burlington, VT 05401 Telephone #: 802-951-1740.

c. Findings

1. Jurisdiction - 10 V.S.A. § 1455(a). Within waters of the State, no person may use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, unless that person has been issued a permit by the Secretary. The control activity, as described in permit application #3038-ANC-C, involves the targeted use of a pesticide, SePRO ProcellaCOR® EC, to control Eurasian watermilfoil, *Myriophyllum spicatum*, within the waters of Lake Iroquois in Hinesburg, Richmond, and Williston. Therefore, the Secretary has jurisdiction under 10 V.S.A. Chapter 50.

2. Application Receipt & Review. An Aquatic Nuisance Control Individual Permit application submitted by the Lake Iroquois Association and the Lake Iroquois Recreation District (permittees) and SOLitude Lake Management (co-permittee) was received on March 3, 2020. It was reviewed in accordance with the Department of Environmental Conservation's Permit Application Review Guidance, adopted March 14, 2019. The Secretary can issue an Aquatic Nuisance Control permit for the use of pesticides in waters of the State for the control of nuisance aquatic plants pursuant to 10 V.S.A. § 1455 (d) if the following findings can be made:

   (1) there is no reasonable non-chemical alternative available;

   (2) there is acceptable risk to the non-target environment;

(3) there is negligible risk to public health;

(4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and

(5) there is a public benefit to be achieved from the application of a pesticide or, in the case of a pond located entirely on a landowner's property, no undue adverse effect upon the public good.

The Secretary has determined that findings c.5.-c.9. can be made. Therefore, the Secretary shall issue a permit for the use of pesticides in waters of the State for the control of nuisance aquatic plants.

3. Background; Aquatic Nuisance Control Permit History. Lake Iroquois is a 255-acre waterbody, has a maximum depth of 37 feet, an average depth of 20 feet, and drains into an unnamed stream that flows into Lower Pond (Sunset Pond). Eurasian watermilfoil was first confirmed in Lake Iroquois in 1990. Permitted control methods for Eurasian watermilfoil in Lake Iroquois include biological controls (*Euhrychiopsis lecontei)*, bottom barriers, and powered mechanical devices. The following is a summary of those Aquatic Nuisance Control permits (permits with no identified expiration date have expired). Permits and records containing additional detail on these control activities may be made available upon request.

    - Bottom barriers: 1994-B01, 2009-B04, 2016-B06 expires 6/2/2026, 2016-B08 expires 6/17/2026, 2206-ANC expires 2/10/2027, 2207-ANC expires 11/22/2026, and 2337-ANC expires 6/26/2027
    - Powered mechanical devices: 1999-H03, 2005-H07, 2014-H02 expires 2/17/2021, and 2016-H13 expires 7/20/2026
    - Biological: 2005-W01

4. Control Activity Purpose. The purpose of the control activity is to use ProcellaCOR® EC as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Iroquois.

5. No Reasonable Non-Chemical Alternative Available – 10 V.S.A. 1455(d)(1). The Secretary identified a potentially reasonable approach for addressing a well-established lake-wide population of Eurasian watermilfoil. Baseline assumptions regarding the proposed control activity were made to outline a reasonable approach for controlling Eurasian watermilfoil as well as identifying ecological and water quality characteristics for this waterbody:

    - The control activity proposes to target specific locations (spot treatments) of dense populations of the aquatic invasive species Eurasian watermilfoil.
    - Eurasian watermilfoil has been established in Lake Iroquois since at least 1990.
    - The Eurasian watermilfoil population has spread throughout the lake, is a well-established population, and eradication is a highly unlikely outcome from control efforts.
    - Non-chemical control methods targeting Eurasian watermilfoil have been used in Lake Iroquois.
    - ProcellaCOR® EC (active ingredient florpyrauxifen-benzyl) is expected to dissipate rapidly to a reduced concentration in Lake Iroquois due to its rapid photolysis and aerobic aquatic metabolism. The outlet of Lake Iroquois flows into an unnamed stream that flows into Lower Pond. Due to its rapid degradation, it is anticipated that reduced concentrations will flow downstream until complete breakdown of the pesticide occurs.
    - As identified in the Vermont Lake Score Card (IROQUOIS – data through 2019), Lake Iroquois's trend score is good, its Vermont Water Quality Standards status is stressed due to elevated phosphorus

concentrations, and it has a "highly disturbed" watershed score. Mean spring total phosphorus is 28.2 ug/L, mean summer total phosphorus is 25.3 ug/L, mean summer chlorophyll a is 10.6 ug/L, and mean summer Secchi depth is 3.8 meters. The mean summer total phosphorus concentration has a highly significantly decreasing trend and the mean summer chlorophyll a has a significantly decreasing trend. This data supports the likelihood of the presence of elevated biological productivity within Lake Iroquois, which may result in dense aquatic plant populations, including Eurasian watermilfoil.

- As identified in the Vermont Lake Score Card, the Vermont Inland Lake Shoreland and Habitat Score/USEPA National Lake Assessment Score ranks Lake Iroquois as being in poor condition. This ranking is a measure of human activity within 15 meters of the lake's shoreline at ten (10) random sites around the lake; it reflects how extensively a lake's shoreland is developed. Those locations of significant development reduce the natural resiliency of the waterbody and increases potential adverse impacts to the biological, chemical, and physical integrity of the waterbody.

The use of a pesticide for targeted spot treatments is a reasonable approach to manage Eurasian watermilfoil. This management approach can target limited locations within the littoral zone where public good uses, such as boating, fishing, or swimming, are impacted by this species. This targeted spot treatment approach can be limited to specific areas to minimize potential adverse impacts on native aquatic plant species that may be sensitive to the pesticide. The Secretary will assess the proposed treatment locations targeted by a spot treatment to ensure the use of pesticide will be focused to areas of dense Eurasian watermilfoil growth only where non-chemical control methods may be unreasonable due to the size or density of the Eurasian watermilfoil population or the potential non-target impacts associated with conducting a non-chemical control activity.

The Secretary has determined there is no reasonable non-chemical alternative available.

6. Acceptable Risk to the Non-Target Environment – 10 V.S.A. 1455(d)(2). The Secretary considers the following as the non-target environment:

    - Aquatic plants and animals within the waterbody proposed for treatment and waters up to one mile downstream of the waterbody.
    - Wetlands within the waterbody proposed for treatment and wetlands within the outlet waters up to one mile downstream of the waterbody.
    - Human use of waters treated with the pesticide. This includes, hydroponic farming, greenhouse and nursery plants, and all locations irrigated with waters treated with ProcellaCOR® EC.
    - The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact. The concept of ecological integrity is identified in the Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy.

    For determining what might be considered an acceptable risk to the non-target environment from a proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment:

    - A control activity for Eurasian watermilfoil will have an impact on the ecological integrity of the waterbody as the non-target environment cannot be avoided completely.
    - Rare aquatic plant species have been recorded as being present in Lake Iroquois. Species observed include prickly hornwort (S2S3), *Ceratophyllum echinatum*, last observed 9/11/2014; Nuttall's waterweed (S3), *Elodea nuttallii*, last observed 8/30/2012; slender naiad (S2), *Najas gracillima*, last

observed 9/17/1968; Guadalupe Naiad (S2), *Najas guadalupensis*, last observed 9/1/2017; straight-leaf pondweed (S2S3), *Potamogeton strictifolius*, last observed 8/2/1993; Vasey's pondweed (S2), *Potamogeton vaseyi*, last observed 8/2/1993; humped bladderwort (S3), *Utricularia gibba*, last observed 9/1/2017, and lesser bladderwort (S3), *Utricularia minor*, last observed 9/14/2012. Those species are not listed as being controlled by ProcellaCOR® EC as identified on the product label. However, *Ceratophyllum echinatum* is a close relative to a native non-target species that is listed as being controlled by ProcellaCOR® EC (*Ceratophyllum demersum*).

- Native aquatic plants controlled by ProcellaCOR® EC as identified on the product label have been recorded as being present in Lake Iroquois. This includes watershield, *Brasenia schreberi*, specific population locations or densities are not known; and coontail, *Ceratophyllum demersum*, last observed in 2019 as trace to scattered density populations along the northern and southwestern shorelines of the waterbody with a 7.8% frequency of occurrence for the survey points within Lake Iroquois. The product label identifies *Ceratophyllum demersum* as being less sensitive to ProcellaCOR® EC and that a higher application rate may be required to control it. The applicant identified that *Ceratophyllum demersum* will most likely only be impacted at a treatment concentration of 5 Prescription Dose Units (PDU) or higher. The applicant also identified that white water lily, N*ymphaea odorata*, and yellow water lily, *Nuphar variegata*, may also be sensitive (not controlled/sublethal) to ProcellaCOR® EC based on treatments conducted in 2018 and 2019. Impacts to those species include slight discoloration, slight stem twisting, and leaf curling. However, plants grew out of those impacts after a period of several weeks after a treatment. *Nymphaea odorata* and *Nuphar variegata* were last observed in 2019 and 2014, respectively. *Nymphaea odorata* was observed as scattered to dense density populations dispersed throughout the waterbody with a 12.2% frequency of occurrence for the survey points within Lake Iroquois. Specific population locations or densities for *Nuphar variegata* are not known.
- The outlet of Lake Iroquois flows into an unnamed stream that flows into Lower Pond. It is anticipated that reduced concentrations of ProcellaCOR® EC will flow downstream until complete breakdown of the pesticide occurs. The species composition within Lower Pond is similar to Lake Iroquois, which includes the presence of Eurasian watermilfoil.
- Mapped Class II wetlands are located along the northern section of shoreline and are present within the outlet stream and Lower Pond. Additional wetlands may be present as defined by a dominance (>50% surface area coverage) of woody, emergent, or floating leaved vegetation anchored in sediment located in areas up to 6.5 feet deep. Examples of wetland vegetation include willow and alder shrubs, cattails, emergent bur-reed, emergent arrowhead/*Sagittaria* sp., and watershield/white water lily pads/spatterdock/floating leaved pondweeds. If only Eurasian watermilfoil is being targeted while conducting the control activity in a wetland or wetland buffer, the control activity would be an Allowed Use (6.18) under the Vermont Wetland Rules.
- Lake Iroquois and its waters are public, and it is reasonable to assume that all public waters may be used for irrigation.
- As identified in the ProcellaCOR® EC Safety Data Sheet, the product is practically non-toxic to fish on an acute basis and the material is slightly toxic to aquatic invertebrates on an acute basis. Review of ecotoxicity studies based on the maximum label rate of 50 parts per billion, indicates parent compound and degradates show toxicity levels are well above the application rates used in aquatic environments. Therefore, the potential for acute risk to fish, invertebrates, amphibians, birds, and

mammals is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.

- Lake Iroquois is 255 acres where the littoral zone covers approximately 115 acres, 45.1% of the total lake surface area. The littoral zone is the area of the lake that supports rooted aquatic vegetation. Both the size of Lake Iroquois and its littoral zone were determined by a bathymetric survey conducted by the Secretary on June 8, 2018. For the purposes of enacting the conditions of this permit, the values from the June 8, 2018 survey will be used for the size of Lake Iroquois and its littoral zone unless additional technical details indicate otherwise while this permit is active.
- Approximately 40 acres are proposed to be treated with ProcellaCOR® EC in 2020, which is 15.7% of the total lake surface area and 34.8% of the littoral zone of Lake Iroquois. If a treatment is proposed during a year this permit is active, the final annual treatment area will be determined annually in accordance with condition a.4. of this permit.

The presence of aquatic vegetation is required for fish and wildlife habitat. Generally, Eurasian watermilfoil has been identified as providing poor fish and wildlife habitat compared with native aquatic vegetation. The removal of Eurasian watermilfoil promotes native plant biodiversity, which improves the biological integrity of the lake over time. However, Eurasian watermilfoil may provide beneficial structural habitat in the absence of other aquatic vegetation. As a measure to reduce potential non-target impacts on the ecological integrity of Lake Iroquois, no more than 40% of the littoral zone may be targeted by aquatic plant management activities annually. For any requests that propose managing more than 40% of the littoral zone, including a combination of chemical and non-chemical control methods, the permittee must demonstrate a need where the potential adverse effects on the non-target environment are outweighed by the tangible benefits.

It is not anticipated that the non-target aquatic plants and animals within Lake Iroquois, the waters downstream of Lake Iroquois (Lower Pond), or the wetlands will be adversely impacted by applying ProcellaCOR® EC in accordance with this permit and the Approved Application. The current treatment application rate is proposed to be up to 3 PDUs (maximum application rate is 25 PDUs), which is within the application rate for targeting Eurasian watermilfoil as identified in the ProcellaCOR® EC specimen label (Table 5). For aquatic plant species that are known to be controlled by ProcellaCOR® EC, aquatic plant species closely related to species controlled by ProcellaCOR® EC, or for species that may be sensitive to ProcellaCOR® EC, proposed treatments will need to be designed appropriately to avoid potential impacts to known locations of those populations. The native non-target species that may be negatively impacted by a ProcellaCOR® EC treatment that are in Lake Iroquois (*Brasenia schreberi, Ceratophyllum demersum, Nuphar variegata, and Nymphaea odorata)* are often located within wetlands or wetland buffers. Due to this potential negative impact, ProcellaCOR® EC treatments should avoid treatment locations within a wetland, wetland buffer, or locations with known populations of these native non-target species unless it can be determined that the overall lake-wide population of a sensitive species will not be significantly impacted.

For each treatment, a quantitative aquatic plant survey will be conducted pre and post treatment during the treatment year, and the year following treatment. Aquatic plant surveys will be conducted to assess how aquatic plant populations respond to control activities. The Secretary will assess those surveys to ensure the acceptable risk to the non-target environment finding can continue to be met.

While there are recommended use restrictions identified on the product label for hydroponic farming, greenhouse, nursery plants, and irrigation of landscape vegetation, use restrictions are limited and will likely be temporary as ProcellaCOR® EC is expected to dissipate rapidly in Lake Iroquois due to its rapid photolysis and aerobic aquatic metabolism.

The permittee is required to submit an annual request for proposed treatment locations and may not conduct the treatment until receiving approval from the Secretary. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the non-target environment, the findings made in this permit to authorize the use of ProcellaCOR® EC may be reviewed annually upon receiving the annual request.

The use of ProcellaCOR® EC is scheduled to occur while Eurasian watermilfoil is actively growing. ProcellaCOR® EC is absorbed through submersed plant shoots and leaves when used in water. There is the potential that treatments scheduled earlier in the year may be more protective of non-target native aquatic plants as Eurasian watermilfoil often begins actively growing before non-target native aquatic plants. Targeting Eurasian watermilfoil with ProcellaCOR® EC earlier in the season may also result in requiring a reduced amount of the pesticide to be effective at controlling Eurasian watermilfoil. As Eurasian watermilfoil biomass may be reduced earlier in the year before non-target native aquatic plants begin fully growing, the reduction of that biomass may allow for an increase in available light for non-target native aquatic plants. This may temporarily increase the competitive advantage for those non-target native aquatic plants to exist for a longer period within the treatment location before Eurasian watermilfoil recolonizes the area, thus potentially reducing the frequency of using a pesticide.

The Secretary has determined that there is an acceptable risk to the non-target environment.

7. Public Health – 10 V.S.A. 1455(d)(3). At the request of the Secretary, the Vermont Department of Health (VDH), Radiological and Toxicological Sciences Division reviewed the risk of the proposed activity to public health, in which it examined potential concerns for public health that may be associated with exposure to ProcellaCOR® EC. Based on VDH's review of the confidential statement of formulation, it is reasonable to conclude that human exposure to the inert compounds contained in ProcellaCOR® EC (at the proposed concentrations that would result under the conditions proposed by the applicants) is not likely to result in an increase in the level of concern for public health.

   To minimize unnecessary pesticide exposure to the public over a weekend, treatments will occur on a Monday, Tuesday, Wednesday, or Thursday only. On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. The permittee will supply potable water upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink on the day of treatment.

   The Secretary has determined that there is negligible risk to public health.

8. Long-range Management Plan – 10 V.S.A. 1455(d)(4). Aquatic invasive species are considered stressors on Vermont's surface waters. Eurasian watermilfoil, an aquatic invasive species, has spread throughout Lake Iroquois, is well-established, and eradication is a highly unlikely outcome from control efforts. Eurasian watermilfoil is and will continue to be a part of the aquatic environment of Lake Iroquois for the foreseeable future. As a result, a targeted use of chemical and non-chemical control methods as a part of an integrated pest management plan to control nuisance levels of Eurasian watermilfoil that are impacting public good uses has been developed.

   The permittee will update the "PROCELLACOR™ EC HERBICIDE TREATMENT PLAN" in the Approved Application as needed to ensure the plan is implemented to achieve the control activity purpose, promote the public good, be protective of the water resource, and include pesticide minimization measures. Review of and updates to this plan or any other sections of the Approved Application will be assessed in conjunction with the baseline biological, chemical, and physical characteristics of the waterbody and watershed to set

expectations for what the control activity may achieve. Potential updates to the plan will incorporate the following review:

- Identify the aquatic nuisance problem, the area(s) with the aquatic nuisance problem, and characterize the extent of the problem, including, for example, water use goals not attained (e.g., wildlife habitat, fisheries, native vegetation, and recreation).
- Identify locations of species that may be sensitive to a control activity.
- Identify locations where wetlands may be present.
- Identify an action threshold to determine when a control activity may be appropriate.
- Identify possible factors causing or contributing to the aquatic nuisance problem.
- Review the past management history of the aquatic nuisance.
- Develop an integrated pest management plan that incorporates short and long-term goals, anticipated levels of control, expectations achieved by a control activity, and whether a control activity will need to occur in perpetuity to maintain anticipated levels of control.
- Develop management alternatives, such as no action, prevention, mechanical or physical methods, cultural methods, biological control agents, or the targeted use of pesticides, to identify how different control activities may reach the goals of the integrated pest management plan. Management alternatives should be compatible with other water uses, not adversely affect natural lake functions, have a known and understood mechanism of control, be documented as low risk to natural ecosystem functions, and are predictable and repeatable in efficacy and outcome.
- Develop methods for evaluating the efficiency of the integrated pest management plan to act as a feedback loop for determining how future control efforts should proceed.
- Implement watershed and shoreline management strategies to address sources of phosphorus and to promote the long-term stability and resilience of the waterbody to help reduce the likelihood of nuisance populations from developing.

As a means to ensure that the permittee is actively implementing their long-range management plan that incorporates a schedule of pesticide minimization, the permittee will need to implement pesticide minimization measures annually and report to the Secretary on those effort. Pesticide minimization measures must include one or a combination of Eurasian watermilfoil non-chemical control projects and/or efforts that reduce the likelihood of Eurasian watermilfoil populations from developing.

The Secretary has determined that a long-range management plan has been developed that incorporates a schedule of pesticide minimization by utilizing an integrated pest management plan.

9. Public Benefit – 10 V.S.A. 1455(d)(5). The Secretary considered the following criteria in determining whether there is a public benefit to be achieved from the application of the pesticide:

    - Whether carrying out the control activity produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
        - Assessment: Tangible benefits to public good uses are likely to be associated with the temporary decrease in the frequency of occurrence and biomass of Eurasian watermilfoil. This temporary decrease is anticipated to benefit boating and swimming within the treatment locations. It remains undetermined as to whether the control activity will produce a tangible short or long-term benefit to fishing. The presence of aquatic vegetation is required for fish

and wildlife habitat. Generally, Eurasian watermilfoil has been identified as providing poor fish and wildlife habitat compared with native aquatic vegetation. However, Eurasian watermilfoil may provide beneficial structural habitat in the absence of other aquatic vegetation. To reduce the potential impact to fishing as a result of impacts to fish and wildlife habitat from aquatic plant management, no more than 40% of the littoral zone may be targeted by aquatic plant management activities.

- Whether the potential cumulative impacts from carrying out the control activity adversely affect the water resource and the public that utilizes that resource.
    - Assessment: Additional cumulative impacts were considered that relate to the water resource and how the public may utilize that resource. The Secretary has determined that the cumulative impacts from carrying out the control activity are not anticipated to affect the water resource and the public that utilizes that resource.
        - On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. Potable water will be supplied by the permittee upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink. Within four weeks after a treatment, it is anticipated that all treated Eurasian watermilfoil will be controlled and no longer present within a treatment area. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment to avoid any potential contamination of compost. Additional advisories and recommendations related to irrigation and the use of treated waters are listed under the following sections of the ProcellaCOR® EC Specimen Label: *Use Precautions*, *Use Restrictions*, *Application to Waters Used for Irrigation on Turf and Landscape Vegetation*, *Residential and other Non-Agricultural Irrigation*, and *TABLE 1: Non-agricultural irrigation following in-water application*. Treatment concentration monitoring will occur to assess concentrations of ProcellaCOR® EC (active ingredient florpyrauxifen-benzyl) within Lake Iroquois and waters downstream to inform the public when the herbicide is no longer detectable and when potential irrigation restrictions no longer apply. Impacts on the public that utilize the water resource are anticipated to be temporary and minor as it is expected that ProcellaCOR® EC will dissipate rapidly to a reduced concentration in Lake Iroquois and waters downstream due to its rapid photolysis and aerobic aquatic metabolism.
        - Lake Iroquois is currently a waterbody that is dominated by aquatic plants within the littoral zone as opposed to being dominated by algal species. Aquatic plants utilize the available nutrients in this waterbody, thereby limiting the available nutrients for algal species. To maintain this current aquatic plant dominated clear water steady state and to prevent algal species from becoming dominant and potentially impacting the water resource and the public that utilizes that resource, no more than 40% of the littoral zone may be targeted by aquatic plant management activities.
        - Treating dense populations of Eurasian watermilfoil with ProcellaCOR® EC (a spot treatment herbicide with relatively short exposure times) will rapidly increase the biological oxygen demand as the Eurasian watermilfoil decomposes, which may deplete concentrations of dissolved oxygen and result in anoxia. Anoxia has the

potential to result in a die-off of aquatic animals, which if that were to happen, it would negatively impact the water resource and potentially impact how the public utilize that resource. To reduce this potential impact, treatment locations within the littoral zone will be limited so that no more than 40% of the littoral zone is targeted annually for aquatic plant management activities.

  - Lake Iroquois is not located within a Groundwater Source Protection Area. It is located within a Surface Water Source Protection Area for the Champlain Water District (CWD) public water system. It is expected that a ProcellaCOR® EC treatment will pose no risk to the CWD due to the rapid breakdown of ProcellaCOR® EC.

- Whether measures to reduce impacts on the water resource have been taken.
  - Assessment: The control activity proposed to control Eurasian watermilfoil only, which is an aquatic invasive species. The target concentration of ProcellaCOR® EC used will be in accordance with the PDUs per acre-foot of water for Eurasian watermilfoil as identified in the specimen label (Table 5). Treatment locations should avoid wetlands, wetland buffer, or locations with known populations of native non-target species that are either controlled by, related to a species that is controlled by, or sensitive to ProcellaCOR® EC unless it can be determined that the overall lake-wide population of the native non-target species in question will not be significantly impacted. The treatment is proposed to be a spot treatment with relatively short exposure times (hours to several days). Treatments will occur during a time of year with actively growing Eurasian watermilfoil. To prevent resistance to ProcellaCOR® EC, the same treatment area will not be targeted for more than two consecutive years with ProcellaCOR® EC. The permittee is required to submit an annual request for proposed treatment locations and may not conduct the treatment until receiving approval from the Secretary. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the resource or public good that may have resulted from a treatment, the findings made in this permit to authorize the use of ProcellaCOR® EC may be reviewed annually upon receiving the annual request.
- Whether the control activity is excessive for the stated purpose.
  - Assessment: The use of ProcellaCOR® EC, a spot treatment herbicide with relatively short exposure times, as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Iroquois is not considered excessive for the stated purpose.

Based upon review of the public good criteria, the Secretary has determined that the tangible benefits to the public good outweigh the potential negative impacts. The Secretary finds that there is a public benefit to be achieved from the application of a pesticide.

10. 10 V.S.A. § 1455(h) – Public Notification. Upon receipt of the application, the Secretary proceeded in accordance with the permit process as identified under 10 V.S.A. Chapter 170.

11. References.

SePRO ProcellaCOR® EC Specimen Label

SePRO ProcellaCOR® EC Safety Data Sheet

USEPA, 2017. Florpyrauxifen-benzyl Environmental Fate and Ecological Risk Assessment for the Section 3 New Chemical Registration. https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0560-0011

Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management. 2017. https://fortress.wa.gov/ecy/publications/documents/1710020.pdf

USEPA Docket on ProcellaCOR: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2016-0560

d. Authorization

By delegation from the Secretary, the Vermont Department of Environmental Conservation has made a determination that the above activity qualifies for an individual aquatic nuisance control permit. The Permittees are authorized per 10 V.S.A. § 1455(i) subject to the conditions herein specified.

This permit shall be effective on the day of signing and expire five years thereafter.

Peter Walke, Commissioner
Department of Environmental Conservation

By: _____
Oliver Pierson, Program Manager
Lakes & Ponds Management and Protection Program
Watershed Management Division

Aquatic Nuisance Control Individual Permit – Response to Comments

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Permittee: Lake Iroquois Association & the Lake Iroquois Recreation District Co-permittee: SOLitude Lake Management Permit Number: 3038-ANC-C	Control Activity: Pesticide (Herbicide – SePRO ProcellaCOR® EC) Waterbody: Lake Iroquois, Hinesburg, Richmond, and Williston

The above referenced Aquatic Nuisance Control Individual Permit #3038-ANC-C approves the use of a pesticide (ProcellaCOR® EC) to control Eurasian watermilfoil, *Myriophyllum spicatum*, in Lake Iroquois in Hinesburg, Richmond, and Williston.

The Secretary of the Agency of Natural Recourses (Secretary) placed the draft permit on public notice between May 1, 2020 and June 3, 2020 and held a public meeting on the draft permit on May 27, 2020 in accordance with the permit process as identified under 10 V.S.A. Chapter 170. Public comments were received during the notice period and during the public meeting. The following is a summary of comments received and the Secretary's responses to those comments. Where appropriate, comments have been paraphrased, consolidated, and categorized for clarity. Duplicative comments were combined where appropriate.

A. Comments Regarding Finding c.5. No Reasonable Non-Chemical Alternative Available – 10 V.S.A. 1455(d)(1)

Comment A-1: Injecting a new toxic pesticide into Lake Iroquois is really concerning. We're worried about the natural community of the lake, our drinking water, our kids' health, and our environment. We want a healthy Lake Iroquois with natural milfoil management. We're calling on the state to deny this permit and for the Lake Iroquois association to invest in non-toxic and long-term milfoil management. There are reasonable non-chemical alternatives.

Response A-1: The purpose of the control activity is to use ProcellaCOR® EC as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Iroquois. The determination for this finding requires a certain degree of subjective judgment. As a result, the Secretary reviewed potential reasonable approaches for addressing a well-established lake-wide population of Eurasian watermilfoil. This includes making baseline assumptions of the proposed control activity, the scope of the project (i.e., long-term lake-wide Eurasian watermilfoil management), as well as identifying ecological and water quality characteristics for this waterbody in the attempt to outline what could reasonably be achieved when pursuing a control activity. While non-chemical alternatives may be available, those methods are not reasonable in this situation due to the size or density of the Eurasian watermilfoil population or the potential non-target impacts associated with conducting a non-chemical control activity. To achieve the purpose of the control activity, it was determined that there are no reasonable non-chemical alternatives.

Also, see responses B-1, C-1, C-8, D-1, E-1, and E-2.

Comment A-2: There are other options for Eurasian watermilfoil management.

Response A-2: Targeted non-chemical Eurasian watermilfoil control options typically used in Vermont include handpulling, the use of bottom barriers, and diver assisted suction harvesting. Other aquatic plant control options, such as mechanical harvesting or hydroraking, are often not specific to an individual species.

Comment A-3: Eurasian milfoil has been successfully permanently removed from a lake in just one instance, a lake in Massachusetts where mechanical methods (only) were diligently used. Simply put, herbicide treatment is

not a cure for this disease. Investing in continued use of mechanical control and eliminating of the use of motorized boats on the lake carries a better prognosis for the lake with a lower risk of side effects for all species.

Response A-3: The Department recognizes that the use of herbicides or non-chemical control for Eurasian watermilfoil will not achieve permanent eradication. While pursing non-chemical control options only for managing a well-established population of Eurasian watermilfoil is an option, depending on the goals and scope of the project paired with the ecological characteristics of a waterbody, the targeted use of herbicide may be a reasonable tool to use as a part of a long-term integrated pest management plan.

Comment A-4: The applicants have not exhausted all reasonable non-chemical alternatives.

Response A-4: 10 V.S.A. 1455(d)(1) requires the Secretary to determine if there are no reasonable non-chemical alternatives available to achieve the purpose of the control activity. This does not require that all reasonable non-chemical alternatives be exhausted prior to making that finding.

Comment A-5: What non-chemical options have the applicants tried before this one?

Response A-5: The permittee has previously used bottom barriers, powered mechanical devices, and biological controls (weevils) in Lake Iroquois to directly control Eurasian watermilfoil.

Comment A-6: It is my understanding that there has been no sustained lake-wide management approach using non-chemical means to control Eurasian watermilfoil. The draft permit states “A sustained lake-wide management approach using non-chemical and chemical control methods targeting Eurasian watermilfoil has occurred in Lake Iroquois.” Permit section c.5. However, in reality, LIA has only dabbled in small scale, nonchemical control methods in the past. Previous efforts have treated only a single, or couple of acres per season. There has been no lake-wide management of milfoil.

Response A-6: The Secretary acknowledges an error in the draft permit that identifies that chemical control methods have been used in Lake Iroquois to target Eurasian watermilfoil. Additionally, while non-chemical control methods for Eurasian watermilfoil have been used at various locations around Lake Iroquois, the Secretary acknowledges that “sustained lake-wide management” is a subjective statement. As such, the sentence in finding c.5. has been updated to state: “Non-chemical control methods targeting Eurasian watermilfoil have been used in Lake Iroquois.”

Also, see responses A-4 and A-5.

Comment A-7: The association’s intended use of ProcellaCOR is the result of failed or ineffective methods implemented over a span of about 40 years. These efforts have included copper sulfate treatments, mechanical weed harvesting, weevil treatment, suction harvesting, bottom covering, and hand pulling. Despite these efforts, the milfoil continues to proliferate and to claim more of the lake each summer. Having witnessed most, if not all, of these unsuccessful treatments as a lake front property owner for more than four decades, I have come to the conclusion that it is worth trying another method.

Response A-7: The Secretary acknowledges this comment.

Comment A-8: Human behavior underlies the infestation. Motorboat propellers are pivotal in the spread, but only token action has been taken to address this fact. Motorboating can be a hot button issue for some, but it must not be ignored. Although DEC may not have direct jurisdiction over boating on the lake, DEC is required to rule out reasonable non-chemical alternatives before permitting this pesticide introduction.

Response A-8: The Secretary acknowledges that there are many factors that contribute to the spread and proliferation of Eurasian watermilfoil. The Secretary will continue to work with the permittee on assessing Eurasian watermilfoil control options and what may reasonably be achieved.

Also, see responses A-3 and A-4.

Comment A-9: I would like to address the term "reasonable". LIA's permit application outlines a budget which includes ~$100,000 for two years of chemical herbicide treatment. If LIA's plan is considered a realistic, viable plan, then a $100,000 expense must be considered "reasonable". However, in the past, LIA has never invested anywhere near this amount of money in nonchemical control actions. There have been years where a much, much lesser amount (~$5-10K?) has been allocated to treat a couple of acres. And during those years, that limited, sporadic nonchemical milfoil treatment activity was working against a headwind as motor boating was uncontrolled, spreading the existing milfoil, thwarting that effort.
To argue "no reasonable nonchemical alternative available" it seems only fair to put both natural and chemical control actions on equal footing financially. LIA has never invested in nonchemical alternative controls at this level of funding, nor at this scope of acreage. Nonchemical control actions have not failed in Lake Iroquois, they just have never really been attempted. And until they are, it is false to conclude "… there is no reasonable nonchemical alternative available …"

Response A-9: See response A-1.

Comment A-10: One of the key reasons the Sonar application was denied was because "all reasonable non-chemical actions to control EWM … have not been pursued, and … there are additional reasonable non-chemical alternative control methods available…". According to former members of the LIA, and the LIA newsletters, not much has changed since the 2017 application. In particular, although limited educational efforts have been ongoing, only 3 acres (1%) have been suction harvested in 2 years. This compares to the 68 acres (7%) planned to be harvested in Lake St. Catherine last year. It is noteworthy that Lake Buel in Massachusetts, a lake similar in size and recreational use as Lake Iroquois, has never used herbicide because they have had an aggressive and sustained program of harvesting and other non-chemical means of milfoil mitigation for over 30 years. In other words, milfoil control can be done without chemicals; we just need the strength of will and commitment as a community to do it. Therefore, reasonable non-chemical alternatives remain not only available, but underutilized.

Response A-10: See responses A-1, A-3, and A-4.

Comment A-11: The Lake Iroquois Association has a strong record of positive action. As one of the people who has recently worked to install benthic barriers and arrange for Diver Assisted Suction Harvesting (DASH), I believe those techniques are inadequate given the scope of the infestation Eurasian Water Milfoil (EWM) in Lake Iroquois. The density of

our infestation makes DASH impractical. Instead, it is a good technique for maintaining areas treated with herbicide. It is now time to treat Lake Iroquois with the herbicide ProcellaCOR to manage the EWM infestation.

I have met with many lake associations of similar lakes around the state and I have been on the water on Dunmore to observe their DASH program. I have discussed the weevil with Sally Sheldon the Middlebury College professor who worked to obtain their approval. Unfortunately, they were not able to be raised in sufficient numbers to manage the infestation. I have seen the Eurasian Watermilfoil progress over the years and feel the herbicide treatments are necessary to protect the diverse native aquatic plant community and the recreational value. Without the use of herbicide's in the management program for EWM Lake Iroquois will continue to lose native plant species and other species in the aquatic community will be harmed.

The property owners can proceed to pull EWM in front of their properties, typically which involves all plants being removed. Or get permits to install benthic barriers creating a patchwork of control. A lake-wide approach ensures the best monitoring, benefit for the ecosystem, and that all users of the lake benefit. The public access points in the northern portion of the lake are some of the most affected by the infestation where an initial herbicide treatment would be focused.

Response A-11: The Secretary acknowledges this comment.

Comment A-12: I am proud to say LIA and LIRD have completed multiple projects to improve water quality including storm water projects, permits to install Benthic Barriers, implemented the Greater Program and the hot water boat wash at the boat launch, hired Diver Assed Suction Harvesting, Plant Surveys and stream monitoring.

All of these efforts have helped with improving water quality, but none of them have prevented the increase spread of Milfoil from year to year. The current milfoil situation cannot be managed by hand pulling, DASH or Benthic Barriers and as a result I strongly support the use of ProcellaCOR as outlined in the draft permit application. I do believe after the application of ProcellaCOR, DASH and Benthic Barriers will be effective treating small isolated areas.

Response A-12: The Secretary acknowledges this comment.

Comment A-13: Benthic mats, installed only for the summer season on the lake bottom provide great boating and swimming conditions, but they block sunlight reaching the lake bottom so that nothing can grow—including native aquatic species of plants so important as a habitat for fish and other aquatic species and the lake ecosystem as a whole.

Diver-Assisted Suction Harvesting (DASH) is hand pulling milfoil. There are two problems with this method: 1--It's expensive. In 2019 it cost $6000 for DASH to clear a little over an acre of milfoil. Hypothetically, if DASH was to clear all 86 acres of the lake currently infested, it would cost over $500,000. 2--When the milfoil is harvested, so is everything else, including any native aquatic plant species.

And that brings us to ProcellaCOR. The fact that it was used successfully in four VT lakes in 2019, and that if it's approved for use in Lake Iroquois it will be applied at a low rate (less than 4 PDU) makes it a logical next step. The plan in the permit application shows that ProcellaCOR will be applied judiciously and closely monitored over five years.

I don't know anyone who WANTS to add chemicals to any of our beautiful bodies of water in VT. This is a last resort effort. We are currently faced with the loss of a prime habitat for native fish, other aquatic wildlife and plant species as well as an important recreational spot for fishing, boating and swimming in the not too distant future.

Response A-13: The Secretary acknowledges this comment.

Comment A-14: Manual harvesting is a non-chemical alternative with no health concerns that will not introduce the possibilities of algal blooms, will not be as expensive in the long term, and will not have drastic ecological consequences on the lake.

Response A-14: See responses A-1, A-3, A-4, and A-8.

Comment A-15: I do believe that the suction harvesting has kept the milfoil at a somewhat manageable level in recent years but I do not think it is a cost effective and sustainable method to address the water quality and the milfoil problem. The suction harvesters likely pull up not just the milfoil but many native plant species along with

it. The mats that sit on the bottom of the lake also kill everything underneath them; including fish species that may have nested at the bottom of the lake. I don't think there is a simple solution for the milfoil problem, but I do know that the LIA Board is made up of several very well educated members who care about this lake who have taken the time (on a volunteer basis on top of their full time careers mind you) to do careful research to explore the best options for the treatment of the milfoil. My husband and uncle are on the Board and I see the effort that the Board has put into exploring the options, weighing the pros and cons of each, and even implementing some of those methods. I've listened to many people who oppose the permit attack the Board (personally and professionally) and accuse them of having an ulterior motive, but that is simply not true, the Board has this lake's best interests in mind and that is very clear to me. I believe there is a group of Hinesburg residents that seem to "have it out" for the Board yet they haven't offered their assistance in finding a solution nor have they proposed a better option. At the very lease they could assist in the fundraising for the DASH divers to continue the harvest suctioning. I've seen them rally people who have no relationship to this lake or even knowledge of it to get them to oppose the permit. This herbicide has been used in four other lakes in Vermont with no opposition in those communities; and with positive results and no side effects from the treatment. I understand that chemical treatment isn't everyone's cup of tea, but the Board has laid out a comprehensive plan which they continue to work on as information is presented. When used correctly and professionally applied I believe it is a safe and promising solution.

Response A-15: The Secretary acknowledges this comment.

Comment A-16: In upstate NY APA, and a farm group, have done studies showing that when milfoil is used as fertilizer, it increased the yield of both beans and tomatoes. In Wisconsin, there is a farm that has demonstrated that when milfoil is used as a mulch they can water crops less during a drought and still keep the soil moist. So it seems that taking these options to utilize the milfoil off the table by applying a chemical that will make the milfoil unusable to anyone is another example of how the LIA and LIRD have failed to show that all methods of nonchemical eradication have not been explored.

Response A-16: See responses A-1 and A-4.

Comment A-17: The conclusion to this finding seems to be untrue, and I question the meaning of reasonable. It does not seem reasonable to dismiss the banning of motorized craft as one non-chemical measure to mitigate the proliferation of invasive milfoil.

Response A-17: See responses A-1 and A-4.

Comment A-18: Based on my discussions with Lake Iroquois residents, I do not believe that their community has exhausted all reasonable non-chemical alternatives to controlling Eurasian milfoil. I would like to share my own experience regarding how Lake Buel in New Marlborough and Monterey, MA has been dealing with its infestation of Eurasian milfoil, which began, slowly at first, in the late 1960's, then becoming rampantly out of control through the ensuing decades.

There is no quick and easy way to eliminate milfoil, in our experience. Out of an abundance of caution and concern about unintended consequences to the balance of aquatic life systems and the downstream effect, our deeded property owners have voted strongly against using non-native aquatic species or herbicides that target milfoil. Knowing that lakes are not at all like swimming pools, and that the health of a lake, both in the water itself and around it, is a complicated and balanced ecological system of algal, fungal, plant and animal life, we turned the to the simplest and most low-impact method: harvesting the weeds.

Harvesting milfoil has saved our lake. It did not happen overnight or in a few seasons. It has taken years, decades even, but we have the milfoil at bay by off-loading tens of thousands of tons of phosphorous-rich organic matter (the milfoil) from the lake along with redirecting sewage and limiting phosphorous run-off from landscaping. We

have seen the return of native fish species, native aquatic plant life and water fowl to their natural levels from years before.

Investing in a harvesting program is not cheap, but neither are chemicals and their management over the long haul. Both approaches require a long-term commitment. There is no "one-and-done" enterprise. Not even with herbicides. Thirty years ago when our lake was clogged with milfoil and eutrophication was accelerating rapidly, our lake residents voted against decades of risky chemical treatment in favor of harvesting. The question of using chemicals to speed the process of eliminating the milfoil comes up every now and again, but each time, after doing the research, we stay the course of mechanical harvesting without the aid of herbicides. Now, there is still some milfoil, but the water is sparkling clear again, ecological balances have returned in and around the lake, and fishing, swimming and boating is fun again, with never any worries about possible short- term or long-term unintended consequences on the ecology or the people who love this lake.

Response A-18: See responses A-1 and A-3.

B. Comments Regarding Finding c.6. Non-target Environment – 10 V.S.A. 1455(d)(2)

Comment B-1: There has been limited testing of ProcellaCOR prior to this proposal and there is little known about the impact the application of this herbicide has on humans, pets, livestock, native plants, animals, fish and birds, which may come in contact with the treated areas.

Response B-1: Based upon the review the application materials, it was determined that there is an acceptable risk to the non-target environment.

As identified in the ProcellaCOR® EC Safety Data Sheet, the product is practically non-toxic to fish on an acute basis and slightly toxic to aquatic invertebrates on an acute basis. Review of ecotoxicity studies based on the maximum label rate of 50 parts per billion, indicates parent compound and degradates show toxicity levels are well above the application rates used in aquatic environments. Therefore, the potential for acute risk to fish, invertebrates, amphibians, birds, and mammals is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.

Regarding potential impacts to non-target native aquatic plant species, native aquatic plants controlled by ProcellaCOR® EC as identified on the product label have been recorded as being present in Lake Iroquois. This includes watershield, *Brasenia schreberi*, of which specific population locations or densities are not known; and coontail, *Ceratophyllum demersum*, last observed in 2019 as trace to scattered density populations along the northern and southwestern shorelines of the waterbody with a 7.8% frequency of occurrence for the survey points within Lake Iroquois. The product label identifies *Ceratophyllum demersum* as being less sensitive to ProcellaCOR® EC and that a higher application rate may be required to control it. The applicant identified that *Ceratophyllum demersum* will most likely only be impacted at a treatment concentration of 5 Prescription Dose Units (PDU) or higher. The applicant also identified that white water lily, Ny*mphaea odorata*, and yellow water lily, *Nuphar variegata*, may also be sensitive (not controlled/sublethal) to ProcellaCOR® EC based on treatments conducted in 2018 and 2019. Impacts to those species include slight discoloration, slight stem twisting, and leaf curling. However, plants grew out of those impacts several weeks after a treatment. *Nymphaea odorata* and *Nuphar variegata* were last observed in 2019 and 2014, respectively. *Nymphaea odorata* was observed as scattered to dense density populations dispersed throughout the waterbody with a 12.2% frequency of occurrence for the survey points within Lake Iroquois. Specific population locations or densities for *Nuphar variegata* are not known.

Rare aquatic plant species have been recorded as being present in Lake Iroquois. Species observed include prickly hornwort (S2S3), *Ceratophyllum echinatum*, last observed 9/11/2014; Nuttall's waterweed (S3), *Elodea nuttallii*, last observed 8/30/2012; slender naiad (S2), *Najas gracillima*, last observed 9/17/1968; Guadalupe Naiad (S2), *Najas guadalupensis*, last observed 9/1/2017; straight-leaf pondweed (S2S3), *Potamogeton strictifolius*, last observed 8/2/1993; Vasey's pondweed (S2), *Potamogeton vaseyi*, last observed 8/2/1993; humped bladderwort (S3), *Utricularia gibba*, last observed 9/1/2017, and lesser bladderwort (S3), *Utricularia*

minor, last observed 9/14/2012. Those species are not listed as being controlled by ProcellaCOR® EC as identified on the product label. However, *Ceratophyllum echinatum* is a close relative to a native non-target species that is listed as being controlled by ProcellaCOR® EC (*Ceratophyllum demersum*).

It is not anticipated that the non-target aquatic plants and animals within Lake Iroquois, the waters downstream of Lake Iroquois (Lower Pond), or the wetlands will be adversely impacted by applying ProcellaCOR® EC in accordance with this permit and the Approved Application. The current treatment application rate is proposed to be up to 3 PDUs (maximum application rate is 25 PDUs), which is within the application rate for targeting Eurasian watermilfoil as identified in the ProcellaCOR® EC specimen label (Table 5). For aquatic plant species that are known to be controlled by ProcellaCOR® EC, aquatic plant species closely related to species controlled by ProcellaCOR® EC, or for species that may be sensitive to ProcellaCOR® EC, proposed treatments will need to be designed appropriately to avoid potential impacts to known locations of those populations. The native non-target species that may be negatively impacted by a ProcellaCOR® EC treatment that are in Lake Iroquois (*Brasenia schreberi, Ceratophyllum demersum, Nuphar variegata, and Nymphaea odorata)* are often located within wetlands or wetland buffers. Due to this potential negative impact, the permit contains a requirement that ProcellaCOR® EC treatments should avoid treatment locations within a wetland, wetland buffer, or locations with known populations of these native non-target species unless it can be determined that the overall lake-wide population of a sensitive species will not be significantly impacted.

Also, see response C-1.

Comment B-2: The intricate web of aquatic life can be disturbed in ways that humans do not observe. The weeds are not harmful, and in fact they are part of the lake plant system that cleans the water and provide needed safe habitat for fish and other wildlife. They also balance the pH level to decrease the risk of cyanobacteria, which as we know can make people sick and be deadly to animals. Destroying the natural balance of the lake by using a new chemical and risking a toxic cyanobacteria bloom in order to make motor boaters happy is expensive and shortsighted.

Response B-2: The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact, is considered a part of the non-target environment. It is assumed that a control activity for Eurasian watermilfoil will have an impact on the ecological integrity of the waterbody as the non-target environment cannot be avoided completely.

The presence of aquatic vegetation is required for fish and wildlife habitat. Generally, Eurasian watermilfoil has been identified as providing poor fish and wildlife habitat compared with native aquatic vegetation. The removal of Eurasian watermilfoil promotes native plant biodiversity, which improves the biological integrity of the lake over time. However, Eurasian watermilfoil may provide beneficial structural habitat in the absence of other aquatic vegetation. As a measure to reduce potential non-target impacts on the ecological integrity of Lake Iroquois, no more than 40% of the littoral zone may be targeted by aquatic plant management activities annually.

In addition, Lake Iroquois is currently dominated by aquatic plants within the littoral zone as opposed to being dominated by algal species. Aquatic plants utilize the available nutrients in this waterbody, thereby limiting the available nutrients for algal species. To maintain this current aquatic plant dominated clear water steady state, and to prevent algal species from becoming dominant and potentially impacting the water resource and the public that utilizes that resource, no more than 40% of the littoral zone may be targeted by aquatic plant management activities.

It is anticipated that limiting the percent of littoral zone that may be targeted annually will reduce impacts on the ecological integrity of Lake Iroquois and thereby reduce the potential for aquatic plant management activities to cause a cyanobacteria bloom to occur. However, it should be noted that cyanobacteria are native species and blooms can occur naturally.

Comment B-3: Species may be harmed indirectly when dead and decaying milfoil falls to the bottom of the lake, causing a low-oxygen zone and smothering other plants and aquatic habitats.

Response B-3: Treating dense populations of Eurasian watermilfoil with ProcellaCOR® EC will rapidly increase the biological oxygen demand as the Eurasian watermilfoil decomposes, which may deplete concentrations of dissolved oxygen and result in anoxia. Anoxia has the potential to result in a die-off of aquatic animals, which if that were to happen, would negatively impact the water resource and potentially impact how the public utilize that resource. To reduce this potential impact, treatment locations within the littoral zone will be limited so that no more than 40% of the littoral zone is targeted annually for aquatic plant management activities. A die-off of aquatic animals within a treatment zone following a treatment has not been observed in the ProcellaCOR® EC treatments that have occurred in Vermont since 2019 (10 treatments in 8 waterbodies),.

Also, see response B-2.

Comment B-4: The product label section titled "Environmental Hazards" states "Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may cause fish suffocation. Water bodies containing VERY HIGH PLANT DENSITY should be TREATED IN SECTIONS to prevent the potential suffocation of fish." (capitals added).

LIA's Plan is outlined in the permit application to the DEC. On page 10, their Plan specifies "in Year 1, 40% (approximately 40 acres at the north end of the lake) of the littoral zone will be treated." This area was chosen because it is known to have the highest plant density.

LIA's Plan to treat this single, continuous, 40-acre section all at once is contrary to the manufacturer's instructions and the intent of the 40% littoral zone treatment threshold. The hazard of this Plan is exacerbated by the realization that those 40 acres are additionally bounded by shoreline on 75% of its perimeter. There is only one escape from the targeted 40 acre killing zone – to the south. If the fish in this vast area do not make the right move at the right time, they risk suffocation. It is possible that the oxygen levels may drop quick enough that fish in the most northern reaches would never even have a chance to escape.

When the targeted 40-acre zone is treated, it is planned that most of the dead milfoil will fall to the bottom of the lake. As this zone is heavily populated with milfoil, it is likely to end up covering the lake bottom like a continuous blanket.

1 - Initially, native aquatic plants in this area risk suffocation by being smothered with a thick and vast layer of treated milfoil.

2 - Treated milfoil will proceed to decompose in place, driving the oxygen loss or depletion as warned by the manufacturer. Native aquatic plants will be harmed as they require dissolved oxygen for respiration when they are unable to photosynthesize, e.g., during nighttime hours, or if sunlight cannot penetrate the layer of treated milfoil.

3 - The manufacturer warns that treated milfoil is unsuitable for composting on land. So, what harm will be caused by this same treated milfoil as it composts on top of these non-targeted plants?

Test results may not indicate harm to non-targeted species, but this is not definitive because not all plants and organisms are tested. And even if a chemical does not initially harm a non-targeted species, this does not safeguard those species from harmful consequences (suffocation, lack of oxygen, contaminated compost) following treatment.

Response B-4: Based upon observations of Eurasian watermilfoil beds after a treatment with ProcellaCOR has occurred, stems may remain upright in the water column for several weeks while others may break apart more rapidly. Eurasian watermilfoil treated with ProcellaCOR® EC often shatters or breaks apart completely to a degree where dead and decomposing material is not easily discernable. Within four weeks after a treatment

with ProcellaCOR, it is anticipated that all Eurasian watermilfoil within a treatment zone will be controlled and no longer identifiable. Therefore, it is not anticipated that a layer of dead Eurasian watermilfoil will blanket and smother underlying species. In addition, given the up to month-long degradation of Eurasian watermilfoil within a treatment zone, it is not anticipated that anoxia issues caused by the breakdown of Eurasian watermilfoil will occur to a point where impacts to aquatic animals (e.g., a fish kill) will result, as dissolved oxygen level should be able to naturally replenish over that period. If anoxia does occur, it is anticipated to be temporary and minor.

Also, see responses B-2, B-3, and E-5.

Comment B-5: ProcellaCOR® EC, active ingredient 2.7% florpyrauxifen-benzyl, appears to be originally manufactured as an herbicide for rice farms. If the original intended use was for agriculture and was to primarily be used in highly agricultural areas, then the risk of this herbicide killing non-target species is low. Meaning, there is not a lot of biodiversity in rice paddies, and therefore there may be less of a chance to accidentally harm important and sensitive species in these dedicated agricultural areas. There is a difference in the application and use of pesticides for agricultural vs. urban use, and I would categorize the use of ProcellaCOR in Lake Iroquois as urban use. Lake Iroquois is a sensitive ecosystem that already suffers from high human recreation activities and heavy mechanical disruption from motor boaters. Although milfoil is highly invasive and is likely "choking out" and displacing sensitive native species of aquatic plants and bottom-dwelling invertebrates (thus adversely changing the lake ecosystem already), it is pertinent to thoroughly assess the total risks of ProcellaCOR killing native plants and algae compared to the ecological damage of leaving the milfoil in place.

Response B-5: See responses B-1 and B-2.

Comment B-6: I am concerned about the proposed plan for herbicide application throughout the northern littoral zone. The ProcellaCOR product label states that this herbicide is intended for “spot or partial treatment designs.” The State has set a limit of 40% of the littoral zone in order to prevent ecological damage within the treatment area. The 40% chosen for this treatment design covers the entire undeveloped region of the lake. This is where fish, frogs, turtles and other creatures are most likely to live. The remaining littoral zone is highly developed shoreline with a lot of human activity. Since the design has focused on the entire northern weed bed, I am concerned that there will be significant damage done to the ecology of this area.

This 40% limit was supposedly chosen to minimize ecological disruption of the whole lake, but I don’t think the permit supports this intention. The permit proposes to apply ProcellaCOR to one contiguous area that occupies 40% of the total littoral zone area, not individual, small areas that add up to a total of 40% of the littoral zone. This is the one area that is relatively undeveloped and therefore is most at risk for causing major changes to the natural life of the lake in that region. In addition, since it sits at the northernmost portion of the lake, the natural north to south flow of water may carry the herbicide downstream where it can affect other, unintended areas, resulting in possible disruption of more than 40% of the littoral area. Of note, the State of Minnesota limits herbicide application to only 15% of the littoral zone, which is much more conservative (https://www.dnr.state.mn.us/invasives/iapm.html). Shouldn’t Vermont consider using the same, careful limit?

Response B-6: For each treatment, a quantitative aquatic plant survey will be conducted pre- and post-treatment during the treatment year, and the year following treatment. Aquatic plant surveys will be conducted to assess how aquatic plant populations respond to control activities. Based on information provided in the application, it was determined that there is an acceptable risk to the non-target environment. However, the Secretary will assess those surveys to ensure the acceptable risk to the non-target environment finding can continue to be met.

Prior to conducting a treatment, the permittee is required to submit an annual request for proposed treatment locations and may not conduct the treatment until receiving approval from the Secretary. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the non-target environment,

the findings made in this permit to authorize the use of ProcellaCOR® EC may be reviewed annually upon receiving the annual request.

Also, see Responses B-1, B-2, and B-4.

Comment B-7: Acceptable" risk?! This herbicide has only been on the market for a few years. Years in which the Environmental Protection Agency has been gutted by a president who doesn't believe in science. We don't have any idea of the long-term possible effects of this chemical. Families live along this lake. Children swim in this lake. Households use water from the lake to shower and wash dishes. Some filter the water to drink. In this case, the "non-target environment" is families and children as well as other aquatic plants and animals. There is no such thing as acceptable risk to our children's health.

Response B-7: See responses B-1 and C-1.

Comment B-8: When making the decision on whether to allow the use of a chemical herbicide in Lake Iroquois, please consider the whole aquatic community and how it functions over time. Each member of this natural community – single cell organisms, aquatic plants, arthropods, amphibians, turtles, fish, birds, and more – has a part to play, and all their lives are interwoven. Yes, milfoil has invaded the lake. It has been a slow moving invasion, taking a quarter of a century to achieve its present range. Milfoil's presence cycles through highs and lows. Only a few years ago it was so scarce many lakeside residents hardly noticed it.

The web of aquatic life is tremendously interdependent and resilient. It allows for generational succession, variations, evolution, introductions, and departures, and for cycles of rainfall, nutrients, and temperatures. Our earth is warming. Here in Vermont, we notice lower snowfall, fewer days of ice covering, hotter summers, more frequent heavy rain and wind events. The lake is already working with all these stressors. Over time, our lake will not be static. In the warming years/decades/centuries ahead it will play its part as species migrate northward into our region while others will disappear to cooler places. Nature accommodates as best as it can on its own time scale.

Using a chemical herbicide is akin to throwing a bomb into this web of life. OK, it is designed to selectively attack milfoil. But, what will that look like in the lake? Very quickly, in a 3–6-week period, the milfoil will die, and a large percentage of the vertical structure in the lake will break apart and collapse. This structure is a living organism, currently breathing oxygen into the lake, and collecting nutrients including phosphorus. These milfoil plants will stop producing oxygen, they will decompose, releasing their nutrients back into the water, and the decomposition process will further deplete oxygen in the lake.

The manufacturer clearly warns us that fish may die from loss of oxygen. And we could reasonably expect death for any other aquatic organism which needs oxygen to survive. The manufacturer also says it is "practically non-toxic to fish" and "slightly toxic to aquatic invertebrates" (SePRO Safety Data Sheet ProcellaCOR EC). So there will be repercussions felt throughout the aquatic community. This leaves a huge hole in the web of aquatic life. And for the most part we as human "caretakers" will not have a clue to what was taken, and how much of the functioning processes will be left behind.

We should not be using a chemical in the lake because it works AGAINST the self-regulating processes already in play. We should instead work only with natural controls which respect the existing processes, and work at a pace designed to maintain balance and system stability.

Response B-8: See responses B-2, B-3, and B-4.

Comment B-9: Research shows that aquatic herbicides cause widespread ecological degradation. While the applicants fall back on the chemical specificity argument, claiming there will be no unintended damage to non-target plants or animals, there is no long-term evidence to support this claim. ProcellaCOR is a new chemical. It

has been used in Vermont for less than one year. It is too soon to tell what the ecological effects will be over time. For example, ProcellaCOR has been shown to affect water lilies, many of which live in the area identified for herbicide application. The applicants claim that damaged water lilies "grow out" of their symptoms; but they have no evidence to show that this will continue to be true moving forward. It is too soon to know what long-term direct and indirect damage will result.

Response B-9: See responses B-2 and B-6.

Comment B-10: It's known to kill off fish due to loss of habitat and water quality, and the sole reason is to make it easier on boats?

Response B-10: The purpose of the control activity is to use ProcellaCOR® EC as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Iroquois. Public good uses include navigation, and other recreational and public uses, including fishing and swimming.

Also, see responses B-1 and B-3.

Comment B-11: Regarding risks to the non-target, natural environment: What is an acceptable level of risk? Who is and what is affected, and to what extent?

Response B-11: The determination for this finding requires a certain degree of subjective judgment. To make this determination, the Secretary considered the following as the non-target environment:

- Aquatic plants and animals within the waterbody proposed for treatment and waters up to one mile downstream of the waterbody.
- Wetlands within the waterbody proposed for treatment and wetlands within the outlet waters up to one mile downstream of the waterbody.
- Human use of waters treated with the pesticide. This includes, hydroponic farming, greenhouse and nursery plants, and all locations irrigated with waters treated with ProcellaCOR® EC.
- The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact. The concept of ecological integrity is identified in the Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy.

For determining what might be considered an acceptable risk to the non-target environment from a proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment:

- A control activity for Eurasian watermilfoil will have an impact on the ecological integrity of the waterbody as the non-target environment cannot be avoided completely.
- Rare aquatic plant species have been recorded as being present in Lake Iroquois. Species observed include prickly hornwort (S2S3), *Ceratophyllum echinatum*, last observed 9/11/2014; Nuttall's waterweed (S3), *Elodea nuttallii*, last observed 8/30/2012; slender naiad (S2), *Najas gracillima*, last observed 9/17/1968; Guadalupe Naiad (S2), *Najas guadalupensis*, last observed 9/1/2017; straight-leaf pondweed (S2S3), *Potamogeton strictifolius*, last observed 8/2/1993; Vasey's pondweed (S2), *Potamogeton vaseyi*, last observed 8/2/1993; humped bladderwort (S3), *Utricularia gibba*, last observed 9/1/2017, and lesser bladderwort (S3), *Utricularia minor*, last observed 9/14/2012. Those species are not listed as being controlled by ProcellaCOR® EC as identified on the product label. However, *Ceratophyllum echinatum* is a close relative to a native non-target species that is listed as being controlled by ProcellaCOR® EC (*Ceratophyllum demersum*).

- Native aquatic plants controlled by ProcellaCOR® EC as identified on the product label have been recorded as being present in Lake Iroquois. This includes watershield, *Brasenia schreberi*, of which specific population locations or densities are not known; and coontail, *Ceratophyllum demersum*, last observed in 2019 as trace to scattered density populations along the northern and southwestern shorelines of the waterbody with a 7.8% frequency of occurrence for the survey points within Lake Iroquois. The product label identifies *Ceratophyllum demersum* as being less sensitive to ProcellaCOR® EC and that a higher application rate may be required to control it. The applicant identified that *Ceratophyllum demersum* will most likely only be impacted at a treatment concentration of 5 Prescription Dose Units (PDU) or higher. The applicant also identified that white water lily, Ny*mphaea odorata*, and yellow water lily, *Nuphar variegata*, may also be sensitive (not controlled/sublethal) to ProcellaCOR® EC based on treatments conducted in 2018 and 2019. Impacts to those species include slight discoloration, slight stem twisting, and leaf curling. However, plants grew out of those impacts after a period of several weeks after a treatment. *Nymphaea odorata* and *Nuphar variegata* were last observed in 2019 and 2014, respectively. *Nymphaea odorata* was observed as scattered to dense density populations dispersed throughout the waterbody with a 12.2% frequency of occurrence for the survey points within Lake Iroquois. Specific population locations or densities for *Nuphar variegata* are not known.
- The outlet of Lake Iroquois flows into an unnamed stream that flows into Lower Pond. It is anticipated that reduced concentrations of ProcellaCOR® EC will flow downstream until complete breakdown of the pesticide occurs. The species composition within Lower Pond is similar to Lake Iroquois, which includes the presence of Eurasian watermilfoil.
- Mapped Class II wetlands are located along the northern section of shoreline and are present within the outlet stream and Lower Pond. Additional wetlands may be present as defined by a dominance (>50% surface area coverage) of woody, emergent, or floating leaved vegetation anchored in sediment located in areas up to 6.5 feet deep. Examples of wetland vegetation include willow and alder shrubs, cattails, emergent bur-reed, emergent arrowhead/*Sagittaria* sp., and watershield/white water lily pads/spatterdock/floating leaved pondweeds. If only Eurasian watermilfoil is being targeted while conducting the control activity in a wetland or wetland buffer, the control activity would be an Allowed Use (6.18) under the Vermont Wetland Rules.
- Lake Iroquois and its waters are public, and it is reasonable to assume that all public waters may be used for irrigation.
- As identified in the ProcellaCOR® EC Safety Data Sheet, the product is practically non-toxic to fish on an acute basis and the material is slightly toxic to aquatic invertebrates on an acute basis. Review of ecotoxicity studies based on the maximum label rate of 50 parts per billion, indicates parent compound and degradates show toxicity levels are well above the application rates used in aquatic environments. Therefore, the potential for acute risk to fish, invertebrates, amphibians, birds, and mammals is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.
- Lake Iroquois is 255 acres; the littoral zone covers approximately 115 acres, 45.1% of the total lake surface area. The littoral zone is the area of the lake that supports rooted aquatic vegetation. Both the size of Lake Iroquois and its littoral zone were determined by a bathymetric survey conducted by the Secretary on June 8, 2018. For the purposes of enacting the conditions of this permit, the values from the June 8, 2018 survey will be used for the size of Lake Iroquois and its littoral zone unless additional technical details indicate otherwise while this permit is active.
- Approximately 40 acres are proposed to be treated with ProcellaCOR® EC in 2020, which is 15.7% of the total lake surface area and 34.8% of the littoral zone of Lake Iroquois. If a treatment is proposed

during a year this permit is active, the final annual treatment area will be determined annually in accordance with condition a.4. of this permit.

Based on what was considered to be the non-target environment and the baseline assumptions made in relation to the known conditions of Lake Iroquois, the Secretary determined that there is an acceptable risk to the non-target environment.

Comment B-12: Research shows that the ecological toxicity studies, "ecotox", did not consider the multiple life stages of aquatic species. For example, larval or juvenile fish or amphibians may be highly susceptible to ProcellaCOR (see pg 45 NOAA/USDA report). We just don't know yet because it has not been studied. Dow did their fish toxicity study in carp, which are resilient and difficult to kill. There is evidence that says trout are more sensitive to Florpyrauxifen-benzyl (the active ingredient in ProcellaCOR) than carp. This is likely the reason Dow chose to use the toxicity data from carp rather than trout to register their product in the US. Obviously, this new herbicide has not yet been thoroughly tested. DDT was once considered a safe chemical and we now know that was not the case. We do not yet know the long-term consequences of ProcellaCOR.

Response B-12: Multiple Life Stages of Aquatic Species have been studied, and several fish species were studied. Studies were conducted with the following test animals:

- Juvenile Rainbow Trout were studied – Lethal Concentration 50 (LC50) 79 ppb
- *Daphnia magna* (crustacean) life cycle ecotoxicity studies – No observable effect concentration (NOEC) 38 ppb
- Invertebrate Larvae were studied, *Chironomus* sp. – LC50 60 ppb
- Early Life Stage studies with Fathead Minnow, 33-day chronic study, NOEC 37 ppb
- Freshwater fish, including rainbow trout (*Oncorhynchus mykiss*), fathead minnow (*Pimephales promelas*), and common carp (*Cyprinus carpio*) were studied. All acute (96-h) LC50 values range from >49 µg a.i./L (rainbow trout) to >52 µg a.i./L.

Studies were conducted with Technical Grade Active Ingredient (TGAI) and Typical End Use Product (TEP).

The chemical and toxicological profile of ProcellaCOR EC is not similar to DDT, this product is not Persistent, Bioaccumulative or Toxic (PBT).

The application concentration of <10 ppb, is well below any acute or chronic effect concentration measured in these toxicity studies.

No data gaps have been identified for the basic environmental profile of ProcellaCOR EC, including environmental fate, product chemistry, toxicology and ecotoxicology, and field studies required by EPA for pesticide registration.

Sources include (these sources have been added to finding c.11. of the permit):
USEPA, 2017. Florpyrauxifen-benzyl Environmental Fate and Ecological Risk Assessment for the Section 3 New Chemical Registration. https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0560-0011

Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management. 2017. https://fortress.wa.gov/ecy/publications/documents/1710020.pdf

USEPA Docket on ProcellaCOR: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2016-0560

Comment B-13: Findings: c. 6., Acceptable Risks to Natural Environment, last paragraph page 10, makes sense in and only of itself, however, in regards to the significance of the early EWM growth season it is at odds and does not comport with the Application Attachment A, Detailed Project Description, page 6, Treatment Timing, nor does the latter conform with Section E of the applicant(s) completed DEC forms. The Findings paragraph on page

10 suggests it is crucial to begin treatments in early June while the Detailed Project Description ignores the fact to a point of contradiction with the Treatment Timing given as June to September.

Response B-13: While it may be preferential to conduct a ProcellaCOR treatment in June once there is sufficiently active Eurasian watermilfoil growth, there is no requirement to conduct the treatment in June only. For the herbicide to work as intended, there needs to be sufficiently active Eurasian watermilfoil growth, which typically occurs between June and September.

Comment B-14: Two different Vermont fish and wildlife biologists have registered concern about the effects of herbicide on lake ecology in general (Bob Popp, 2007 regarding Lake Hortonia, and Shawn Good, 2006, regarding Lake St. Catherine and Lake Hortonia). How is it, then, that the LIA can be so sure that ProcellaCOR was "incredibly successful" in the 4 Vermont lakes to which it has been applied?

Response B-14: ProcellaCOR was not an herbicide that was available for use in 2006 and 2007, therefore, conclusions made in those years cannot be directly related to the current permit. In addition, once ProcellaCOR was approved by the Agency of Agriculture, Food and Markets for use in Vermont in 2018, the Department of Environmental Conservation and the Department of Fish and Wildlife conducted a review of the herbicide and how herbicides may impact the non-target environment. It was concluded that treating no more than 40% of the littoral zone annually would have an acceptable impact on the non-target environment. To date, all use of ProcellaCOR® EC within Vermont has received an Aquatic Nuisance Control permit. The Secretary has assessed the results of those treatments and has been able to continue to conclude that the resulting control of Eurasian watermilfoil populations has occurred as anticipated while still maintaining an acceptable risk on the non-target environment.

Comment B-15: The applicants have failed to demonstrate that there is acceptable risk to rare and endangered species: While the applicants acknowledge the presence of rare or endangered species in Lake Iroquois, they do not make any special efforts to locate these plants or to provide for their protection. Other than checking the box marked "yes" they do not mention these plants anywhere in the permit application. By failing to focus on them, the applicants show disregard for the significance held by rare and endangered species within the natural community. The applicants justify use of chemical herbicides by claiming that milfoil crowds out native species. Yet they fail to address the most valuable native plants in the lake. This is not acceptable risk to the non-target environment.

Response B-15: As a part of the Approved Application, the permittee conducted an aquatic plant survey of Lake Iroquois to document the species that are present (native and non-native), their locations within Lake Iroquois, and their abundance. There are no known threatened or endangered species known to occur in Lake Iroquois.

Also, see response B-1.

Comment B-16: The applicants refer to a chemical half-life of 1.7 hours for ProcellaCOR in order to illustrate the rapid disappearance of this chemical from the water. They use this figure to argue for the safety of ProcellaCOR; however, this 1.7-hour half-life does not appear anywhere on the Safety Data Sheet the applicants themselves attach to the permit application. The Safety Data Sheet actually shows that florpyrauxifen-benzyl is "expected to biodegrade very slowly (in the environment)" and "Fails to pass OECD/EEC tests for ready biodegradability." Its stability in water (half-life) is shown to be 111 days for pH 7 and temperature 25 degrees C. How do the applicants explain this discrepancy between the data and their own claims for ProcellaCOR? Why do the applicants choose to ignore this data? Because this product is so new, there is no evidence available to demonstrate how ProcellaCOR actually behaves once it enters the lake. If the chemical persists in the water and soil longer than the applicants claim, risk of damage will be greater than predicted. This is not acceptable risk to the non-target environment.

Response B-16: The SePRO ProcellaCOR® EC Safety Data Sheet states that the half-life for ProcellaCOR active ingredient is 111 days through hydrolysis at pH 7. However, when ProcellaCOR is applied to a waterbody, the primary breakdown of the compound is through photolysis and plant uptake. ProcellaCOR is typically applied at 4-6 parts per billion (ppb) to treat Eurasian watermilfoil. Concentrations have been confirmed to be below 1 ppb (limit of detection) at all concentration monitoring locations within 3 days after an application as demonstrated by results from waterbodies treated with ProcellaCOR in Vermont in 2019 and 2020. Most treated waterbodies have pH between 6-8 and breakdown timing remains consistent. In the absence of sunlight and plant uptake, hydrolysis would be the major driver of breakdown and would be a slower mechanism.

Comment B-17: ProcellaCOR is intended to be used not as a whole-lake application but as a spot treatment for smaller sections of the lake. The label explicitly states: "Water bodies containing very high plant density should be treated in sections to prevent the potential suffocation of fish." The applicants acknowledge that DEC's 40% limit on ProcellaCOR use is meant to protect the environment, stating: "the intention is not to impact the entire habitat in order to maintain an appropriate balance within the system." Yet, while conceding the intent behind this restriction, the applicants nevertheless violate its purpose by choosing one single 40-acre habitat block to treat with herbicide. This is not spot treatment. The applicants propose to treat essentially the entire northern third of the lake. The applicants chose this region knowing that it contains "very high plant density" and is therefore likely to lead to fish suffocation. Furthermore, the selected area of Lake Iroquois is its only undeveloped littoral zone region. The remaining 60% is highly disturbed shoreline dotted with houses, and frequently disrupted by people. This particular area encompasses precisely the region most likely to be inhabited by fish, amphibians and other aquatic organisms. Not only have the applicants violated the spirit of the limitation, they have essentially duplicated the whole-lake approach rejected by DEC only two years ago. Treatment of this entire 40-acre habitat block will negatively impact fish and other creatures living in the lake. This is not an acceptable risk to the non-target environment.

Response B-17: The Secretary considers the current 40-acre treatment proposal as a spot treatment within Lake Iroquois. This treatment location covers approximately 15.7% of the total lake surface area and 34.8% of the littoral zone of Lake Iroquois.

In addition, the proposal in the application is only a proposal. The final treatment area is requested for by the permittee and reviewed and approved by the Secretary annually as identified under condition a.4.

Comment B-18: There is insufficient science and insufficient experience to back up claims of environmental safety. Past experience with countless other herbicides teaches that unforeseen consequences will follow its use. It is still too soon to know what particular unforeseen consequences might result. Every lake consenting to try ProcellaCOR must now engage in its own long-term experiment. The Lake Iroquois aquatic natural community itself must now become the testing ground for this new product. This is not an acceptable risk to the non-target environment.

Response B-18: Based on the information that is currently available and as identified in the Approved Application, the Secretary can conclude that there is an acceptable risk to the non-target environment. However, in the event that aquatic plant survey results are not as anticipated and it can be demonstrated that unanticipated results are resulting in an unacceptable risk to the non-target environment, the Secretary may reopen or revoke the permit in accordance with standard conditions b.13. or b.14.:

> b.13. Reopener. If after granting this permit the Secretary determines that there is evidence indicating that an authorized activity does not comply with the requirements of 10 V.S.A. Chapter 50, the Secretary may reopen and modify this permit to include different limitations and requirements.
>
> b.14. Revocation. This permit is subject to the conditions and specifications herein and may be suspended or revoked at any time for cause including: failure by the permittee to disclose all relevant facts during the application process which were known at that time; misrepresentation of any relevant

fact at any time; non-compliance with the conditions and specifications of the permit; or a change in the factors associated with the control activity such that the Secretary can no longer make all applicable findings.

Comment B-19: There is not a lot of ecological and environmental information available that isn't provided by the manufacturers. I would be hesitant to use such a new compound until I knew more about the effects to an entire system (like a lake) and see case studies in other locations that use ProcellaCOR. It looks like there are several recreation departments and environmental management groups across the country using/ planning to use ProcellaCOR to manage invasive aquatic plants. I would at least wait a few years to see how those ecosystems rebound from ProcellaCOR application and critically assess the environmental effects in those locations. ProcellaCOR seems fairly cost effective, but something to consider is how often this will need to be applied. I did not see any readily apparent information on the efficacy of ProcellaCOR on different life stages of milfoil (or even if native species are more sensitive in different life stages), so it may need to be applied many times over the next few years. There are so many unknowns here, which I know is not helpful, but with so much uncertainty I would recommend holding off on using ProcellaCOR until we know more. To me, it is not worth the risk right now when there are so many people who live by, live downstream, and recreate at Lake Iroquois.

Response B-19: See responses B-1, B-6, and B-18.

Comment B-20: This herbicide will introduce far greater problems than having weeds in the lake. In reality, the weeds are nothing more than a nuisance. They feel funny on your legs when you swim, they can get caught in propellers if you drive through the thick patches (again, this has been a problem since 1990 and there are still plenty of deep water, weed free areas), and that is about it. Personally, I milfoil has never detracted from my enjoyment of the lake. Moreover, they provide excellent habitat for fish and other aquatic species, allowing a flourishing wildlife population to thrive (including breeding loons and eagles, to name a few), and they soak up excess nitrogen and fertilizers that run off from agricultural areas and lawns, preventing algae blooms. Yes they are a nuisance, but they do not cause any health or environmental concerns. If the milfoil are killed, they will not be replaced by other plants performing these duties, because ALL plants will be killed by this herbicide. If this happens, let me describe the series of events to follow. The loss of plant matter will leave everything that depends on those plants to die as well. This will include fish, macroinvertebrates, amphibians, and more, not to mention the potential fallout from organisms eating poisoned plants before they die. When the plants die, they will also release all of the stored nitrogen and phosphorus into the water, and there will be no other plants to take those materials up. This excessive nutrient load will create perfect conditions for algae blooms to occur, including the infamously toxic blue-green algae. These are just the obvious ramifications of herbicide use. By removing the milfoil with herbicides we would eliminate the mild nuisance, and in doing so introduce massive health and ecological concerns that the state will then have to address for years to come. Again, we are not going to solve anything here, but rather open up the doors for a long-term crisis control over the management of the lake.

Depends on what acceptable means, but there will absolutely be a reduction in species diversity, the breeding pair of loons might leave due to loss of habitat, fish might be heavily impacted affecting the entire ecosystem chain, non-target plants will die.

The applicants assert that there is a milfoil crisis on the lake. LIA claims that because of a recent “infestation” of milfoil, the lake will “die” or “fail.” This is alarmist hyperbole. Milfoil has been present in the lake for decades. Lake Iroquois is home to a growing population of loons, eagles, osprey, heron, kingfishers and many other birds. There is an abundant fish population along with turtles, amphibians and numerous other species. On the whole, the lake’s natural community has adapted to milfoil. A plant survey done at the request of LIA in 2019 revealed: “Species richness in Lake Iroquois was quite high” and “the native plant populations appear robust.” (https://www.lakeiroquois.org/water/plant-surveys). This same survey notes that species diversity in Lake Iroquois has actually increased from 2014 to 2019. There are natural fluctuations in the levels of milfoil; some

years are good while others are bad. For example, the summer of 2018, after DEC denied the Sonar permit, Lake Iroquois found itself remarkably free of milfoil. Many residents remarked that, even without herbicide use, “success” had been achieved. (I sent emails in 2018 to DEC with photos documenting the clear condition of the lake.) It has taken decades for the natural community to achieve its present balance. These applicants can disrupt the natural balance in just one day of chemical application. There are many people who enjoy the natural beauty and peaceful aquatic community of Lake Iroquois. There is no public benefit when we weigh the integrity of the natural community against temporary enhancement of boating on the lake.

Response B-20: See responses B-1, B-2, B-3, E-1, and E-2.

Comment B-21: It is unfortunate that consideration for "dense density populations" of White Water Lily is reduced "to a 12.2% frequency of occurrence throughout the waterbody" in this draft section and in the contractor supplied documents. The number just might be correct but the dense populations are where the invited public sees them, north and south of the west side fishing access. The White Water Lily pads and flowers just might be the premier aesthetic of the lake that the viewing public appreciates most. Damage to these dense populations of Water White Lily will not be an acceptable to the public as the fishing access is one of only two public access viewpoints.

Response B-21: The permittee identified that white water lily, *Nymphaea odorata*, and yellow water lily, *Nuphar variegata*, may be sensitive (not controlled/sublethal) to ProcellaCOR® EC based on treatments conducted in 2018 and 2019. Impacts to those species include slight discoloration, slight stem twisting, and leaf curling. However, plants grew out of those impacts several weeks after a treatment. It is not anticipated that the use of ProcellaCOR will result in a long-term negative impact to the white water lily population in Lake Iroquois.

Comment B-22: I am concerned about the loss of plant species diversity in Lake Iroquois as a result of the infestation of EWM. This is a plant that can and does crowd out native species. I noticed that in the 2012 plant survey 53 species of plants were listed, though some were invasives and terrestrial or emergent. In the 2017 and 2019 surveys only 33 native species are listed. The annual Aquatic Plant Survey of Lake Iroquois in 2019 by Darrin Fresh Water Institute shows a 28% decline in native aquatic plants in the lake from 1984 to 2019. To a large extent, the native aquatic plants in the lake are being overcome by EWM.

I realize that survey methodologies may differ, and that aquatic species ID skills may differ, but there does seem to be a significant loss of native aquatic plant species over time. The applicants wish to use a small amount of herbicide in a dense patch of EWM for beneficial purposes. Aquatic herbicides are diluted once applied, which makes for challenges in their application, but limits human exposure to chemicals.

Response B-22: The Secretary acknowledges this comment.

Comment B-23: When the milfoil is at its peak the lake’s ecosystem is suffering greatly. The milfoil suffocates the native species of the lake quite rapidly. There is a significant increase in the number of dead fish that float to shore. I am witness to this because I live on the north end of the lake and in 2015 and 2016 when the milfoil was at its densest we had numerous dead fish wash up on shore and at the beach daily. When the milfoil is at its peak we lose our duck and otter population. Ducks cannot swim through the dense milfoil and therefore leave the lake. When I was growing up on this lake we had at least 5-7 families of ducks all summer long. Now we have maybe 2 families of ducks who leave the lake once the milfoil reaches the water’s surface. Our osprey and bald eagles (yes we have resident osprey and bald eagles) are unable to fish. I’ve watched an osprey get stuck in the milfoil while diving for a fish. I myself have been stuck in the milfoil 10 feet from my dock in a row boat and needed someone to assist me to get back to my dock. I can’t imagine how difficult it must be for a duck, bird, otter or other wildlife to try to get out of such a tangle.

Response B-23: The Secretary acknowledges this comment.

Comment B-24: I am an avid birdwatcher and am worried about the reduction in species diversity that will inevitably ensue if herbicide is used (for example, we have a breeding pair of loons that depend on the lake and its aquatic species). We learned from DDT and other chemicals that the negative environmental impacts associated with the use of herbicides and pesticides are widespread and are often initially overlooked.

Response B-24: See responses B-1 and B-2.

Comment B-25: Testing has not been on amphibians and reptiles, which should be protected from potential harm. Testing of other animals should not be considered an adequate surrogate for amphibians and reptiles. For example, though birds (one of the groups tested) are actually in the Reptilia class, turtles branched off the evolutionary tree earlier than other reptiles (snakes/lizards/birds); so much so that some groups suggest that they should be in a cladistic group of their own. I'd argue that they should not be considered to have the same response to chemicals as birds. In addition, an aquatic turtle such as a Painted Turtle or Snapping Turtle that spends its entire life in the water cannot be considered the same as a bird that may fly in and out of the water. Similarly, amphibians are an entirely different group of animals, not closely related to birds, invertebrates, fish, or mammals. Some of these amphibian species spend years in the water. American Bullfrog tadpoles may spend 3-4 years as aquatic larvae. During this time, they could potentially be exposed to more than one treatment with ProcellaCOR before metamorphosing, and another treatment or two as a sub-adult/adult. Amphibian eggs laid in and larvae developing in the water could additionally have direct exposure to ProcellaCOR application (e.g. spray could be applied directly on top of surface- laid egg masses). We have no data on how this may affect the egg/larval phase. With this lack of data on how these animals and their various life stages might respond on an acute or chronic basis, this application does not meet the standards of demonstrating an acceptable risk to the nontarget environment.

Besides the concern with acute risk, I am concerned with the lack of information on long-term, sub-lethal effects of the chemical on amphibians and reptiles (among other species). Performing acute testing is helpful, but this does not indicate that there will be no long-term effects (for example, changing the sex ratio of animals over time, or causing malformities in metamorphosed frog tadpoles that then cause them to be predated more frequently). In addition, I am concerned that if even some aquatic invertebrates are affected by this chemical, it could affect the entire foodweb (including amphibians and reptiles).

Applications of ProcellaCOR in other lakes have shown no direct effects on amphibians (dead frogs, etc.), but there have also been no standardized studies to examine these effects. Short of a mass die-off of these animals, any effects are likely to go un-noticed by the general public.

Response B-25: USEPA believes that fish species can serve as surrogates for aquatic-phase amphibians. Whether risks of pesticides to amphibians and reptiles are addressed by surrogate taxa used in pesticide risk assessment is currently under debate. A 2018 study published in Ecotoxicology (2018 Sep;27(7):819-833), examined the validity of fish, birds and mammals as surrogates for amphibians and reptiles in pesticide toxicity assessment. A positive correlation between toxicity recorded on fish and amphibians was found, the former revealing, in general, to be more sensitive than the latter to waterborne pollutants.

ProcellaCOR toxicity studies have been conducted on Early Life Stage (ELS) of Fathead Minnow (33-day chronic studies) and Juvenile Rainbow Trout were studies as well. Life cycle studies were conducted with the crustacean *Daphnia magna* and Invertebrate larvae studies were conducted with *Chironomus*. Life cycle studies measured endpoints such as growth rate / weight, and reproduction success as measured by brood size. Freshwater mussels, snails and amphipods have also been part of the toxicity studies reviewed for this product.

The application concentration of <10 ppb, is well below any acute or chronic effect concentration measured in these toxicity studies. The product does not bioaccumulate in fish or freshwater clams due to rapid metabolism

and chemical depuration. The product is not persistent, bioaccumulative or toxic (PBT), the low product concentrations in the surface water will not be long lasting as it dissipates quickly with rapid photolysis (< 1day).

Based on review of available ecotoxicity studies and the chemical and toxicological profile of the product, the potential for acute risk to fish, invertebrates, amphibians is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.
Sources include:
USEPA, 2017. Florpyrauxifen-benzyl Environmental Fate and Ecological Risk Assessment for the Section 3 New Chemical Registration. https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0560-0011

Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management. 2017. https://fortress.wa.gov/ecy/publications/documents/1710020.pdf

USEPA Docket on ProcellaCOR: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2016-0560

Comment B-26: I am concerned with the proposed treatment to the north end of the lake. This portion of the lake is one of the more "natural" areas of shoreline (few camps/more natural shoreline, forested, shallow wetlands, emergent vegetation). Because of these factors, it is also one of the best pieces of amphibian and reptile habitat in the lake. If we are to treat 40% of the lake at a time (which I argue we should not), this should not be the place to start. Instead, the 40% of the lake treated should include only the areas needed for high-use swimming/boating (near camps, the boat launch area/channel, etc.). I understand that leaving this northern area with a dense mat of Eurasian watermilfoil will lead to re-rooting down the lake by the chopped up fragments, but as this treatment will not be ridding the lake of milfoil anyways, the treatment should rather be seen as a way to control it in high-use areas where not otherwise controllable by benthic barriers. Signs and education could be used to try to keep boaters out of heavily-infested areas.

Response B-26: Treatment areas area are initially selected by the permittee based on a combination of achieving the project purpose along with including measures to reduce impacts on the resource (e.g., avoid potential impacts to the non-target environment to the greatest extent possible). Should the permittee seek to conduct a treatment during a calendar year, they will need to submit an annual request to the Secretary for review and approval. The Secretary will review that request based on the conditions and findings of the permit and either approve, approve with modifications, or deny the request.

Also, see responses D-1 and E-2.

Comment B-27: I have concerns regarding effects on rare native plants. As noted in the application, several S2 species have been found in Lake Iroquois in the past. I do not feel that the testing of this chemical adequately covers all of these species, and would like to see confirmation of its non-effect on these rare species before treatment begins (rather than waiting for a plant survey after application – if a rare plant cannot be found after application, what then? Would it not be better to wait until we know that this herbicide will not affect our rare plants before applying it?). In summary, I recommend denying this application on grounds of the risk to non-target species being unacceptable. I'd like to see further studies conducted before proposing treatment. Scientifically-based pre- and post-treatment studies of amphibian and reptile populations, including various life stages (egg, tadpole, and adult) should be conducted, and should show no or limited effect, prior to approval of this permit. The risk to non-target species as presented is not acceptable.

Response B-27: Regarding amphibian/reptile and aquatic biota, USEPA believes that fish species can serve as surrogates for aquatic-phase amphibians. A positive correlation between toxicity recorded on fish and amphibians has been reported (Ecotoxicology 2018 Sep;27(7):819-833), revealing, in general, fish to be more sensitive to waterborne pollutants.

ProcellaCOR toxicity studies have been conducted on Early Life Stage (ELS) of Fathead Minnow 33-day chronic studies and Juvenile Rainbow Trout were studies as well. These fish toxicity studies which include chronic / acute and ELS studies should provide adequate toxicity data to be protective of aquatic-phase amphibians. The Secretary agrees that aquatic biota toxicity studies and results provide adequate data for review and risk assessment.

Life cycle studies were conducted with the crustacean *Daphnia magna* and invertebrate larvae studies were conducted with *Chironomus*. Life cycle studies measured endpoints such as growth rate / weight, and reproduction success as measured by brood size. Freshwater mussels, snails and amphipods have also been part of the toxicity studies reviewed for this product. The application concentration of 7 ppb is well below any acute or chronic effect concentration measured in these toxicity studies.

The product does not bioaccumulate in fish or freshwater clams due to rapid metabolism and chemical depuration. The product is not persistent, bioaccumulative or toxic (PBT), the low product concentrations in the surface water will not be long lasting as it dissipates quickly with rapid photolysis (< 1day).

Based on review of available ecotoxicity studies and the chemical and toxicological profile of the product, the potential for acute risk to fish, invertebrates, amphibians is expected to be low. Chronic toxicity of concern would be short lived due to rapid degradation in the environment, and rapid dilution from spot application use pattern.

Also, see response B-1.

Sources include:
USEPA, 2017. Florpyrauxifen-benzyl Environmental Fate and Ecological Risk Assessment for the Section 3 New Chemical Registration. https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0560-0011

Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management. 2017. https://fortress.wa.gov/ecy/publications/documents/1710020.pdf

USEPA Docket on ProcellaCOR: https://www.regulations.gov/docket?D=EPA-HQ-OPP-2016-0560

Comment B-28: According SePRO, ProcellaCOR's chemical, florpyrauxifen-benzyl, is expected to biodegrade very slowly in the environment and fails the 10-day window test. Bioaccumulation is moderate. Bio accumulation is a serious threat for all parts of the eco system. Who is going to tell the beavers, the fox, the fisher cat, the fish, the ducks, the geese, the gulls, the cranes, the frogs and the turtles not to drink the water during and within a specified time after application?

Response B-28: As identified in the Supplemental Environmental Impact Statement for State of Washington Aquatic Plant and Algae Management, bioaccumulation risk is very low, especially given the single application use pattern and short exposure time in the water (1-3 days):

"A fish bioconcentration factor study and magnitude of residue studies for clam, crayfish, catfish, and bluegill support that, as anticipated from its physical chemistry and organic affinity, Procellacor™ will temporarily bioaccumulate but is rapidly depurated and/or metabolized within freshwater organisms within 1 – 3 days after exposure to high concentrations (150 µg/L or higher). For reference, the proposed treatment at Lake Iroquois would be below 10 ug/L within the treatment area. Based on these findings and the low acute and chronic toxicity to a wide variety of receptor organisms, bioconcentration or bioaccumulation are not expected to be of concern for Procellacor™ aquatic use."

Also, see responses B-1, B-25, and B-27.

C. Comments Regarding Whether there is Negligible Risk to Public Health – 10 V.S.A. 1455(d)(3)

Comment C-1: The long-term public health impact of the use of the proposed herbicide is not really known especially as many around Lake Iroquois use the water in the lake for drinking and bathing as well as recreation. This chemical has only been in use for 2 years, with limited experience regarding human and animal exposures. It cannot be deemed "safe" at this early time. The fact that it may not cause obvious acute illness immediately following exposure in no way excuses the likelihood that more prolonged exposure, or even short-term exposure, may result in long-term toxic effects. There are a multitude of examples, from asbestos to DDT, where environmental substances prove highly toxic to humans or animals despite the absence of effects immediately upon exposure. The children and adults of Vermont and of our towns around Lake Iroquois should not become the experimental subjects that demonstrate long-term or more subtle toxic effects from the unintended and unexpected consequences of ProcellaCOR. What is a negligible level of risk? Who is and what is affected, and to what extent?

Response C-1: The Secretary acknowledges that any use of an herbicide in waters of the State potentially contains some risk to public health. Authorization of an herbicide in waters of the State requires that the Secretary make the finding that the risk is negligible. As a part of reviewing this application, the Secretary asked the Vermont Department of Health (Health) to review this application and to determine whether the project poses a negligible risk to public health. Health examined the herbicide, ProcellaCOR EC, and the potential level of concern for public health that may be associated with exposure to water that has been treated with the herbicide. Health reviewed the 2020 permit applications for the use of ProcellaCOR EC at Lake Dunmore, Lake Iroquois, Lake Pinneo, and Lake Beebe as well as the 2019 permit application for the use of ProcellaCOR EC at Lake Morey, Lake St. Catherine, Burr Pond, Lake Hortonia, and Sunrise Lake. Health provided the Secretary the following on March 17, 2020:

"The EPA label for ProcellaCOR does not include any restrictions on use of the treated water for domestic (including drinking and cooking) or recreational use. The proposed treatments at the four sites would result in a maximum floryrauxifen-benzyl concentration of 7.72 ppb, or ~4 PDUs. The EPA label allows use of up to 25 PDUs, which corresponds to roughly 50 ppb. While EPA identified no adverse impacts in animals across the required toxicology studies, Health selected a point of departure of 300 mg/kg/day and derived a chronic oral reference dose of 3 mg/kg/day. Use of this chronic oral reference dose in Health's standard drinking water equations, assuming daily exposure to a 0-1 year old, gives a drinking water health advisory of 3,429 ppb. The drinking water health advisory for florpyrauxifen-benzyl is over 400 times higher than the highest proposed concentration in the treated areas, and over 60 times higher than the highest use amount allowed on the EPA label. Thus, the proposed treatments of the four lakes with ProcellaCOR are expected to result in negligible risk to public health. Based on a review of the confidential statement of formulation, it is reasonable to conclude that human exposure to the inert compounds contained in ProcellaCOR at the concentrations that would result under the conditions proposed by the applicants, is not likely to result in an increase in the level of concern for public health."

The chronic study referenced in the paragraph was a two-year study. Based on this review, Health and the Secretary have found that the proposed use of ProcellaCOR EC in Lake Iroquois poses a negligible risk to public health.

Comment C-2: In the past, we have seen other examples of unintended consequences in use of other chemicals, such as DDT. DDT was a chemical which was intended to be helpful, but caused genetic mutations and proved to be mutagenic and teratogenic. (Teratogenic definition is - of, relating to, or causing developmental malformations.). Developmental toxicity of p,p'-dichlorodiphenyltrichloroethane, 2,4,6-trinitrotoluene, their metabolites, and benzo[a]pyrene in Xenopus laevis embryos. We don't know what the long term safety of this chemical is.
The thought of even ONE child acquiring a serious illness from this chemical in the water of Lake Iroquois is terrifying to me, and should be a concern for us all. If we cannot even safely compost ProcellaCOR treated

Milfoil, what does this say about its effect on gardens, animals, and people who use and are exposed to the water in Lake Iroquois.?
Using ProcellaCOR is a terrible idea, and one that I oppose based on health concerns, and also on financial concerns. We are in the midst of a pandemic. 15-20% of people in the US have lost income or their jobs entirely. Why would we add financial burden to our community when we are in an uncharted territory, regarding Covid-19 and its effect on our community?

Response C-2: See responses B-1 and C-1.

Comment C-3: I have grave concerns about the possible long-term unintended health risks posed by the application of an untested chemical into Lake Iroquois, as it is heavily used by children and women, some pregnant. Chemicals such as pesticides, have been shown to accumulate in human fat tissue, and are excreted in breastmilk. (If you look at the Lake on a nice day in summer, a large share of the people there are mothers and small children, and many babies and toddlers who still may be breastfeeding.) Although the direct benefit of breastfeeding remains intact, the chemicals in our bodies can directly be transferred to our children during breastfeeding, and there may be serious and unintended consequences. No "safe" level of chemical contamination in breastmilk has been established. Children also inadvertently ingest water while swimming, and would take this chemical or its metabolites/byproducts in directly as they swam. Childhood diseases such as cancer can be increased by chemical contamination of water. Some pertinent articles:

Does Mother's Milk Transfer Environmental Toxins to Breast-Feeding Babies?
https://www.scientificamerican.com/article/earth-talks-breast-feeding/

https://www.cdc.gov/breastfeeding/breastfeeding-special-circumstances/environmental-exposures/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fbreastfeeding%2Fdisease%2Fenvironmental_toxins.htm

Chemicals can often have unintended consequences. The morbidity and mortality of children and infants and pregnant women is and should remain a high priority of every town in our State. It would be catastrophic if we later learn that this chemical had an unintended negative consequence, causing illness or death in affected susceptible growing human beings. There also could possibly be liability involved and that would add to the emotional, and financial burdens already placed by using this chemical on Lake Iroquois. Additionally, and importantly, many animals are dependent on this body of water, and I want them to continue to thrive. This chemical could inadvertently have the result of killing off some of the animals, or their potential aquatic food sources and that could cause a negative chain reaction in the delicate environmental balance that exists in Lake Iroquois and its watershed. This would again be tragic.

An independently established safety profile of the herbicide ProcellaCOR is basically non-existent with respect to long-term human health consequences. Profiles that are listed on the manufacturing website indicate that the EPA, (such as it is under this administration), has not done any independent testing on this chemical, or its metabolites (the chemicals that appear as it degrades), and is relying SOLELY on biased manufacturer's data, which may or may not be truthful or not. The goal of ProcellaCOR company is to sell chemicals. We should not be accepting their word for it re: safely. It is a new chemical, and there are no studies that can independently establish its safely.

Response C-3: See responses B-1 and C-1.

Comment C-4: The vast majority of the research done on this chemical has been by the chemical industry itself. In one of the rare, non-industry studies done, there is evidence suggesting that ProcellaCOR EC may cause endocrine disruption in Rats. Endocrine disrupting compounds (EDCs) either mimic natural hormones or interfere with the production and molecular signaling of hormones in the body. The studies with male rats (the

mammalian studies used as a proxy for effects in humans) found that some rats developed tumors in their mammary glands.

Response C-4: The following excerpt is from the Washington State Department of Ecology's review of ProcellaCOR (Section 4.3.3.5 Toxicological Profile; Mammalian and Human Toxicity) that can be found on page 86/100 in the Approved Application:

"Several studies conducted on both mice and rats, over the course of 1-2 years have indicated no treatment-related (post-necropsy) clinical observations or gross histopathological lesions. An 18-month mouse study was conducted, and no chronic toxicity, carcinogenicity, or other adverse effects were observed, even in those male and female mice receiving the highest doses tested. A 1-year dog study is also ongoing; similar to the above mammalian toxicity tests, no treatment-related toxicity or pathology has yet been observed during this study. Reproductive, developmental, and endocrine toxicity (immunotoxicity) has also been tested, and results of all these tests showed no evidence of toxicity. Although no specific human testing has been conducted for Procellacor™, based on extensive laboratory testing on mammalian species, little to no acute or chronic toxicity would be expected in association with environmental exposures."

In addition, a review by the Connecticut Department of Health states:

Tumor Effect:

In a long-term study, the incidence of adenocarcinoma of the rat mammary gland was 0/50, 0/6, 1/11, and 2/50 in males given 0, 10, 50 or 300 mg/kg/day, respectively (Two-Year Chronic Toxicity/Oncogenicity Study in F344/DuCrl Rats. In Volume 3 – Annex CA - B.3 – Page 222). This dose response has been identified as possibly indicative of a data gap and has led some reviewers to consider 50 mg/kg*day the NOAEL for an endocrine effect. (European Food Safety Authority (2018) https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2018.5378) Others however have noted that the minimally higher incidence of mammary gland adenocarcinomas in males given the high-dose of 300 mg/kg/day was not statistically significant, and while effects on mammary gland including mammary tumors are most commonly seen in female rats, study, there were no treatment-related effects on the mammary gland of females at any dose in this study, and no females from either the control or treatment groups had an adenocarcinoma of the mammary gland.

While this response to Procellacor may represent a data gap, the response was positive in just a single test animal in the 50 mg/kg group, and the effect is not dose-dependent. Though the result is most likely an artifact, the small number of test animals in the 10 and 50 mg/kg*day groups highlights a weakness in the study.

TUMOR EFFECT OR THRESHOLD

*LOAEL (mg/kg*day)*	*NOAEL (mg/kg*day)*	*Doses (mg/kg*day)*	*Route of Exposure*	*Tumor Endpoint*	*N (initial)*	*# Dosing Days*	*Model*
none	>300	0,10,50,300	Diet	no significant tumor result *	50/(sex* group)	760	Rat
none	>800(F),>1000(M)	0,50,200,800(F), 1000(M)	Diet	no significant tumor result	50/(sex* group)	547	Mouse

* Dose response for interstitial cell adenomas of the testes was within the range of historical controls.

This conclusion by the Connecticut Department of Health is also reflected in EPA's Toxicology Chapter, which notes that "none of the tumor incidences was considered to treatment related due to one or more of the following reasons: weak or no dose-response, no statistical significance, tumor incidence was within historical control range, or no supporting non-neoplastic lesions found in the study."

Comment C-5: I understand the toxicological review process by the EPA, including how animal data are used as surrogates for human data, and the use of FQPA safety factors and other uncertainty factors. It is the best we can do short of actual toxicology data from humans, which are, for most chemicals, unethical or not feasible to

obtain. I understand that ProcellaCOR "is not likely to result (in an increased risk) …for public health" by the VT Dept. of Health (Sara Vose, toxicologist), based on review of EPA data. But given that this is a public lake, I think the highest threshold for safety must be considered, and in that regard, since there are no data from humans or any long-term follow-up data, there is no evidence yet that Procellacor is safe for humans.

The data that the EPA evaluated to approve the herbicide was provided by industry only, not by peer-reviewed, independent research. This is made clear in the GEI Consultants, Inc. review of ProcellaCOR for Washington State Department of Ecology in 2017. This can obviously result in a biased view of the data. For example, a recent study found that the EPA only focused on industry-sponsored, non-peer-reviewed studies in making their determination that glyphosate was safe (Benbrook, Environ Sci Eur 2019), despite the World Health Organization coming to the conclusion that glyphosate was a probable human carcinogen when they reviewed independent, peer-reviewed data.

The data provided were obtained from animals only, and it is well established that there is no consistent relationship between animal and human toxicity. Research shows that the overall concordance of such data is about 70% (Olson, Regulatory Toxicology and Pharmacology 2000). Everyone is familiar with thalidomide, which was found to be entirely safe in animals and then found to be very toxic in humans. Among the animal data, a data gap was found by the European Food Safety Authority (June 2018) in the area of endocrine toxicity in rats.

Response C-5: See responses C-1 and C-4.

Comment C-6: There are people who live downstream who have compromised health and they are worried about the effects of this toxin on their body. Not enough testing has been done to convince me that those with compromised health will not be adversely affected by the addition of this chemical to the water.

Response C-6: Waters flowing out of Lake Iroquois are anticipated to contain a reduced or no detectable concentration of ProcellaCOR EC immediately after a treatment. As demonstrated with previous ProcellaCOR EC treatments in Vermont, the majority of concentration sampling for ProcellaCOR EC after a treatment has no detectable concentration at 48 hours after the treatment, which includes a sampling location approximately 1 mile downstream of the outlet of the treated waterbody.

Also, see response C-1.

Comment C-7: ProcellaCOR EC is safe by all government standards. LD50 is safer than table salt. It is NOT carcinogenic. It is NOT teratogenic. It is NOT mutagenic.

Response C-7: The Secretary acknowledges this comment.

Comment C-8: There have been no long-term plans proposed by the Lake Iroquois Association for the provision of safe water for residents impacted by the proposed herbicide application. This is a short sighted plan lacking clear and sustainable goals for maintainability of the effected regions of the lake. The health and safety of the residents of Williston, Hinesburg, St. George and Richmond must take precedent over the poisoning of a nuisance aquatic species which has no real long-term efficacy. Proposal is to supply bottled water for 24 hrs but permit states testing should be done until concentration is less than 2ppb. Shouldn't water be supplied (and likewise use of lake for recreational purposes disallowed) until concentration is below 2ppb?

Response C-8: There are no drinking water restrictions on the U.S. Environmental Protection Agency approved SePRO ProcellaCOR® EC Specimen Label, meaning that Lake Iroquois can be used for drinking water purposes on the day of treatment. However, to minimize unnecessary exposure to the public from a treatment, the Secretary requires that the permittee supply potable water on the day of treatment upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink.

Comment C-9: There is some evidence suggesting that ProcellaCOR may cause endocrine disruption. Endocrine disrupting compounds (EDCs) either mimic natural hormones or interfere with the production and molecular signaling of hormones in the body. In order to register new pesticides in both Europe and the US, a series of toxicological tests are conducted in mammals, algae, fish, invertebrates. The studies with male rats (the mammalian studies used as a proxy for effects in humans) found that some rats developed tumors in their mammary glands. This is unusual since the mammary glands were the only target of toxicity, and the exact cause of toxicity for these tumors has yet to be determined.

Response C-9: See response C-4.

Comment C-10: Findings: c. 7., Public Health, This paragraph is a hollow statement to the extent it specifically and only addresses human exposure to the "inert compounds", not the active ingredient(s). The Label and SOS are referenced with links provided on pages 2 and 14. Page 1 of the Label shows the active ingredient is 2.7% of the formulation whereas 97.3% are other ingredients. Page 1 of the SOS indicates that 94.3% of the mixture is "not available" and which necessitated "the review of the confidentiality statement of formulation provided to the Vermont Department of Health" (VDH) by the manufacturer.

In all probability the 94.3 and 97.3 is the percentage of the inert carrier for the active ingredient(s) in the formulation. Neither the Secretary nor anyone for that matter can make a determination that there is negligible risk to public health from ProcellaCOR by only considering the inert compounds of the formulation. It appears the Public Health findings statement is limited to one closing paragraph cut and pasted from the State Toxicologist Memorandums (letters) of April 4, 2019, or March 17, 2020. That paragraph does not address the active ingredient, only the inert compounds!

Regards the content of the above referenced letters the main active ingredient of ProcellaCOR, florpyrauxifen-benzyl (which is the abbreviated chemical name) appears three times in the body of the memorandums. It is misspelled in its second appearance in the core of the letter both in 2019 and 2020. It is hoped the database research of chemical registries and toxic abstracts on the active ingredient by the VDH did not employ the misspelling as surely it would have led to false dead ends. While remaining respectful of the VDH and its credentialed professional I hope the repeating error is not indicative of rubber stamping.

Response C-10: The Health Department reviewed the potential health risk from both the active and inert ingredients, as described in the quoted text within response C-1. Specifically, the Health Department reviewed the risk from potential exposure to the active ingredient and concluded “the proposed treatments of the four lakes are expected to result in negligible risk to public health”. Consistent with the process to review pesticides used in the aquatic nuisance program, Health also reviewed the inert ingredients and made the same conclusion. Health sincerely apologizes for the spelling error. The “p” was left out of one mention of the active ingredient, and this did not affect the literature searches.

D. Comments Regarding Finding c.8. Long-range Management Plan – 10 V.S.A. 1455(d)(4)

Comment D-1: A safer, multipronged approach can be used to control nuisance aquatic weeds, including limiting the speed and number of large HP power boats on this tiny little lake. The motors of these boats create further amounts of Milfoil growth by creating tiny seedlings every time they slice a plant up into fragments. What would happen, over a five year period, if our communities tried to mitigate this Milfoil issue by, among other things, reducing or eliminating the use of the lake by high horse-power boats? Other lakes have installed slow/no wake buoys in several sensitive areas of the lake, and prohibit boats from coming too close to the edges of the Lake, shoreline, or piers.

What I do wonder is to what degree surrounding homeowners have stopped using fertilizer on their lawns. From the Lake Iroquois Homeowners Manual 6.20.15 - "Avoid using fertilizers or pesticides on your garden or lawn

These are significant polluters to the lake and increase the phosphorus level. Our susceptibility to Eurasian watermilfoil is directly attributable to the high level of phosphorus in Lake Iroquois." They could as a homeowner association have a vote and pass new rules to limit fertilizer and pesticide use.

I also wonder to what degree wastewater from surrounding homes, whether it be actual waste from homes or fertilizer-laden runoff, is actively staunched. Pouring poison into the lake will temporarily solve one of the symptoms. To what degree have homeowners done anything about the actual causes? I know that they have stationed someone during certain hours on certain days to make sure boat owners are aware of their responsibility, but it is only part of the problem.

Response D-1: The Secretary must find that the applicant has a long-range management plan that incorporates a schedule of pesticide minimization. Currently, the permittee has Aquatic Nuisance Control permits for the use of bottom barriers and diver assisted suction harvesting, both of which, if implemented, would minimize the use of herbicide. These efforts would be considered pesticide minimization measures as well as additional efforts that would reduce the likelihood of Eurasian watermilfoil populations from developing, such as the efforts identified in the comment. As a part of implementing the long-range management plan and pesticide minimization measures, the permittee should review the recommended pesticide minimization measures and work with the Secretary on how to potentially pursue a pesticide minimization measure in order to be in compliance with the permit.

In response to this comment, the Secretary has determined that for the permittee to be in compliance with this finding throughout the effective period of this permit, the permittee must implement pesticide minimization measures annually and to report to the Secretary on those efforts. As such, the following conditions and findings have been added to the permit:

Condition a.14. Pesticide Minimization Measures. Beginning the first calendar year of a treatment until expiration of this permit, the permittee shall implement pesticide minimization measures annually. Pesticide minimization measures shall include one or a combination of Eurasian watermilfoil non-chemical control projects and/or efforts that reduce the likelihood of Eurasian watermilfoil populations from developing. Should pesticide minimization measures not be completed over a calendar year or the Secretary has determined that pesticide minimization measures were insufficient at achieving the purpose of pesticide minimization, the permittee shall submit a pesticide minimization compliance plan to be approved by the Secretary prior to any additional proposed use of pesticide under this permit.

Condition a.15. Pesticide Minimization Annual Report. Beginning the first calendar year of a treatment until expiration of this permit, the permittee shall submit an annual pesticide minimization report to the Secretary by December 31st and shall include:

A. A summary of pesticide minimization measures completed during the current calendar year.

B. A summary of proposed pesticide minimization measures to be completed over the following calendar year.

Finding c.8. As a means to ensure that the permittee is actively implementing their long-range management plan that incorporates a schedule of pesticide minimization, the permittee will need to implement pesticide minimization measures annually and report to the Secretary on those effort. Pesticide minimization measures must include one or a combination of Eurasian watermilfoil non-chemical control projects and/or efforts that reduce the likelihood of Eurasian watermilfoil populations from developing.

Comment D-2: While the applicants claim to have an “intensive integrated management program” on Lake Iroquois, there is no evidence that such a management plan actually exists.

Response D-2: Elements of the 5-Year Integrated Pest Management plan can be found on page 1 of the Lake Iroquois - 2020 ProcellaCOR EC Permit Project Description (page 8/100 on the Approved Application pdf).

Also, see response D-1.

Comment D-3: The application of herbicide alone without longer-term physical removal of milfoil is ill-conceived and likely to failure. Brief application alone will surely select for weeds and plants resistant to this herbicide. Efforts at physical removal along with or instead of herbicide application are essential but are not part of the long-term plan for managing milfoil in Lake Iroquois.

Response D-3: The permittee identified they will be pursuing the physical removal of Eurasian watermilfoil through scuba diver handpulling, diver assisted suction harvesting, and snorkel handpulling.

Also, see responses D-1 and D-2.

Comment D-4: It is my belief that LIA has not met the permit requirement for a long term management plan as they have failed to provide any documentation or proof as to how they will be able to meet the extensive financial commitments they have undertaken in this permit. The proposal is for $250,000 over five years. LIA has failed to provide even a plan as to how they hope to be able to raise this much money. This is many magnitudes greater amount then any funds they have been able to raise in the past for smaller private projects or any money the LIRD obtains from the applicable towns. If the plan is to ask the towns to raise $250,000 in taxes to pay for this plan, that is not a long range management plan but rather a pipedream. It would appear that true long range planning would require proof of an ability to perform the entire permit application process over the next 5 years including an ability to raise the funds necessary for completion of the entire application. Failing to show how they can afford to actually complete the entire process, by definition, should be a lack of proof of satisfying the permit requirement for long range planning.

Response D-4: The Secretary does not require proof of funds for how the proposed project and implementation of the long-range management plan will be paid for. However, failure to implement pesticide minimization measures would result in non-compliance with the permit.

Comment D-5: What happens if they are able to raise the approximately $50,000 for the initial herbicide application, but cannot come up with the remaining $200,000 required to complete the project? Has LIA delineated what they intend to cut out of any the required elements of the permit if they fail to raise the necessary funds?

Response D-5: The permittee is required to implement pesticide minimization measures annually. Noncompliance with the conditions identified in response D-1 would be addressed by the Secretary.

Also, see response D-4.

Comment D-6: Where is the contingency plan if LIA is unable to apply the herbicide in the current growing season in the lake which is already well underway and will not last much longer. By necessity that will push the 5 year plan into a 6 year plan with no contingency planning provided for this extra time required to complete the plan nor any contingency planning for any increase in the costs associated with turning this into a 6 year plan. Again, how can LIA meet the permit requirement of a long term management plan when these contingencies are not addressed in the permit application.

Response D-6: The intent of the long-range management plan that incorporates a schedule of pesticide minimization is to have the permittee actively pursue pesticide minimization measures over the effective period of the permit. While the current long-range management plan outlines actions to pursue over the five-year effective period of this permit, the annual report (condition a.13.) and the annual pesticide minimization report

(condition a.15.) are meant to act as a feedback loop to review actions that have been taken and actions that will be taken to reduce the Eurasian watermilfoil population. This report driven feedback loop allows for current information to best direct how the long-range management plan will be implemented, which means that plan is inherently flexible as a means to achieve the intent of the finding.

Comment D-7: I would like to offer my perspective as a Hinesburg resident and licensed commercial herbicide applicator engaged in the control of non-native, invasive species (NNIS), and why I am opposed to this permit application.

While it is human nature to focus on the absence or presence of NNIS, close attention should be paid to the underlying conditions that led to the infestation and proliferation of the particular plant or animal that has been deemed 'invasive'. It would seem the conditions that facilitated this infestation include nutrient-rich waters, source of seed or plant material, and disturbance that facilitated the distribution of the plant material. There may be others, hopefully, DEC scientists and ecologists can clarify. If the underlying conditions are not addressed before the application of this herbicide, I think it is likely we will see one of the following outcomes:
1. the milfoil population is greatly reduced in the first year, then rebuilds in subsequent seasons
2. the milfoil population is greatly reduced in the first year, then is replaced by another NNIS in subsequent seasons.
Application of herbicide without addressing underlying conditions that led to the infestation is not ecological restoration, it is chemical mowing. Chemical mowing is not a derogatory term. It has its place in landscape management, but it is a temporary fix (like mowing the grass) and it is not restorative. It happens to be a great business model for herbicide applicators.
I have no doubt that the application of ProcellaCOR will result in a significant reduction in milfoil. Killing plants is the easy part, predicting and influencing plant community/ecosystem response is the challenge. I have not seen a discussion of potential outcomes and the actions those outcomes will warrant. What will happen to nutrient cycling in the lake? What will occupy the empty niche now occupied by the milfoil? What I can envision is a continuous cycle of herbicide application that is not ecologically beneficial and is financially burdensome to taxpayers.
As an aside, if the State did approve this application, they should mandate that Lake Iroquois property owners comply with the requirements of the Shoreland Protection Act. If it is warranted for new lakeshore development, then applying it to existing development along Lake Iroquois will yield water quality benefits as well. This should be a condition of any herbicide application to Vermont Lakes that is exacerbated by nutrient loading.

Response D-7: Given that eradication is an unlikely outcome from control efforts, the long-range management plan must include pesticide minimization measures that consist of the non-chemical control of Eurasian watermilfoil and/or pursue efforts that reduce the likelihood of Eurasian watermilfoil populations from developing. This includes identifying and addressing the underlying conditions that lead to dense growth of Eurasian watermilfoil.

Also, see responses D-1 and D-6.

Comment D-8: Eradicating milfoil is impossible, there is only management. The proposed permit shows a long-range management plan which incorporates a schedule of herbicide injections. When the milfoil no longer response to ProcellaCOR, as the manufacturer admits will happen, other chemicals will need to be introduced and chemical injections will continue indefinitely.

Response D-8: See response D-7.

Comment D-9: LIA's Plan needs to incorporate limitations on propeller-driven boat activity for the duration of the 5-year treatment period.

Milfoil spreads by stem fragmentation and underground runners. Motorboats running through a milfoil bed act like “food processors” chopping the plant into pieces, greatly accelerating regeneration as each piece is now ready to reestablish itself as an independent plant. Day use motorboats harbor milfoil fragments and spread them from lake to lake, and boat propellers exacerbate milfoil spread within a lake. Established milfoil is a persistent problem. If herbicide is used, the lakebed cannot, and will not, remain suspended in this cleared state. Note that the herbicide does not protect against future regrowth. So, this newly cleared lakebed will be open for recolonization by both native and invasive species. Milfoil, being virulent and opportunistic, will reestablish as a pioneer species, and once again outperform native plants. The VT Fish & Wildlife Department recognizes that “the best management option for milfoil is spread prevention”. And motorboat limitations are one of the most basic, least-cost options to achieve that goal.
Limitations should include: closing the boat access, excluding treatment areas from motorboat usage, and limiting speed and/or motor HP on the lake for the duration of the five-year Plan. I am unsure how these may be implemented. Perhaps as a prerequisite for herbicide application LIA needs to successfully petition the DEC to change the Vermont Use of Public Water Rules, or the DEC needs to condition the permit with temporary limitations. Whatever the official process, the intent is to minimize the spread of milfoil by motorboats.
Applying herbicide will not eliminate milfoil from Lake Iroquois. Without addressing motorboat usage on the lake it makes little sense to invest all the other proposed money and labor in an effort to manage milfoil. Every available treatment option should be incorporated in order to give this Plan the best likelihood for success. Limiting motorboat activity provides recognizable benefits, and it costs nothing. It is a reasonable, non-chemical alternative treatment that has not yet been incorporated into LIA’s Plan.

Response D-9: See response D-1.

Comment D-10: The management plan also does not minimize pesticide use, a condition of permit approval. All we are given is a 5 year plan that may or may not require additional pesticide in years 3, 4 and 5. A list of non-toxic control measures is “proposed” (not guaranteed) to continue in the application, but as stated in response to requirement #1, these measures have not been pursued to a maximal degree. While the statement is made that “diligent control and spread prevention measures … must be taken by all lake users in order to mitigate future spread potential…”, how will this occur if there is not community-wide support? In addition, there is no discussion of the elephant in the room, which is motorboat use. Without addressing how motorboat activity needs to be minimized to help control milfoil, and knowing that other lakes have more heavily invested in approaches to controlling milfoil by harvesting and shoreline protection, the application falls short of any plan to minimize pesticide use.

Response D-10: See responses A-1 and D-1.

Comment D-11: Lastly, as was the case when DEC denied the request the last request to use a different herbicide (Sonar) nothing has changed. "As eradication of EWM is not feasible, EWM populations would recover and likely revert to their current state creating a long-term continuous cycle of impact on the non-target environment within the entirety of the lake. Control activities would need to occur in perpetuity to maintain suppressed levels of EWM." Therefore the current proposal again seems to violate the requirement to have s a long-range management plan which incorporates a schedule of pesticide minimization.

Response D-11: The intent of this finding is to establish a long-range management plan that incorporates a schedule of pesticide minimization. This does not necessarily mean that the plan must identify a point at which pesticide will no longer be used, as eradication of Eurasian watermilfoil is not an anticipated outcome from management activities.

Also, see response D-6.

Comment D-12: There are other methods that can be explored to slow the growth of the milfoil, such as limiting the use of powerboats on the lake and insisting that homeowners with lake frontage plant buffers at the lake edge.

Response D-12: See response D-1.

Comment D-13: Any plan expresses intent and often requires adjustment over time. Still, considering the above, that all reasonable non-chemical alternatives have not been pursued and that many longer-term effects of the pesticide are unknown, it is unreasonable to expect a solid multi-year plan here. The plan, as laid out, assumes an initial targeted chemical milfoil-kill will suffice to stay ahead of infestation. The plan does not address the aggressive nature of milfoil filling the void (including effects of motorboat propellers).

Response D-13: See response D-6.

Comment D-14: Even now, in the current permit application, the applicants resist committing to comprehensive milfoil management. The permit application fails to lay out any systematic program for milfoil control moving forward. The applicants say that they will: "Continue to use a combination of EWM control techniques," but they provide no specifics. They provide only a general list of acceptable management practices. There are no details. There are no timetables. There are no schedules outlining concrete actions. Most importantly, the applicants never state any commitment to "pesticide minimization." The proposed budget shows only the same limited funds devoted to suction harvesting as have proven grossly insufficient in the past. The applicants leave their management plan open to interpretation and thereby open to the possibility of considerably more herbicide use over the next five years. Once started down this path, it may prove very hard to stop. LIA has no proven track record for consistent non-chemical milfoil control. This permit application provides no reason to anticipate that LIA's course of action will change. The applicants have failed to establish "a long-range management plan …which incorporates a schedule of pesticide minimization."

Response D-14: See responses D-1 and D-2.

Comment D-15: The approval of a permit to apply herbicide to this community lake will fail to get at the root of the problem. Control of overabundant aquatic plants like Eurasian watermilfoil is best accomplished by reducing or redirecting nutrient sources from the lake. This can be accomplished by reducing fertilizer applications near the lake, maintaining septic systems properly, redirecting nutrient rich runoff away from the pond, and maintaining vegetative buffer strips around the lake. Continuous and enforceable non-chemical efforts must be in place over a period of time, phosphorus runoff into the lake. Additionally, physical and biological controls. None of these are easy, and all require resources and time-consuming efforts. But if we fail to address the underlying nutrient causes of Eurasian watermilfoil, we will encounter a perpetual need to control it. The application of herbicide (and necessary reapplication of herbicide yearly or even multiple times during a year) will be a regular occurrence if the permit is approved, requiring little consideration of non-chemical approaches and causing a myriad potential negative consequences to ecosystem health. Again, it is a bandaid that does not require transformation in practices because it does not address the root of this problem and brings with it risks greater than what it might achieve.

Response D-15: See responses B-2, D-1, D-6, and D-7.

Comment D-16: Since underlying conditions like high phosphorus levels make Lake Iroquois a desirable location for milfoil, then phosphorus reduction and natural milfoil control should be the focus. Yes, this is difficult, time consuming, and costly. It's probably not "high tech", not sexy, and does not provide instant gratification. But,

with good planning, diligence, and effort it can work. Plus, it respects the existing, interwoven web of aquatic life in the lake.

Response D-16: See response D-1.

Comment D-17: The draft permit states "The Secretary has determined there is no reasonable non-chemical alternative available". Permit section c.5. However, in reality, the Secretary does not recognize the contributions of motorboat activity as a contributing factor in the spread of milfoil. Natural, non-chemical control methods take time and effort. Adding controls for motorboat speed, range, motor size will give natural, non-chemical control methods their best chance for success.

Or, if the final decision is to grant the permit, then please include conditions to require motorboat controls in order to enhance the outcome.

Response D-17: While it is known that fragmentation from motorboats causes Eurasian watermilfoil to spread, it is not specifically known to what degree fragmentation contributes to its spread as there are can be a multitude of factors that can influence this. As a pesticide minimization measure, the permittee could initiate efforts to reduce the spread of Eurasian watermilfoil cause by motorboat fragmentation. However, the permittee may also pursue other pesticide minimization measures to satisfy the conditions of this permit. It should be noted that by issuance of this permit, the permittee is not solely responsible for addressing and managing any and all potential factors that may contribute to the Eurasian watermilfoil population.

Also, see response D-1.

Comment D-18: Despite solid scientific information, and now a statutory response in the Shoreline Protection Act, the number of clear-cut shorelines around the lake has not changed in the last 14 years. Shoreline buffers reduce phosphorus runoff into the lake, and data for the lake confirm its high phosphorus levels. A reduction of phosphorus and the growth of shade trees along the lake shore limit the potential growth of Eurasian Watermilfoil (EWM). The applicant must do much more to eliminate "lawn-to-the-shore" properties and should plant shade trees around the lake. Our property is evidence of a milfoil-free littoral area that can result from shade trees and a manageable effort at hand-pulling. EWM has been in Lake Iroquois since 1990 – 30 years. Annually the infestation is cyclical with some years worse than others. Especially in recent years, the principal means of EWM propagation is through plant fragments. These fragments are created almost exclusively by propellers (not swimmers!). Fragments are blown around the lake to all its shorelines. The fragments sprout roots and then establish themselves in the lake's littoral areas. Hand pulling around a specific shoreline, like our property, must continue through each summer as EWM fragments arrive almost daily.

Suction harvesting is futile if the problem of fragments is not addressed. The applicant has not taken or proposed any reasonable actions to minimize EWM fragments such as:

-Milfoil marking buoys. Lake Iroquois has become much safer in recent years after 200 foot "safety buoys" have been used in the lake to mark the 200' shoreline "no wake" zone. Similar buoys could be used to mark the mid-lake milfoil areas near the 2 islands and the danger buoy. Coupling concentrated power boater education with pathways from the infested littoral areas into open boating waters will significantly reduce fragmentation. Then, efforts by landowners around the lake to remove shoreline milfoil would be far more effective and successful.

-Lake residents in the heavily infested north end, along with support from the applicants, could develop a pathway along their shorelines for propellers to move (slowly!) along a milfoil-free shoreline path to an exit pathway developed for these boats to move out into deep waters.

-A similar pathway is needed for the public launch

Fragmentation of EWM can be controlled and reduced. By taking reasonable efforts to minimize fragmentation, everyone using the lake will see not only a marked improvement in EWM propagation, but will also enjoy toxin-

free waters. The application as submitted to the DEC has no specific proposals to reduce fragmentation – a reasonable non-chemical alternative to the problem that has been largely created by fragmentation.

Response D-18: See response D-1.

Comment D-19: Pesticide minimization will not be possible once an application regime has started. Milfoil is in our state and across the country and will come back as soon its not being poisoned.

Response D-19: Pesticide minimization measures are considered projects that directly control Eurasian watermilfoil through non-chemical control projects or are efforts that reduce the likelihood of Eurasian watermilfoil populations from developing.

Comment D-20: The lake is too small for waterskiing and to precious. Now they come with even stronger wake boats to surf on the wake behind. These wakes destroy the flora and edges of the lake and bother the fauna with the high waves and disturb our fauna and the peaceful boaters in kayaks and paddleboards out there. Small fisher boats are ok. If we want to save this lake in the long run, we need to keep motorized boats out of the lake. My suggestion would be stop motorboats immediately and use the chemical if needed.

Response D-20: Regulations pertaining to the use of public waters are under 10 V.S.A. § 1424, which are beyond the scope of review under Aquatic Nuisance Control. However, proposed alterations to the use of public waters, such as altering a use that may reduce the likelihood of Eurasian watermilfoil populations from developing, would be reviewed and assessed under the process for implementing 10 V.S.A. § 1424.

Also, see response D-1.

Comment D-21: My final concern about the use of any herbicide and in particular the use of ProcellaCOR, relates to the lack of any detailed plan to effectively control the milfoil and minimize the use of herbicides in the future. LIA's plan only addresses the next year or two. It contains no detail about specific ongoing alternative methods of control or ways to minimize the need to continue the use of an herbicide. The proposed use of an herbicide over the next two years is far from a sustainable lake-wide management plan for controlling the milfoil in Lake Iroquois without permanently damaging the health of the public and the ecology of the lake and its environs.

Response D-21: The LIA has identified a 5-year management program (pages 10-11 on the *Lake Iroquois - 2020 ProcellaCOR EC Permit Project Description* in the Approved Application) and has a list of integrated pest management approaches (page 1 on the *Lake Iroquois - 2020 ProcellaCOR EC Permit Project Description* in the Approved Application) that have and will continue to be pursued. The Secretary has determined that a long-range management plan has been developed that incorporates a schedule of pesticide minimization by utilizing an integrated pest management plan.

Comment D-22: If the Division, LIA, and contractor(s) continue to hide behind the ultimate defense of "navigable waters", as if Lake Iroquois is a shipping lane between Williston and Hinesburg, rather than collaborate with neighbors too, or adopt ideas of boat lanes or motorboat exclusion zones in the littoral as another Eurasian watermilfoil (EWM) control tool, then time, talent and treasure will continue to be wasted over the duration of any proposed permit.

Response D-22: See response D-1.

Comment D-23: Manual maintenance of Eurasian watermilfoil by the landowners will increase appreciation and maybe provide jobs for folks vs paying the man for more drugs.

Response D-23: See response D-1.

E. Comments Regarding Finding c.9. Public Benefit – 10 V.S.A. 1455(d)(5)

Comment E-1: The milfoil infestation on Lake Iroquois Has a profoundly negative impact on both the people that use Lake Iroquois for recreation and the animals and plants that depend on Lake Iroquois for their habitat.

Plants and Animals: The milfoil infestation concentrates along the shoreline (depths ~ < 15ft) which actually represents a large proportion of the lake's total area. Logically, this concentration, decreases the amount of the lake that can be used to support these animals. The infestation also impacts the fish by crowding out the shallower water with the infestation, thereby limiting their potential habitat. Finally, as an invasive species, the milfoil infestation negatively impacts the lake's plant biodiversity.

Humans: Recreational activities such as kayaking, canoeing, paddle boarding and swimming are significantly limited by the milfoil infestation particularly, as this infestation concentrates in the shallower peripheral waters (which also serve as the path which most recreational users take around the lake). The public beach is also challenged by the infestation given its location on the shallower north end of the like. Naturally, fisherman are also negatively impacted by the milfoil.

The herbicide has been safely used in other lakes in Vermont as well as in other states. It is vitally important to restore the health of Lake Iroquois to the benefit of the wildlife as well as the residents.

Response E-1: As stated in finding c.9. of the permit, tangible benefits to public good uses are likely to be associated with the temporary decrease in the frequency of occurrence and biomass of Eurasian watermilfoil. This temporary decrease is anticipated to benefit boating and swimming within the treatment locations. It remains undetermined as to whether the control activity will produce a tangible short or long-term benefit to fishing. The presence of aquatic vegetation is required for fish and wildlife habitat. Generally, Eurasian watermilfoil has been identified as providing poor fish and wildlife habitat compared with native aquatic vegetation. However, Eurasian watermilfoil may provide beneficial structural habitat in the absence of other aquatic vegetation. To reduce the potential impact to fishing as a result of impacts to fish and wildlife habitat from aquatic plant management, no more than 40% of the littoral zone may be targeted by aquatic plant management activities.

Based upon review of the public good criteria, the Secretary has determined that the tangible benefits to the public good outweigh the potential negative impacts. The Secretary finds that there is a public benefit to be achieved from the application of a pesticide.

Comment E-2: Even if there are no adverse effects from ProcellaCOR, we cannot be sure that upsetting lake balance will generate the desired effect. Could eliminating Eurasian watermilfoil result in toxic algae blooms or other effects? Could this result in a change in the food chain that impacts other species, potentially endangered / threatened ones such as bald eagles? I believe it is naive to assume that removing a nonnative invasive species will return the lake to the pre-Eurasian watermilfoil status from decades earlier.

Response E-2: The purpose of the control activity is to use ProcellaCOR® EC as a part of an ongoing integrated pest management plan to manage an established population of an aquatic invasive species (Eurasian watermilfoil) to improve the public good uses of Lake Iroquois. Eurasian watermilfoil has spread throughout Lake Iroquois, is well-established, and eradication is a highly unlikely outcome from control efforts. Eurasian watermilfoil is and will continue to be a part of the aquatic environment of Lake Iroquois for the foreseeable future. Lake Iroquois is currently a waterbody that is dominated by aquatic plants within the littoral zone as opposed to being dominated by algal species. Aquatic plants utilize the available nutrients in this waterbody, thereby limiting the available nutrients for algal species. To maintain this current aquatic plant dominated clear water steady state and to prevent algal species from becoming dominant and potentially impacting the water

resource and the public that utilizes that resource, no more than 40% of the littoral zone may be targeted by aquatic plant management activities, including the use of herbicide.

Comment E-3: Reducing plant life just for convenience of motorboats is short-sighted and weakens the lake ecosystem. Applying the herbicide is a short-term fix to what only a subset of lake users view as a problem for them. Herbicide treatments will not lead to increased biodiversity within Lake Iroquois. Native plants will not suddenly populate the areas cleared by ProcellaCOR. Any improvements to boating will be temporary given the inevitable fact that milfoil will grow back. There is no public benefit to a temporary reprieve from milfoil followed by its immediate resurgence.

Response E-3: See responses E-1 and E-2.

Comment E-4: A 40% treatment of the North end of the lake will make a huge difference for all users of the lake as well as native plants.

Response E-4: The Secretary acknowledges this comment.

Comment E-5: I run the Green Mountain Compost facility for Chittenden Solid Waste District. Early this year, and then again in the past week I've received communications from a resident of Lake Iroquois who is concerned about the potential of Eurasian Milfoil or non-target species being harvested and brought to our facility in the event that the ProcellaCOR application process is approved and moves forward this summer. You'll see in my response from LIA this winter that they anticipate no harvesting of treated plants and composting them due to the plants dying back "very quickly, essentially becoming brittle and disintegrating." Upon reading the application prepared by SOLitude Lake Management however, I read the following description related to the rate of degradation of the treated plants:

Lake Iroquois - 2020 ProcellaCOR EC Permit Project Description 9 Following treatment efforts, the plants within the treatment areas would be anticipated to follow a similar decomposition timeline as follows: within a week of treatment – EWM plants are anticipated to be leaning over within the water column; within two weeks of treatment – EWM plants are anticipated to be leaning and more fallen over within the water column, beginning to brown and get discolored, and if touched, the plants would be anticipated to easily break apart, however fragments of these plants are no longer viable; within three weeks of treatment – EWM plants are anticipated to be completely fallen within the water column and be difficult to find even along the bottom sediment.

It would appear that the estimated 2+ week post-application degradation window would leave ample time for an unwitting resident to collect the vegetation and remove it from the Lake. I have a message into SOLitude Lake Management to ask about their application events across Vermont in 2019 to see what level of concern they have of this possibility unfolding. I'm also hoping to speak with someone at DEC or elsewhere within ANR who would be familiar with the application process, degradation, and potential of removal of treated vegetation from the Lake. Is that you, and if not, can you point me to the best person to ask about this? If the concern is not warranted, I'd like enough information in order to respond adequately to our concerned citizen. If it is warranted, I'd like to find out what additional measures might be taken to prevent harvest of treated plants.

Response E-5: The SePRO ProcellaCOR® EC Specimen Label identifies a Use Restriction that one should not compost plant material from a treated area. The Secretary obtained clarification from the co-permittee on this question and the co-permittee received the following from SePRO (the manufacturer of ProcellaCOR):

"This restriction is because a breakdown product of ProcellaCOR (acid form listed 2nd on FasTEST reports) can be released from treated plants up to a week or so after application and it can impose herbicidal activity. I recommend prohibiting any harvesting operations in the treatment areas for at least 4 weeks after application, at which point the plants will be almost completely broken down and impossible to collect with a harvester.

If a resident ignores the recommendation not to harvest any plants after application, the small quantity of hand harvested plant matter would not pose a risk to the compost."

In response to this comment, the Secretary has amended specific condition a.9. by including the following: "It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment."

In response to this comment, the Secretary has amended finding c.9. by including the following: "Within four weeks after a treatment, it is anticipated that all treated Eurasian watermilfoil will be controlled and no longer present within a treatment area. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment to avoid any potential contamination of compost."

Comment E-6: The dead milfoil cannot be composted. How is something "safe" if the resulting product is too toxic to compost? What will be done with the muck? How will it be safely removed so as to remove all remains of the chemical from the lake and downstream locations?

Response E-6: See responses B-16 and E-5.

Comment E-7: We have never felt that the milfoil ruined our experience of the lake. We enjoy the natural beauty and peacefulness. As avid gardeners, we have learned that herbicides provide only temporary relief from weeds. We think that ProcellaCOR application will lead to a futile and endless cycle of herbicide dependence. Vermont is very reliant on its tourist economy and enjoys a strong reputation for its healthy, natural environment. Chemical treatment of Lake Iroquois would damage that reputation in the public eye. Milfoil has never affected my enjoyment of the lake; if I wanted sparkling clear waters, I would go to a chlorinated swimming pool! To me, there is no public benefit to the application of herbicide. The herbicide would provide a temporary solution, at best, to a nuisance weed in an otherwise healthy, thriving lake ecosystem. Please deny this permit because it does not satisfy the requirement of Public Benefit.

Response E-7: See response E-1.

Comment E-8: Vermont prides itself on our outdoor tourism industry and pays a lot of money to maintain hiking trails and conserve land. Vermont needs to also maintain public waterways and keep them safe and open to the public. Vermont is currently spending a lot of federal and state money to clean up Lake Champlain, thank you! The coronavirus has had a major impact on our tourism and now more than ever it's important to keep our waterways healthy and open to the public.

Response E-8: The Secretary acknowledges this comment.

Comment E-9: The LIRD beach has suffered financially due to the Milfoil in and around the beach swimming area. The swimming area is currently small due to Milfoil growing increasingly closer to shore. The smell from the Milfoil in July and August is almost unbearable and has discouraged visitors coming to the beach.

Response E-9: See response E-1.

Comment E-10: The Lake Iroquois Association (LIA) does not represent this community. An overwhelming number of people on the lake and throughout the surrounding towns do not support this plan. Lake Iroquois is a Public Resource. It is not a private lake. One of the requirements for approval is that "there is a public benefit to be achieved from the application of a pesticide", but not everyone is in favor of herbicide. On the basis of the ethical principle of justice, or the obligation to be fair to all people, it would therefore be unethical for the DEC to approve the application. Such a decision affects all of us, not just those in favor of the herbicide, because we all

share in this beautiful, natural resource. There is no such thing as zero risk in anything we do. Therefore, the DEC must make its decision according to the highest standards of safety and respect for the environment and the community. Yet, unlike the communities of other Vermont lakes to which ProcellaCOR has been applied, much of the Lake Iroquois community does not support this permit application. Apparently, this was not the case for the 4 lakes that have used ProcellaCOR, where we have been told there have been "no complaints", implying full community support. But the Lake Iroquois community is different, and we need to recognize that.

I suggest that the DEC would be on safer moral ground if they knew that our community had achieved consensus on the role of herbicide in milfoil control. Building consensus is not an easy a process, but it is the only way we can find a solution that will respect the wishes of both sides of this debate. Building consensus means laying the issues on the table, and then working together to find solutions that we can live with, even if they are not perfect. Opponents of using herbicide were waiting to see the details of the proposal before evaluating it. Now that we have seen it, we have a lot of concerns. The community needs a plan to build consensus, which will require negotiation and compromise, and possibly even mediation, to find a solution that works for everyone.

Unfortunately, it is a State of Vermont process that allows private citizens to petition the state to apply herbicide in state-owned, public lakes, without any requirement for professional, scientific evaluation or oversight. This seems wrong. While I understand this is not the purview of the DEC, I appeal to the DEC to understand the big picture and how this one applicant (the LIA and LIRD) is not speaking on behalf of the entire community. For a publicly owned, natural resource, it would be morally wrong for the DEC to approve the application of a toxic chemical to a body of water used by the public, many of whom would not otherwise have chosen to apply the herbicide. In other words, if they wanted to enjoy the lake like everyone else, they would be forced to be exposed to a chemical against their will. Would the DEC rather approve the permit, and have something go wrong, all the while not having full community support, or deny the permit, which will allow more time for consensus building and more time to observe whether ProcellaCOR is truly safe and effective in the lakes where it has been applied?

This permit for ProcellaCOR should be denied, because there are so many concerns. Building consensus among our community is the only way for a program of milfoil eradication to be successful. I urge the DEC to deny the permit application.

Response E-10: To determine whether there is a public benefit to be achieved from the application of a pesticide, the Secretary considered the following criteria:

- Whether carrying out the control activity produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
- Whether the potential cumulative impacts from carrying out the control activity adversely affect the water resource and the public that utilizes that resource.
- Whether measures to reduce impacts on the water resource have been taken.
- Whether the control activity is excessive for the stated purpose.

Public opinion or whether there is consensus on a proposed project is beyond the scope of review under Aquatic Nuisance Control. Applications are reviewed based on the technical statutory criteria identified under 10 V.S.A. § 1455(d). There are no requirements that could limit who can apply for these permits. While the permit allows the permittee to move forward with implementing the project as permitted, the permittee also has the option to not pursue to the project entirely. The permitting process and resulting permit identifies how the permittee can implement the project, not whether they should implement the project. As such, the Secretary neither encourages nor discourages the permittee from pursuing this project.

Based upon review of the public good criteria, the Secretary has determined that the tangible benefits to the public good outweigh the potential negative impacts. The Secretary finds that there is a public benefit to be achieved from the application of a pesticide.

Comment E-11: Futility of Treatment – The applicants claim that milfoil is crowding out native species of plants and making it difficult to boat on the lake. It is one thing to identify a problem; it is another to find a solution that actually works. Milfoil has proliferated on Lake Iroquois, as it has throughout Vermont. But there is no evidence that chemical herbicides actually bring back native plants. ProcellaCOR will never lead to eradication of milfoil in Lake Iroquois. Vermont Fish and Wildlife states: "Despite a variety of treatment methods, Eurasian watermilfoil is nearly impossible to eradicate once it has invaded." (https://vtfishandwildlife.com/learn-more/landowner-resources/liep-invasive-species-program/aquatic-invasive-plants/eurasian-watermilfoil). There is no evidence that killing milfoil at the north end of Lake Iroquois will actually cause new native plants to grow back. Herbicide use has been tied to decreased biodiversity: "pesticide exposure has resulted in decreased biodiversity, toxicity to certain algae and diatoms resulting in harmful algal blooms, and alterations in ecosystem food webs, such as increases in heterotrophic activity." (Crit Rev Toxicol. 2015 Nov; 45(10): 813–836) Milfoil itself, an aggressive and opportunistic species, will quickly grow back to fill the niche emptied by ProcellaCOR. ProcellaCOR breeds resistance. Furthermore, Lake Iroquois remains open to boats traveling in from other lakes, carrying milfoil fragments, and to boats traveling within the lake, carrying fragments back from untreated areas. These fragments, along with herbicide-resistant plants, will soon repopulate the chemically-cleared area. Experience shows that Vermont lakes, struggling for decades to eradicate milfoil, have not achieved long-term success despite repeated efforts. These lakes end up back where they started, working to eradicate milfoil time and time again. Consequently, any short-term improvements in boating conditions will be temporary. There is no public benefit from a temporary measure that is doomed to fail.

Response E-11: To manage potential resistance to ProcellaCOR, the permit requires (condition a.5.): "The same treatment location shall not be targeted with the same authorized pesticide for more than two consecutive years.

Also, see responses E-1 and E-2.

Comment E-12: I also note that after treatment, the lake water cannot be used to water vegetable gardens includes carrots and other broadleaf plants. If approved, the applicant should also have to provide water for gardens as well as drinking.

Response E-12: Impacts on the public that utilize the water resource are anticipated to be temporary and minor as it is expected that ProcellaCOR® EC will dissipate rapidly to a reduced concentration in Lake Iroquois and waters downstream due to its rapid photolysis and aerobic aquatic metabolism. As demonstrated in ProcellaCOR concentration sampling conducted in other waterbodies within Vermont in 2019 and 2020, ProcellaCOR concentrations are typically reduced to a non-detectable level within two days post treatment, meaning that potential impacts to the use of waters treated with ProcellaCOR are minor and temporary.

In addition, the permittee is required to implement treatment concentration monitoring as identified under specific condition a.8., which requires results from this monitoring to be publicly posted 24 hours of the permittee receives the results.

Comment E-13: While the milfoil is certainly a serious issue that needs to be addressed, I believe that the use of herbicides will not only deeply impact the health of the lake, it will have a long term negative effect on the lake's tourism from both our local citizens and guests from outside the area who enjoy this lake and community. Ultimately, the decision to use herbicides would effect the local lake economy and the lake owners who depend upon vacationers to support the cost to own these homes and it will not solve the issue. I'm concerned about the health of my guests and the potential liability and ask the DEC the following questions:

1. Do I disclose to my guests that herbicides will be or were used in the lake and they may not be able to swim during their vacation or can swim but at their own risk?

2. Do I have guests sign a waiver that I am not liable if they are personally sensitive to chemicals and I'm not responsible for their health and safety if they or their pet becomes ill?

3. How do I explain to a guest that they can't swim in the lake on a particular day while they are renting?

4. How do I get compensated if a guest cancels and demands their money back due to the information of herbicide use or potential application of the herbicide prior to or during their visit

The water quality in Lake Iroquois is very good. Herbicide use will impact that water quality. In a visitor's mind, a proliferation of weeds is not the same as poor water quality. Killing weeds, with the use of herbicides will not enhance the water quality, it will negatively impact water quality, both because of the addition of nutrients into the water, and also because of the chemicals themselves. I urge the DEC to not approve this permit and for the state, local communities and lake owners to create a path to non-toxic, sustainable methods to control this invasive species.

Response E-13: Specific condition a.7.A.viii., which relates to the public informational notification that the permittee is responsible for posting at least 30-days in advance of the scheduled treatment date, states: "A statement informing all property owners that if their property is leased, rented, or used at any time during treatment and/or while the use advisories are in effect, the property owner is responsible for informing all transient users."

The public informational notification is to be physically posted around the lake as well as being posted online. The notification needs to contain the water use advisories and recommendation, which states that (specific condition a.9.): "On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment. Additional advisories and recommendations related to irrigation and the use of treated waters that are listed under the following sections of the ProcellaCOR® EC Specimen Label shall be posted to the webpage as required under a.7. of this permit: *Use Precautions*, *Use Restrictions*, *Application to Waters Used for Irrigation on Turf and Landscape Vegetation*, *Residential and other Non-Agricultural Irrigation*, and *TABLE 1: Non-agricultural irrigation following in-water application*."

Potential economic impacts from treatment of or from not treating a waterbody with an herbicide are beyond the scope of review under Aquatic Nuisance Control Permitting.

Also, see response E-2.

Comment E-14: The use of ProcellaCOR is a risk to private drinking water supply systems, such as water being pulled directly from the lake or water coming from a well nearby.

Response E-14: There is no restriction to drinking water as identified on the SePRO ProcellaCOR® EC Specimen Label from waters treated with the pesticide. However, to minimize unnecessary pesticide exposure to the public, on the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. The permittee will supply potable water upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink on the day of treatment.

As stated in a letter to the Vermont Department of Environmental Conservation's Lakes and Ponds Program from the Vermont Department of Health's State toxicologist on March 17, 2020:

"The EPA label for ProcellaCOR does not include any restrictions on use of the treated water for domestic (including drinking and cooking) or recreational use. The proposed treatments at the four sites would result in a maximum floryrauxifen-benzyl concentration of 7.72 ppb, or ~4 PDUs. The EPA label allows use of up to 25 PDUs, which corresponds to roughly 50 ppb. While EPA identified no adverse impacts in animals across the required toxicology studies, Health selected a point of departure of 300 mg/kg/day and derived a chronic oral reference

dose of 3 mg/kg/day. Use of this chronic oral reference dose in Health's standard drinking water equations, assuming daily exposure to a 0-1 year old, gives a drinking water health advisory of 3,429 ppb. The drinking water health advisory for florpyrauxifen-benzyl is over 400 times higher than the highest proposed concentration in the treated areas, and over 60 times higher than the highest use amount allowed on the EPA label. Thus, the proposed treatments of the four lakes with ProcellaCOR are expected to result in negligible risk to public health. Based on a review of the confidential statement of formulation, it is reasonable to conclude that human exposure to the inert compounds contained in ProcellaCOR at the concentrations that would result under the conditions proposed by the applicants, is not likely to result in an increase in the level of concern for public health."

The Secretary concluded that carrying out the proposed project would result in a negligible risk to public health and have no undue adverse effect upon the public good.

As identified in the Washington State Department of Ecology's 2017 evaluation of ProcellaCOR, which is found in the Approved Application, section 4.3.3.2 states:

"Few studies have yet been completed for groundwater, but based on known environmental properties concerning mobility, solubility, and persistence, Procellacor™ is not expected to be associated with potential environmental impacts or problems in groundwater.

In laboratory aquatic ecotoxicity studies, the highest concentration of TGAI that could be dissolved in the test water (or functional solubility) was approximately 40-60 µg/L in freshwater and 20-40 µg/L in saltwater. This is due to the low water solubility of the active ingredient and limits the range for which these toxicity tests can be conducted. This finding suggests that the water chemistry of Procellacor™ would limit potential environmental impacts to groundwater or surface water.

Impacts to public water supplies are expected to be low to negligible based on the low solubility, low persistence, and low acute and chronic toxicity of Procellacor™. Section 4.3.4 discusses possible measures or best management practices (BMPs) that could be used to further reduce potential impacts to public water supplies. The Ecology permit has mitigation that requires permittees to obtain an approval letter for this treatment prior to obtaining coverage under the permit."

Also, see response E-12. Based on this information, it is not anticipated that ProcellaCOR will significantly interact with groundwater and that impacts on the public that utilize the water resource as a private drinking water supply are anticipated to be temporary and minor.

Comment E-15: Any level of risk must be outweighed by benefit, otherwise there is no justification to accept any level of risk. The benefit of applying the herbicide does not outweigh the risk. According to the LIA, ProcellaCOR was "incredibly successful" in the 4 Vermont lakes in which it has been applied. But this success, as far as I can tell has only been measured by the degree to which milfoil has been reduced. I have heard nothing about it being successful in restoring the natural habitat or native species in those lakes, and nothing about the general water quality. Likewise, nothing was mentioned about the effects of the herbicide on other plant species and on other animal species, including birds, fish, amphibians and reptiles. It is notable that the Safety Data Sheets repeatedly use phrases like "practically non-toxic" and "slightly toxic" to fish, birds and invertebrates; that means there is some toxicity! The proponents of the herbicide see it as eradicating a dangerous and invasive species. I just don't see it that way; the milfoil is no doubt a nuisance, but it is not dangerous. Natural life is thriving on Lake Iroquois (in number of plant species, water quality and variety of habitat types), despite an increase in milfoil proliferation, based on Darrin Fresh Water Institute Sept 2019 survey. Therefore, the benefit is unclear, and yet the potential risks are real.

Response E-15: See responses B-1, E-1, and E-2.

Comment E-16: Who is "the public" and how do they benefit? The voice of the applicant should not be mistaken as speaking for the public, the community. The few people on the boards of LIA and LIRD have chosen this path. After submitting the application, LIA has acknowledged that this is a divisive issue and yet LIA did not actively seek to include the community in discussions earlier. During this comment period some have spoken in favor. Still, many lake area homeowners and others who frequent the lake do not favor this path and had no input before the application was submitted. How can one deem the use of ProcellaCOR to be a public benefit if the community does not consider itself benefitted? The permit applicants cannot be seen to represent the community or to decide for everyone on this issue which affects all.

Response E-16: For the purposes of the public good finding, the public is broadly viewed through the lens of public good uses (e.g., boating, fishing, swimming) and members of the public that may interact with the water resource. Any person or entity (e.g., Lake Association, municipality, organization) may apply for an Aquatic Nuisance Control Permit.

Also, see responses E-1 and E-10.

Comment E-17: To put herbicides in peoples drinking water simply to have a more enjoyable time recreating on the water is the height of disrespect to the community. The reason to put herbicides in the water (so that a few, privileged people have an easier time handling their boats) does not outweigh the reasons not to (to protect the health and safety of all people who source water from the lake's watershed, including those who do not have the luxury of that kind of recreation). Please do not let the recreational desires of a vocal, heavily privileged few outweigh the health concerns of the general public. We want a healthy Lake Iroquois with natural milfoil management.

Response E-17: See responses A-1, C-1, E-1, E-10, E-12, and E-14.

Comment E-18: Another issue that may arise is toxic algae, killing too much milfoil will lead to less oxygen being produced in the lake and a surplus of phosphorus leading to perfect conditions for blue-green algae blooms to form. Which could affect overall recreation uses in the lake.

Response E-18: Finding c.9. of the permit identifies that: “Treating dense populations of Eurasian watermilfoil with ProcellaCOR® EC (a spot treatment herbicide with relatively short exposure times) will rapidly increase the biological oxygen demand as the Eurasian watermilfoil decomposes, which may deplete concentrations of dissolved oxygen and result in anoxia. Anoxia has the potential to result in a die-off of aquatic animals, which if that were to happen, it would negatively impact the water resource and potentially impact how the public utilize that resource. To reduce this potential impact, treatment locations within the littoral zone will be limited so that no more than 40% of the littoral zone is targeted annually for aquatic plant management activities.”

Also, see response E-2.

Comment E-19: The chemical will travel downstream from Lake Iroquois, perhaps affecting groundwater and certainly Sunset Lake, and perhaps even Lake Champlain.

Response E-19: Finding c.6. identifies that: “It is anticipated that reduced concentrations of ProcellaCOR® EC will flow downstream until complete breakdown of the pesticide occurs” and “It is not anticipated that the non-target aquatic plants and animals within Lake Iroquois, the waters downstream of Lake Iroquois (Lower Pond), or the wetlands will be adversely impacted by applying ProcellaCOR® EC in accordance with this permit and the Approved Application.”

Also, see response E-14.

Comment E-20: The LIA says they will provide sufficient water to those affected by the application of the herbicide. However, the plan does not delineate how much water they will supply or for how long or how much that is going to cost. At the recent Selectboard hearing, the LIA representatives stated that they did not put those costs into their budget as they do not know how much that is going to cost. Are they going to supply water only on the day of the application?

LIA touts a one day half life, but the MSDS sheet for the chemical itself states a 1.3 day half life in the best possible circumstance given water temperature and acidity of the water at time of application. A half life of 111 days is the next possibility with a slightly different ph level and a water temperature remaining at 77 degrees Fahrenheit. (That is pretty warm for Lake Iroquois!) What if the water temperature or Ph levels for the lake at time of application are not the optimal level? Will water be supplied for 111days which is the only other half life data point available for this herbicide? Are they going to supply water only to people who live on the lake or those affected by the downstream run off of the herbicide into their drinking water too? Are they going to supply water for people's pets? Are they going to supply water for people's gardens?

Response E-20: While there are no drinking water restrictions, as a means to minimize unnecessary pesticide exposure to the public, specific condition a.10. states: "On the day of treatment, the permittee shall supply potable water upon request to those who depend upon the treated waterbody or its outlet stream for up to one mile downstream for domestic use to prepare food or drink." It is the responsibility of the permittee to satisfy this condition.

Regarding water use, the SePRO ProcellaCOR® EC Specimen Label identifies that treated waters should not be used for hydroponic farming, irrigation (except as described in the application to *Water Used for Irrigation on Turf and Landscape Vegetation* section), or greenhouse or nursery irrigation.

Also, see responses B-16, C-8, and E-12.

Comment E-21: LIA's Five Year Eurasian Watermilfoil Management Plan (Plan) is incomplete because it does not make provisions to safely dispose of herbicide-treated milfoil.

ProcellaCOR EC is manufactured by SePRO Corp. and the manufacturer's product specimen label can be found at: https://www.sepro.com/Documents/ProcellaCOR_EC--Label.pdf

The label section titled "Use Restrictions" clearly states "Do not compost any plant material from treated area".

Currently, lakeside residents have to manage dead aquatic vegetation which washes up on their shores, and one common action is to compost this vegetation on site. South end residents are more heavily impacted as the lake water runs north to south towards the dam. It may be expected that a large percentage of the killed milfoil will drop to the bottom and decompose. However, with a 40 acre treatment area supposedly filled top to bottom with milfoil, a large amount of treated dead plant material may still find its way to residents' shores.

During the public hearing we learned that the milfoil will die over a 3-6 week period. During these weeks the milfoil will be "growing itself to death", creating more (but non-viable) plant material. Concurrently, motorboats will be in use on the lake. Without any new motorboat curtailments, these boats will continue to chop up milfoil, where it will then either sink, or wash up on shore.

I am very much concerned about what happens next because LIA's Plan does not account for dead plant material collection and proper/safe disposal.

LIA has no accommodations in their Plan to test if any contaminated milfoil is being washed up on shore. Lakeshore residents will be unable to differentiate between herbicide-treated and untreated milfoil. The herbicide manufacturer explicitly prohibits composting the treated milfoil. So, to comply with the manufacturer, lakeshore residents will have to manage all dead milfoil as herbicide-treated milfoil. It will fall on lakeside residents to rake, collect, and transport this milfoil elsewhere.

So, I contacted the Chittenden Solid Waste District (CSWD).

CSWD replied that they "absolutely need to avoid receiving any herbicide-treated material at our facility". CSWD goes on to reference the permit application where the applicant/permit preparer states that "most of the milfoil will fall to the bottom". But, what about that material that doesn't?

CSWD did not answer the direct question about what residents should DO with this material. Again, residents will not know if their dead milfoil is treated or not. Should this material be landfilled? Should it be dropped off at the hazardous waste facility? The current LIA Plan burdens lakeside residents with these problems, and potential disposal expenses. I could try to hunt this down further; but, this should not be my job. This responsibility rests with LIA, and their Plan. Simply stating that the dead milfoil falls to the bottom is NOT a Plan.

To further complicate this situation, the manufacturer does not state how long to wait before the dead plant material can once again be used for compost. Again, the Plan needs to give specific guidance. Leaving the composting prohibition open-ended is NOT a Plan.

LIA's Five Year Eurasian Watermilfoil Management Plan is incomplete because it does not address or make provisions for safe disposal of herbicide-treated milfoil. Additionally, the Plan does not provide guidance on when dead plant material should once again be deemed safe.

Response E-21: See responses B-4 and E-5.

Comment E-22: LIA's Five Year Eurasian Watermilfoil (EWM) Management Plan (Plan) does not provide a lasting public benefit because EWM will grow back. Further, as herbicide application leads to herbicide-resistant EWM strains there is a possibility that the lake may be left in a degraded condition after the Plan is implemented.

ProcellaCOR EC is manufactured by SePRO Corp. and the manufacturer's product specimen label can be found at: https://www.sepro.com/Documents/ProcellaCOR_EC--Label.pdf

The label section titled "Resistance Management" states "Weed populations may contain or develop biotypes that are resistant to ProcellaCOR EC and other Group 4 herbicides" and "… do not use ProcellaCOR EC alone in the same treatment area for submersed and emergent plant control for more than 2 consecutive years unless used in combination or rotated with an herbicide with an alternate mode of action."

LIA's Plan includes herbicide application for 2 consecutive years, the maximum allowed by the manufacturer. Then what? The EWM will grow back. And it will grow back essentially unchecked because LIA's track record of implementing alternative, natural controls have been limited to a handful of acres per year. The VT Fish & Wildlife webpage on Aquatic Invasive Plants/EWM states "Despite a variety of treatment methods, Eurasian watermilfoil is nearly impossible to eradicate once it has invaded." and "Due to the high costs and continuous effort required, the best management option for milfoil is spread prevention." Please note that VT Fish & Wildlife does not identify herbicide as the best management option.

After 2 years, it is possible that the population of EWM in Lake Iroquois will have herbicide-resistant strains. If so, the ProcellaCOR EC manufacturer recommends using a different class of herbicide. However, there is no safe "Plan B" herbicide for this scenario. Not only will the lake have EWM regrowth, but also selected strains of EWM may become resistant to the only herbicide even under consideration.

The LIA Plan needs to exhibit a public benefit, but the term "public benefit" is not explicitly defined. We can imagine many examples of public benefit: safe drinking water, good quality swimming/boating conditions, good quality fish habitat, healthy fish/bird/turtle/amphibian populations, abundant native plants, natural self-regulating ecosystem stability, etc. Public benefit can be defined at a high level as "a material positive impact on society and the environment, taken as a whole…" It is important to recognize that the swimming benefit may be utilized only 4 months of the year (1/3 of the year) and boating perhaps slightly longer. The other components of public benefit are enjoyed year-round. Perhaps they deserve a weightier consideration.

LIA's Plan is deficient because it provides only a temporary reduction in EWM (at high expense and risk), plus over the longer term this Plan may actually degrade the lake if herbicide resistant EWM strains develop.

Response E-22: See responses B-1, C-1, D-1, E-1, E-2, and E-11.

Comment E-23: If ProcellaCOR were used in the lake, who will be responsible for removing the drifting milfoil in the south (and elsewhere?). Where will they take it?

The product specification sheet clearly states that treated vegetation cannot be composted. During the recent public comment forum, Kara Sliwoski, District Manager for the Co-Permittee, Solitude Lake Management, explained that the chemical binds with plant cell receptors and takes about 3-6 weeks to impact the milfoil. The pesticide then lingers in the plant material for an extended period. Therefore, the treated vegetation will be suspended in the water for some time, a target for motorboat propellers as before treatment. But the chopped bits now cannot be managed by residents. We cannot know what is infected with the chemical and what not. We cannot risk putting it on our compost. The permittees must take responsibility and action.

Similarly, the co-permittee said that the chemical does not persist in sediment. What happens to the affected vegetation during and after the 3-6 week period? If it sinks to the lake bottom, a heavily infested area would have a large amount of degraded matter, perhaps covering the sediment, perhaps stirred into a muddy mix if disturbed.

The permittee should be required to collect dead milfoil that drifts to the south end of the lake.

Response E-23: Eurasian watermilfoil treated with ProcellaCOR is anticipated to break apart entirely within four weeks after a treatment; therefore, the Secretary is not requiring the permittee to attempt to collect treated Eurasian watermilfoil after a treatment.

Also, see responses B-4 and E-5.

Comment E-24: The applicant is not the public. LIA as Applicant does not necessarily represent the public or its benefit:

We offer this information to illustrate that, as pesticide applicant, LIA should not be perceived as speaking for the public at large or for the Lake Iroquois community. Is something a "public benefit" if the "public" is not in favor of it? We value the many good works of LIA indeed but take strong issue with a notion that this permit application represents the public or its will. In making your decision on the permit, this is an important consideration.

Again, this information is offered to illustrate that the applicant's request does not necessarily represent the opinion of the community, the Public, and will not provide a benefit.

Response E-24: Any person or entity (e.g., Lake Association, municipality, organization) may apply for an Aquatic Nuisance Control Permit.

Also, see responses E-1 and E-10.

Comment E-25: In 2 separate select board meetings, The LIRD said that they were requesting the permit because of decreased use of the beach. They did not cite any numbers or facts surrounding this. I am wondering if they have done a use study to see if the decrease is correlation vs. causation. VT has one of the oldest populations in the country, 4th in the nation. Could it be that the reason the use of the beach has decreased is not, as the LIRD suggests, the milfoil but actually that there are fewer young people to go to the beach? If a use study were completed, would it, in fact, show that people are still coming to the area to see the nesting loons and other birds? That more people are coming to fish than to swim? What are the different uses of the lake, and would this chemical negatively impact those activities? I know in the winter I see very few people on the lake other than those who are fishing. Would treating the lake be detrimental for the other uses and users? Would it negatively

impact those who use the lake for the rest of the year and not just in the summer? (i.e., ice fishing and naturalists).

Response E-25: See responses E-1, E-2, E-5, E-12, E-13, and E-14.

F. Other Comments *(general comments and questions which are outside of our scope of review)*

Comment F-1: Comments in support and opposed to the project were received.

Response F-1: The Secretary acknowledges these comments.

Comment F-2: We have had an impact on Lake Iroquois by introducing this invasive. It is our responsibility to take action to correct it.

Response F-2: Invasive species are one of the ten major stressors on Vermont's surface waters as identified in the Watershed Management Division's Surface Water Management Strategy: https://dec.vermont.gov/sites/dec/files/documents/wsmd_swms_StressorPlan_Aquatic_Invasive_Species.pdf

The Secretary acknowledges this comment.

Comment F-3: ProcellaCOR is a new chemical (2018 approval) and was approved by a substantially weakened EPA under the current administration. I do not believe there has been sufficient time for adequate testing of potential long term safety consequences of ProcellaCOR or of the byproducts from breakdown of ProcellaCOR. I also note a discrepancy between the manufacturers label / MSDS and statements in the permit / application regarding biodegradability. While the permit/application refers to low half life and ease of biodegradability the manufacturers label refers to biodegradability as low. In addition I would caution that short half life does not necessarily mean safety, as it depends on what the degradation products are. One potential byproduct is listed as hydrogen fluoride (HF) -- especially troubling because of the ability of HF to penetrate the skin and cause damage to bones.

Response F-3: The following is a response from the co-permittee and SePRO (the manufacturer of ProcellaCOR): "The major degradates of florpyrauxifen-benzyl are florpyrauxifen-acid, XDE-848 benzyl-hydroxy, and XDE-848 hydroxy-acid. Our FasTEST method reports the acid form along with ProcellaCOR itself, and we've only seen limited instances of measurable acid form in all of the different northeast to date (~100 waterbodies). As a general indicator of activity, the EPA's Environmental Fate and Ecological Risk Assessment for florpyrauxifen-benzyl looked at toxicity for the three different breakdown compounds to non-target vascular aquatic plants using EWM as one reference plant. Compared to ProcellaCOR (florpyrauxifen-benzyl), EPA concluded:

...the relative toxicity of the transformation products on SAVs:

- *florpyrauxifen-acid was 30x less toxic*
- *the benzyl-hydroxy was 1,700x less toxic*
- *the hydroxy-acid was 11,400x less toxic*

EPA also concluded that '*Degradates are not expected to cause any human health adverse effects and the EPA does not have any hazard concern for metabolites and/or degradates of florpyrauxifen-benzyl that may be found in food or drinking water.*'

In addition to that information supporting negligible risk of the metabolites, our formal aquatic field dissipation studies submitted to EPA (MRID 49677722 - 50 ppb a.i. static (i.e., whole pond) applications) showed only minor detections of the hydroxy acid metabolite (2.6 - 6.6% of applied a.i.) that peaked at 2 weeks after application, and the hydroxy acid was completely undetectable (<<<1 ppb) by 3 – 4 months post application. The hydroxy-benzyl metabolite showed detections levels of 0.2 - 1.5% of applied a.i. that peaked at 2 weeks after application

and this compound was completely undetectable (<<<1 ppb) by 6 weeks – 2 months post application. In summary, our official aquatic field dissipation studies show these compounds appear only at very low levels and are not persistent. With ProcellaCOR EC use rates <10 ppb a.i. (5 or less PDU per acre-foot) in spot/partial site applications for EWM in VT where significant dilution would also occur compared to our static dissipation work, levels of the two additional compounds here would be negligible under almost all scenarios."

Comment F-4: Although approved by the EPA under FIFRA in 2017, I note that the chemical has never been subjected to long-term study, both low biodegradability and high potential for bioaccumulation of ProcellaCOR's fluorine compounds in the studies referenced in the application and permit are of particular concern. I believe that several more years of study are warranted before application in a body of water as critical to habitat and human uses as Lake Iroquois.

Response F-4: The following is a response from the co-permittee and SePRO (the manufacturer of ProcellaCOR): "ProcellaCOR EC has been studied and developed for several years prior to EPA registration in 2018. It has since been deployed for milfoil control in valuable water resources such as Lake Winnipesaukee (NH), Minerva Lake (Adirondack Park, NY), Lake St. Catherine (VT), etc.

The following excerpt is taken from Connecticut's Dept of Health Review, half-life is very fast when exposed to sunlight and will not accumulate in sediments.

ENVIRONMENTAL FATE AND PERSISTANCE

Water Column:
Procellacor has a low water solubility (about 15 µg/L) and is rapidly hydrolyzed in surface water with a half-life of 1.3 days at pH 9. When exposed to direct sunlight, the photolytic half-life approximately 0.1 days.

Soils and Sediments:
Procellacor log Koc values are approximately 5.4 to 5.5, indicating that the compound will bind to organic carbon of soils with high affinity. The compound degrades in aerobic soil with half-lives ranging from 2.5 to 34 days. Anaerobic soil metabolism rates are similar to the aerobic rates. The parent compound is thus not expected to accumulate in the sediments of treated lakes.

"

Comment F-5: Another concern related to risk is the appropriateness of using ProcellaCOR in Lake Iroquois. According to the Specimen Label and EPA approval, ProcellaCOR is to be used in "slow-moving/quiescent waters with little or no continuous outflow". In fact, it is a violation of federal law not to use it according to the product label. A 1985 Lake Iroquois Diagnostic Feasibility study measured the mean surface outflow at up to almost 700 x 104 m3 per year. This translates into approximately 5 million gallons per day! I am not sure what the official definition of "slow-moving/quiescent" is, but the DEC must confirm that ProcellaCOR is appropriate for Lake Iroquois given this EPA restriction. I imagine that the flowing water effect is significant for at least two reasons: 1) it allows dilution of the herbicide, thereby making it ineffective, or requiring higher concentrations to work; and 2) it allows flow of the herbicide out of the target area and into other non-target and potentially vulnerable areas. I expect that the DEC has confirmed that the use of ProcellaCOR in Lake Iroquois is not violating this requirement.

Response F-5: The following is a response from the co-permittee and SePRO (the manufacturer of ProcellaCOR): "Lake Iroquois is approximately 230 acres and 20 ft average depth, which means it contains about 4,600 acre-ft of water. If the outflow is 5 million gallons per day (15.34 acre-ft), then that means the waterbody turns over once every 300 days. ProcellaCOR EC only requires hours of exposure time on milfoil to achieve complete control, and therefore flow is not a factor that would impact treatment efficacy at Lake Iroquois."

Comment F-6: Label Use Restrictions also include "Do not apply to salt/brackish water''. Brackish water means one of two water types, one is fresh water. The Label makes no reference to salinity. Lake Iroquois has three culverts feeding into the shallow north end which also happens to be the problem herbicide target area where mixing with deeper lake water does not take place. One culvert is a four foot diameter concrete direct conduit for this brackish (tea colored) water to flood that isolated part of the lake. Not seeing a reason for the restriction the existing water chemistry condition may suggest herbicide treatment for Lake Iroquois would be compromised, especially in the shallow north end littoral.

Response F-6: Brackish water refers to water that has higher salinity than fresh water (< 1 part per thousand), but not as high as salt water (~35 parts per thousand).

Comment F-7: The LIA has not addressed with a line item in the budget how they will make sure that the residents who will be impacted by this will get fresh water. They have not indicated what they will do to mitigate the added expense of having so many plastic bottles of water delivered to so many people who will be impacted this or what they will do to minimize the increased trash and fossil fuel use from this.

Response F-7: Logistics on managing how the permittee will implement this condition is beyond the scope of review under Aquatic Nuisance Control.

Also, see response E-20.

Comment F-8: I do not see any references to use of water for agricultural purposes. I believe there is at least one livestock farm in the 1-mile discharge range.

Response F-8: The SePRO ProcellaCOR® EC Specimen Label contains the following recommended use restriction: "To minimize potential exposure in compost, do not allow livestock to drink treated water."

Condition a.7. requires the permittee to post a public informational notification of the scheduled treatment date 30 days in advance of the treatment to all property owners (including commercial camps) that abut Lake Iroquois, and all property owners that abut the waters receiving effluent up to one mile downstream of Lake Iroquois's outlet by a method that provides proof of notification. The notification must include a summary of the Water Use Advisories & Recommendations (condition a.9.), which states: "On the day of treatment, no use of the treated waterbody and associated outlet stream for up to one mile downstream is recommended for any purpose, including swimming, boating, fishing, irrigation, and all domestic uses. It is recommended to not compost aquatic plant material from the treatment location for up to four weeks after the day of treatment. Additional advisories and recommendations related to irrigation and the use of treated waters that are listed under the following sections of the ProcellaCOR® EC Specimen Label shall be posted to the webpage as required under a.7. of this permit: *Use Precautions*, *Use Restrictions*, *Application to Waters Used for Irrigation on Turf and Landscape Vegetation*, *Residential and other Non-Agricultural Irrigation*, and *TABLE 1: Non-agricultural irrigation following in-water application*."

Comment F-9: There are references to treating only 40% of the littoral area at one application (in order to minimize impact of oxygen depletion and potential for fish suffocation, as well as to provide habitat after removal of Eurasian watermilfoil). Where does the 40% come from? What were original studies based on? Does it matter if the Eurasian watermilfoil treated region is all from one region of a larger water body? (i.e., is it really the 40% that matters or the size of the treated patch that matters...treating small patches that add up to 40% could well have a much different impact than treating one large patch that could effectively kill off that entire area...).

Response F-9: The Department of Environmental Conservation worked in collaboration with the Department of Fish and Wildlife to identify the 40% littoral zone threshold. This threshold was identified using scientific literature on lake management issues and is the Secretary's current best professional judgment to ensure the

project will meet the statutory findings. The Secretary is not aware of any information that would identify that the 40% threshold is inadequate. However, should new scientific literature on lake management or observations of results from a treatment indicate that the threshold is inadequate, or the Secretary can no longer make all applicable findings required by statute, the Secretary can reassess this threshold.

Comment F-10: The people who oppose this treatment will not be swayed by facts or evidence. They have made an emotional decision and have closed their minds. We can see this type of attitude spreading on the internet every day. In the medical science field, we have been fighting the dangerous anti-vaxer movement for decades and are losing ground. Because of this we are seeing resurgences of diseases that had been held in check since the middle of the last century. Climate scientists have been fighting against climate deniers for decades as the climate rapidly heats, destroying habitat. And now in the midst of the Covid crisis we see a rapid evolution of conspiracy theories and denialism that directly contradicts the recommendations of experts in the field who have studied viral diseases for their entire lives. This level of science denialism endangers all of our lives.

Response F-10: The Secretary acknowledges this comment.

Comment F-11: What is most frustrating to me, as an owner of a property on the lake, is that this decision is being held up mainly by people who do not live on the lake, do not use the lake, and, scientific studies show, will never experience any of this chemical in their groundwater. It is based on their irrational fear that all chemicals are dangerous, no matter what the data says. What the board needs to decide is whether the health of the lake, and of our society in a larger sense, is going to be dictated by evidence-based science or irrational fears. While the decision to use ProcellaCOR in Lake Iroquois is not a matter of life or death, our decision to make rational choices based on science and evidence is vital to public policy.

Response F-11: The Secretary acknowledges this comment.

Comment F-12: We sincerely appreciate changes in the permit notification process you have instituted since 2018, when LIA applied for use of the pesticide Sonar. The new requirements allow the public to be better informed of pending issues and to voice themselves, whether in favor or opposed. This is vital and we applaud the changes. We also appreciate the patience and civility with which the voices of all citizens have been heard. Many diverse voices deliberating openly can enhance mutual understanding and bring about better outcome.

Response F-12: The Secretary acknowledges this comment. Effective January 1, 2018, the Department of Environmental Conservation adopted the standardized permit procedure as outlined under 10 V.S.A. Chapter 170.

Comment F-13: Standard Conditions: b. 1., page 4, references Co-Permittee Status. While the draft permit does not list co-permittee(s) the contractor's application includes completed forms for the LIA and the Lake Iroquois Recreation District (LIRD). As a citizen of Hinesburg whose LIRD single member is appointed by the Town of Hinesburg to a currently three member LIRD Commission, I'm uncertain whether the LIRD or its member has authority from the respective townships to be a co-permittee, not having seen a warning of any such kind. The current chair of LIRD is also an officer of LIA. I'm uncertain whether this is permitted under the statute and regulations or is a conflict of interests.

Response F-13: This is beyond the scope of review under Aquatic Nuisance Control Permitting.

Comment F-14: The lack of a formal outline for the Table of Contents and the lack of page numbers specific to titled section(s) also hinders public review, particularly with documents containing as many as 87 and 100 pages

as in the application. The lack of standard format in an application, however, does lend itself to cookie cutter production of multiple permit applications for a single contractor.

Response F-14: The Secretary acknowledges this comment.

Comment F-15: Lake Iroquois has experienced a steady increase in acreage impacted by the aquatic invasive Eurasian Water Milfoil (EWM) (*Myriophyllum spicatum*) since approximately 1992. From an ecological standpoint, I am most concerned with the threat of its spread to other water bodies despite best efforts by the Lake Iroquois Association (LIA) to prevent or mitigate its existence through various means. As my knowledge and understanding of EWM grew over the last two decades, it became apparent that once a waterbody becomes infested, countless time and treasure will be spent trying to contain its spread.

Response F-15: The Secretary acknowledges this comment.

Comment F-16: We have paid both state and local taxes as lake shore property owners and would respectfully ask that you please use some of those funds to protect our property from this invasive plant.

Response F-16: This is beyond the scope of review under Aquatic Nuisance Control Permitting.

Comment F-17: With this ProcellaCOR permit application, the applicants are proposing to shift significantly the way Lake Iroquois will be managed moving forward. Lake Iroquois has, until now, been largely left alone, in its natural state, with no sustained lake-wide management efforts. Now, the applicants propose to begin a long-term continuous cycle of chemical treatment for milfoil management. Experience from other Vermont lakes shows that once begun, these treatments will continue indefinitely. Because of herbicide resistance and continued use of power boats, milfoil will grow back and new chemicals will be employed over time. This will be expensive and labor-intensive, stretching into the future. The Lake Iroquois Association claims it can raise over $200,000 to fund this project over the next five years. In fact, LIA is a small, informal organization that has never raised anywhere close to this amount before. LIA does not have the backing of the community and this fact alone must hamper its ability to raise the funds. DEC does not require Proof of Funds as a condition of the permit. LIA can begin applying herbicide as soon as it has the money for one single application. Does the Lake Iroquois community have both the will and the resources to support this effort long-term? Is there any point beginning the herbicide roller-coaster without assurance that the follow-up maintenance will continue? What happens if LIA raises enough money initially to apply ProcellaCOR, but then fails to raise the funds needed to complete the project? What happens to private fundraising efforts if critical members of the Board suddenly step away, leaving no one with the energy and drive to complete the planned mitigation? There is a substantial risk that funds will dry up and treatments will end, leaving the lake in worse condition than before with no success at controlling milfoil. The enormous amount of money spent on chemical application should instead be spent on improving underlying conditions at the lake – road improvement projects, tributary and shoreline restoration projects, tree planting and improved buffers on the lake. There is no public benefit to be had from siphoning money away from these important ecological projects in order to initiate the never-ending cycle of herbicide application followed by milfoil regrowth.

The budget on pg 11 of the LIA project description on their website includes almost no funds for additional coordinated mitigation efforts against milfoil until year 3, and then only enough money for about 1-2 acres per year of Diver Assisted Suction Harvesting (DASH). This contrasts with approaches of at least one other lake in Vermont that they cite using ProcellaCOR, Lake St. Catherine, which combined the use of ProcellaCOR on 38.1 acres along with the concurrent use of DASH on 65.8 acres https://lakestcatherine.org/Milfoil_Control

The LIA budget does not match the language in their project description about combined mitigation efforts, and suggests that they believe that the herbicide will magically "save" the lake. It will not as resistance to ProcellaCOR will inevitably develop within a few years, necessitating other measures, possibly additional

herbicides. They should begin with a much more robust intervention with sustainable control measures such as DASH before considering herbicides. Cost is not an excuse if their real concern is management of the lake.

In addition, the management plan presented is not a cost-effective solution. The total cost for the LIA Five Year proposal is estimated at $200,000, with $100,000 of that from the herbicide alone. There are no herbicide costs shown in years 3, 4 and 5 and LIA admits that this is because they do not know yet how extensive herbicide treatment might need to be in those years. It is plausible that the costs will be similar to the costs in years 1 and 2. But most importantly, as stated by Bob Hyams, the use of herbicide is essentially a "chemical mowing" that will require reapplication year after year; otherwise the milfoil will just return. And the problem with this approach, besides the costs, is that milfoil can become resistant to ProcellaCOR if it is used repeatedly.

Response F-17: How a project is funded is beyond the scope of review under Aquatic Nuisance Control. However, the permittee is responsible to implement a long-range management plan that incorporates a schedule of pesticide minimization. Failure to implement pesticide minimization measures would result in non-compliance with the permit.

Also, see responses D-1 and E-11.

Comment F-18: The Lake Iroquois Association has said that this herbicide will need to be used continuously, in different areas of the lake each year, to keep the milfoil at bay. This will be a very expensive undertaking.

Response F-18: This is beyond the scope of review under Aquatic Nuisance Control Permitting.

Comment F-19: Why would it be appropriate to introduce a chemical pesticide in a natural water body used by the public to mitigate a nuisance weed?

Response F-19: 10 V.S.A. § 1455 creates the regulatory framework for one to apply to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, within waters of the State.

Comment F-20: Without independent study data to show what the direct and indirect impacts to ecology and humans are over time when this very new chemical control (ProcellaCOR) is applied, it seems irresponsible to move forward with a short-term solution to a long-term problem. History tells us that the true extent and magnitude of herbicide/pesticide impacts on ecosystems and people is often different than what we can predict based on laboratory research, and usually more harmful than initially anticipated.

Response F-20: Based upon the technical data included within the application, the application meets the statutory requirements under 10 V.S.A. § 1455 and shall be approved.

Comment F-21: The lake is not in a state of crisis NOW in terms of the natural communities, and the recreational uses it can support. A slow, cautious approach is required to do no harm while seeking to improve the recreational and environmental value of Lake Iroquois.

Response F-21: The Secretary acknowledges this comment.

Comment F-22: Milfoil is an inconvenience. We'd all rather it wasn't there. A clear cool lake would be ideal for recreation, but that is not what lake Iroquois has ever been. It is a shallow, nutrient filled weedy lake.

Milfoil has been a member of the lake Iroquois aquatic community for years and years. It is there and thriving because something else is out of balance, possibly high nutrient levels from run off and nearby house and camp septic systems (or lack there of). Other species have adapted, and many are thriving as well. The lake Iroquois aquatic community will progress toward equilibrium.

Adding an herbicide may temporarily help with the unpleasantness of a weedy lake. But what problems will the herbicide cause? It will not eradicate Milfoil. To be effective, it will need to be used in perpetuity.

It will destroy the progress that the aquatic community has made toward equilibrium. It will damage other non target species. The United States has always had a problem with identifying the harmful effects of chemicals long after they have been in use, and now we have the worst EPA in 50 years. Will half the population have cancer. Chemicals cause cancer!

Response F-22: See responses B-1, B-2, E-1, and E-2.

Comment F-23: The facts are clear. ProcellaCOR is rapidly taken up by the targeted EWM then degrades below detection in less than two days. It has been shown to be non-toxic to animals (a lethal dose would be greater than 5 grams/Kg, or ¾ of a pound for an adult weighing 150 lbs.). Neither the chemical itself nor its metabolites bioaccumulate. The company that is applying it has vast experience and has never had a complaint with their treatments. It has been used in lakes in Vermont and across the country with great success and no ill effects. If nothing is done about the EWM, it will choke out all life in the lake.

Response F-23: The Secretary acknowledges this comment.

Comment F-24: It seems to me that there needs to be careful monitoring of chemical levels after application to ensure levels fall to what the EPA considers "safe" levels for drinking or irrigation. While the half-life was stated as very short (1.68 hours), the Safety Data Sheets say that biodegradability is “very slow” with a 29-day exposure time in the environment. The half-life is 1.3 days in pH 9 water, but the water in Lake Iroquois was measured at 7.45 by the 1985 Lake Iroquois Diagnostic Feasibility report, corresponding to a half-life of 111 days. There needs to be monitoring for growth of cyanobacteria, and, if it occurs, a plan to deal with it, including providing drinking water to residents during the time of cyanobacteria growth. There needs to be a plan to monitor the effects on other plants and animals to make sure there are no unforeseen toxicities. The application states that “there are rare, threatened or endangered species associated with the waterbody”. But nowhere in the application are these species identified or is monitoring for their safety discussed. A detailed plan should spell out a specific protocol of timing, testing, sampling region, and course of action for untoward findings. And unlike the previous application involving Sonar, the monitoring should take place by an independent body, not the company that applies the herbicide.

Response F-24: Specific condition a.8. relates to monitoring the concentration of ProcellaCOR post treatment and states:

Treatment Concentration Monitoring. Water samples shall be collected at each of the approved monitoring locations (condition a.4.D.) to determine the concentration of florpyrauxifen-benzyl after completion of each treatment. The results shall be submitted to the Secretary within 24 hours of the permittee receiving the results and be posted to the webpage as required under condition a.7. of this permit.

A. Water samples shall be chemically tested 48 hours after completion of each treatment. If samples indicate that florpyrauxifen-benzyl concentrations are greater than 2 parts per billion (ppb), monitoring shall continue after an additional 24-hour period. This monitoring process shall proceed until all monitoring locations are less than or equal to 2 ppb florpyrauxifen-benzyl, or if this process is authorized to be discontinued by the Secretary.

B. The Secretary may require additional monitoring, including additional monitoring locations or the frequency of monitoring, if determined necessary.

C. Samples shall be analyzed using a methodology with a minimum detection limit of at least 1 ppb florpyrauxifen-benzyl.

Specific condition a.12. requires annual aquatic plant surveys to monitor for how aquatic plant populations respond to the treatment, which include the rare aquatic plant species known to occur in Lake Iroquois:

Aquatic Plant Surveys. For each treatment, a quantitative aquatic plant survey shall be conducted pre-treatment during the year of treatment, post treatment during the year of treatment, and the year following the last treatment. All aquatic plant surveys shall be completed using the point-intercept rake-toss methodology or an alternate method approved by the Secretary. All aquatic plant surveys shall include the date the survey was completed, a map depicting the survey points, and a description of all aquatic plant species present at each point and their relative abundance. All survey data shall be reported in a similar format to prior years and include a digital submission of data collected at each point-intercept.

Also, see responses B-1, B-16, E-2, E-14, F-3, and F-4.

Comment F-25: The state is proposing this treatment.

Response F-25: This is incorrect. The applicants for this project (the proponents) are the Lake Iroquois Association, the Lake Iroquois Recreation District, and Solitude Lake Management. The Secretary's (representative of the State) role is to review the proposed project to determine if the findings under 10 V.S.A. § 1455 can be made to issue a permit.

Comment F-26: I started reviewing all of the multi-faceted efforts of the Lake Iroquois Association (LIA) to control the milfoil in the past. The Greeter Program, initiated in 2009, continues to educate boaters about the spread of milfoil and cleans boats to lessen the risk of spreading milfoil from one body of water to another. The problem with this program is that although it provides education and a great service, it's not mandatory. Boaters can decline the offer of boat washing and potentially bring additional aquatic invasive species into the lake.

Response F-26: This is beyond the scope of review under Aquatic Nuisance Control Permitting.

Comment F-27: As a retired professor of chemistry I have long been an advocate of the use of this chemical treatment but I have been willing to give the nonchemical methods a try. My hope is that whatever "chemophobia" might have been associated with chemical treatment will disappear when one considers the success rate of ProcellaCOR treatments in other Vermont lakes and data associated with government approved ProcellaCOR. Of course, use of any chemical reagent should only occur after a satisfactory analysis of "need vs. risk". No one using the lake over the last several years can deny the increasing need. My hope is that several, if not all, of the following risk-addressing items will assuage fears of opponents of the use of ProcellaCOR to improve the overall quality of Lake Iroquois. Here are some reasons I enthusiastically support the LIA's effort to solve the milfoil problem. ProcellaCOR has been approved for use by EPA since 2017 for management of vegetation in freshwater ponds, lakes (etc.) There are minimal restrictions for treated water for swimming or fishing when used according to label directions.

ProcellaCOR has already been used successfully in several Vermont lakes and lakes in other states including Wisconsin and Florida.

ProcellaCOR is considered non-genotoxic and therefore nonmutagenic.

ProcellaCOR's application process has only minimal precautions for the technicians.

ProcellaCOR undergoes light-catalyzed degradation in plants to nontoxic products.

In short, I find ProcellaCOR an exciting potential solution to our lake's milfoil problem. Unlike other Class 4 auxin growth inhibitors which bind both growth regulating sites, ProcellaCOR has remarkable specificity for just one. It is therefore unique in its growth regulation.

Our government agencies (state and national) have already given it a thorough study before approving it for the aforementioned purposes. ProcellaCOR falls well within government guidelines for safe use. EPA data regarding mutagenicity, carcinogenicity, toxicity, and environmental effects on fish and other animal wildlife are available

in its 09/08/2017 publication: Final Registration Decision on the New Active Ingredient Florpyrauxifen-benzyl. Therefore as a retired chemist I enthusiastically support the recommendation of the LIA to address the milfoil problem using ProcellaCOR. It all comes down to risk vs. need. I want to remind everyone that almost all of us write off as “an acceptable amount of CHEMICAL risk” when we:

Pump our own gas.

Drink water treated with fluoride or chlorine

Take prescription (or over the counter) medicines.

Drink a diet soda.

Eat foods that have chemical additives.

Use sunscreen or choose not to use sunscreen.

Consume alcoholic beverages.

Expose ourselves to household cleaning and home improvement chemicals.

Of course, the risks of the preceding examples are far surpassed by the rewards or needs.

Consider the Covid 19 vaccine for a moment. The vaccine will undoubtedly have governmental approval by the appropriate agency (FDA or CDC). Will an aversion to chemical risk keep you from using the vaccine? Or, will government approval make risk acceptable in that situation?

Risks of NOT treating Lake Iroquois with ProcellaCOR are significant. Memories of trying to paddle a kayak or canoe from the beach to the fishing access last summer point to a dismal future for pleasurable navigation and fishing in that end of the lake and elsewhere. Indeed, future milfoil growth without mitigation might result in some portions of the lake becoming swamp or wetlands.

Our personal lake front is not ridden with weeds. However, because I am dismayed by what the milfoil has done to many other parts of the lake and the general quality of the lake I feel compelled to enthusiastically support LIA board’s recommended of ProcellaCOR.

Response F-27: The Secretary acknowledges this comment.

Comment F-28: As we move through this process, we rely on the Vermont Department of Environmental Conservation to be fair and equitable in its review of the Lake Iroquois Association permit. Procellacor has been approved and used successfully in other lakes and reservoirs in Vermont. These other bodies of water have similar characteristics to Lake Iroquois. As citizens of Vermont we trust that our Agencies and Departments use the approved science and technology consistently.

So, in going forward I expect that the Vermont Department of Environmental Conservation will apply the same criteria and objectives to Lake Iroquois that they have used to approve the use of Procellacor in other Vermont bodies of water.

What is most discouraging to me is to, time and again, see the state's experts recommend well-documented solutions that have been successfully & safely used across the country (as well as in other lakes in Vermont) and yet be prevented from applying them by political pressure. How does a state that prides itself on rational, science-based decision-making allow those decisions to be overridden by the unfounded opinions of a few?

Finally, if the Department of Environmental Conservation is responsible "to protect, maintain, enhance and restore the health of Vermont's waterways" how does it conscience the arbitrary application of this solution to only some lakes?

Response F-28: See response F-20.

Comment F-29: I have not seen any flow studies done on what the effect will be on the southern end of the lake to determine if the concentration will be different, given the southern flow of this lake. The guidance from Procellacor is that it not be used on lakes that have an outlet. In LAKE IROQUOIS DIAGNOSTIC -FEASIBILITY STUDY 1982 -1985 the state indicated that millions of gallons of water flow out of Lake Iroquois.

Response F-29: ProcellaCOR® EC (active ingredient florpyrauxifen-benzyl) is expected to dissipate rapidly to a reduced concentration in Lake Iroquois due to its rapid photolysis and aerobic aquatic metabolism. The outlet of Lake Iroquois flows into an unnamed stream that flows into Lower Pond. Due to its rapid degradation, it is anticipated that reduced concentrations will flow downstream until complete breakdown of the pesticide occurs. It has not been determined to be necessary for a flow study to be conducted as findings that are required to be made under 10 V.S.A. § 1455 can currently be made.

Comment F-30: Because ProcellaCOR is new and has just started to be applied to lakes in Vermont I feel that waiting in order to gather data from other lakes that have applied the chemical already is a good idea. I understand the destructive nature of invasives and I am a strong believer in dobbing cut buckthorn stumps with glyphosate because I know when I do that I am not harming plants nearby and I am helping restore the forest. I don't know enough about the chemistry that makes ProcellaCOR so selective and there seems to be various answers as to how quickly it degrades. A chemical in the water is a bit disturbing - how is the chemical not like spraying glyphosate over an entire community?

Response F-30: It has been demonstrated in the application materials and through the use of ProcellaCOR in Vermont in 2019 and 2020 that this herbicide is highly selective for controlling Eurasian watermilfoil while having minimal to no observed direct impacts on non-target species.

Comment F-31: Herbicides provide, at best, a temporary solution to weed control. ProcellaCOR will not be different. The product label says that it breeds resistance. The weeds will come back. Meanwhile, herbicides are known to degrade the natural ecology of lakes and can lead to toxic algae blooms. While we can all agree that milfoil has proliferated in the lake, we have been shown no evidence that killing the milfoil with chemicals will actually increase the native species and improve the overall condition of the lake. Will the chemical application bring back native plants or just lead to more milfoil? Success does not mean killing the milfoil for a season or two. Success means improving the quality of the lake community over time. Lake Iroquois, having seen minimal lake- wide milfoil mitigation over the past decades, is arguably in better shape than other Vermont lakes who have labored extensively to remove milfoil over and over again. The State keeps what is called a Lake Scorecard for every lake in the State. Lake Iroquois still scores “good” despite being “stressed” in terms of water quality standards and “highly disturbed” based on the amount of development around its shores. The four lakes treated last summer with ProcellaCOR do not hold up well by comparison. All four start out with better underlying conditions than Lake Iroquois. They meet water quality standards and are only moderately disturbed in terms of shoreline development. Yet, Lake Morey, Lake St. Catherine and Lake Hortonia all score only “fair” despite having better underlying conditions. The point is, these four lakes, despite all their efforts, are not in better condition as a result. Three out of the four are worse. Now they still have problems with milfoil PLUS all the consequences of constant disturbance. The fact is that herbicides have not saved any of these lakes from milfoil proliferation.

Response F-31: The Secretary acknowledges this comment. Also, see response E-11.

Comment F-32: WE, collectively, built a dam which flooded a marsh north of Hinesburg Pond, creating the current configuration of Lake Iroquois. Our lake now has a shallow shelf on the north end, at a perfect depth for Eurasian watermilfoil. WE have built houses with septic systems right on the shore. WE have farmed, allowing agricultural runoff to contaminate the lake. WE have transported milfoil into our lake. And WE brought in powerboats which stress wildlife, churn up the water, and spread the milfoil.

We might not have understood the consequences of our actions at the time, long ago, but we have learned. So, we have improved these same septic systems, reduced agricultural runoff, upgraded the shoreline, and employed natural measures to control milfoil. And we need to continue.

Through all this, nature has adapted to the changes we forced, to create the present day conditions. There are nesting loons (in our town!), eagles, and shorebirds. Amphibians and fish have prospered. A 2019 plant survey finds hardy native plant populations. We have a beautiful, thriving natural aquatic ecosystem, although sometimes these natural systems can be messy, smelly, or inconvenient. So, while we cannot undo the dam, or the houses, or the introduction of milfoil, we still can honor this existing and stable natural system.

Herbicide application is a dreadful, invasive action sometimes referred to as "chemical mowing". Its specific stated goal is to kill milfoil, but its subsequent effect will be an extensive and unnatural regime change in the lake.

I'm not going to cover details printed on the herbicide manufacturer's datasheet. Instead, at this point,

I'm just wondering - who are WE to want to inject our lake with a chemical herbicide? Or more simply put - Who ARE we?

Are WE a community, a state agency or department, willing to support an expensive chemical application that will knowingly upend a stable, natural environment primarily to enhance propeller boat conditions on the lake?

Are WE shortsighted?

Are WE insensitive to the multitude of organisms and complex processes currently efficiently operating in the lake by choosing to not also consider their wellbeing?

Do WE want to be known later on as those caretakers who "took it up to the next level", by accelerating the development of herbicide-resistant milfoil? as we start the lake down the path of chemical herbicide dependence?

So, who ARE we? Apparently, YOU get to decide.

I sure hope it turns out that WE, this community, this state agency and department, decides that WE together are Responsible Conservation Stewards, and that we oppose the use of chemical herbicides in the lake.

Response F-32: The Secretary acknowledges this comment. Also, see response B-2.

Comment F-33: I'd like everyone here to imagine the economic impacts of these two different paths we could take. Along the path to apply herbicide, this community gives a hundred thousand or several hundred thousands of dollars to a chemical company in Indiana, and an applicator. Compare that to the path we might take to equivalently fund a natural management plan. Here the same amount of money could be paid out locally to people we may know, who live near us or our friends, who buy lunch at our local restaurants, and engage in our local economy. I understand that pulling milfoil is very difficult work, but something tells me in these times there will be people grateful to have this type of employment.

Everyone from the manufacturer, to state agencies, to the public, recognizes that the milfoil will be back, yes, even with the use of herbicide. So, with the long term outcome the same, I encourage you to take the path which minimizes health and environmental risks, and which also strengthens our local economy and community.

All things considered, I believe it is our obligation, our mandate, to work only with non-chemical, natural control measures, as necessary, to conserve the thriving, diverse, and stable natural community of Lake Iroquois.

Response F-33: See responses E-10 and F-20.

Comment F-34: We see many attempts to control the growth of the milfoil. All of the actions are temporary in nature and actually are spreading the growth to other portions of the lake. Some attempts of "harvesting" the

milfoil are counterproductive in the long term. Although the milfoil is temporally removed, it does return. The removal process widely disburses pieces of the milfoil to other parts of the lake and thereby increasing the spread of the plant.

Doing nothing or manually removing the milfoil is not a long-term solution. In the recent past there has been a great deal of push back from environmental groups over the use of ProcellaCOR which ONLY targets EWM. No matter how safe the use of ProcellaCOR EC there is opposition. No viable alternatives are offered by those in state and out of state groups except the continuation of the same manual removal or in doing "nothing." Failure to do nothing is the ultimate failure.

Many people whether camp owners or daily visitors use the lake for summer recreation. Without trying to control the growth and spread of the EWM with ProcellaCOR EC we will relegate our lake to a weed filled puddle unfit for anything! There is enough anecdotal evidence on treated lakes both in the state of Vermont and out of the state of Vermont that will attest to the successful use and safety of this herbicide.

Response F-34: The Secretary acknowledges this comment.

Comment F-35: As an aggressive invasive with no natural controls or predators, EWM poses a severe risk to the ecology of Lake Iroquois. It has already begun to disrupt the lake ecosystem and has the potential to completely transform it. It has become the most dominant plant species in the lake and the data show that the lake is steadily losing native aquatic plant species to the EWM (p. 2 of the permit application; Attachment A: DFWI Plant Survey). All native species will not disappear in a day or even a year. This is a slow moving disaster. While the lake, due to the hard work of the LIA, is showing a significant decline in phosphorus levels and the water is reasonably clear and clean, EWM is inexorably reducing native aquatic flora which will lead to reductions of native aquatic fauna and will eventually result in an utterly transformed ecosystem. This won't happen suddenly. Nevertheless, so long as the EWM continues its expansion, decline is inevitable.

The LIA has presented an integrated pest management plan to control the invasive EWM. It proposes an approach to managing EWM by carefully balancing the use of herbicide in the smallest effective concentration on a small portion of the lake (less than 16% of the total) combined with continuation of the other non-herbicide methods and programs. The LIA plan includes all of the requirements laid out by the state of Vermont for testing and monitoring as well as providing required notifications, and water to households that draw their drinking water from the treated waterbody. Some details are not filled in, such as how many households will require water on the day of application because that date is currently unknown and numbers needing water cannot be collected until the date is known since the majority of residences on the lake are seasonal. In addition, next steps in the plan are conditioned on results of each year's activities and plant surveys. The plan is evidence-based and the data collected each year is used in to formulate appropriate methods in consultation with state agencies and experts. This is a sensible approach to planning this type of project.

While the introduction of any substance into a natural system is of concern, how, when, and in what concentration such a substance is used actually matters. Chlorine when taken internally can kill you, yet you would not drink town water if it was not treated with it nor would you care to swim in a public pool that was not so treated. The concentration matters; how and when and where it is used matters. A chemical is not in and of itself evil. Chemicals are everywhere – we're made of them. Many of them make our lives better, more comfortable, cleaner, safer, healthier. Certainly, if misused they can be harmful. This, however, is not the case in this plan. This herbicide was given a reduced risk status in 2016 (under the previous administration). It has been studied and used and shown to be nearly non-toxic. It is important to look at ALL of the data and ALL of the studies. So far, the data show that there is little risk in using this herbicide, especially in the very low concentrations necessary for this project.

The LIA has attempted a variety of non-herbicidal control methods. Lake Dunmore has been pointed out as an example of a lake that has done considerable non-herbicidal EWM control work, particularly Diver-Assisted Suction Harvesting (DASH). It has been suggested that since LIA has not done as much, it is too soon to consider

using an herbicide. I believe this is backward thinking. The LIA board has spent many hours talking with the Lake Dunmore Association and has learned from their experience that even with the $1 million they raised and running several DASH boats through the summer, they could not keep up with the aggressive spread of this invasive and have now turned to using herbicide. Nevertheless, the LIA chose to test out DASH in a limited fashion to accomplish two things: 1) To clear the public boat access channel in order to minimize fragmentation due to boat traffic and 2) to gather data on how much DASH could be accomplished per week given the density of the infestation here and how much that would cost. The LIA preferred, wisely I think, this method of testing by spending a smaller amount of money in order to fully understand how DASH would work on Lake Iroquois and whether it could be efficient and cost-effective enough to deploy more widely. At the same time, the LIA also gained a first-hand experience of the way DASH can itself cause fragmentation as well as sending bottom sediment into the water column, thereby releasing trapped nutrients. The conclusion, based on the work at Dunmore and other lakes as well as the trials on Lake Iroquois, was that DASH is useful for clearing small, less dense areas but is not adequate or cost-effective for dealing with the large and dense infestation now existing on Lake Iroquois. The estimate from the tests on Lake Iroquois shows that it costs approximately $6000/week for a DASH boat to clear 1 acre. To clear the 40 acres proposed in this plan would therefore cost nearly ¼ of a million dollars and take 40 weeks – not remotely feasible. DASH alone is not going to solve the problem. It has its place in an integrated management plan, but alone it will not do the job.

It has been suggested that reducing nutrient levels in the lake will reduce the EWM - that somehow higher nutrient levels are the cause of the EWM infestation. This is not accurate. EWM was introduced into the lake by human action. While the LIA works to reduce human caused nutrient levels in the lake and has had success in doing so, it is neither possible nor desirable to reduce nutrient levels to zero. Phosphorus and other nutrients are naturally occurring and native species need those nutrients to survive. So long as there are nutrients in the lake, EWM will not only survive but thrive and outcompete native species. While aiming to reduce human caused nutrient levels in the lake is an important goal, it will not solve the EWM problem.

In terms of cyanobacteria blooms, there has been some discussion that removing the milfoil could cause such a bloom or that the presence of milfoil actually hampers cyanobacteria blooms. There is no evidence to suggest that either of these scenarios is likely given the limited size of the treatment area and the abundant incidents of EWM and cyanobacteria blooms co-occurring (e.g. St. Albans Bay).

Finally, there is widespread community support for this project. Of the 90+ households on the lake there have been only two or three who have voiced objections along with a limited number of objections from others in the surrounding communities who only occasionally, if at all, use the lake. The people most impacted by the EWM and by any proposed treatment, the people who have seen this problem up close and who will have to deal with the consequences of this decision are overwhelmingly in favor of this project.

I want to conclude by pointing out that we can never know everything about an action that we take and we cannot definitively predict the future. There is always some risk and unknowns in everything we do. If we wait until we know everything about a situation, none of us would ever be able to make a decision or take an action. Human knowledge is always limited. Yet just because we can never have perfect knowledge it does not mean that we have no knowledge. We do know that EWM is not naturally occurring; it was introduced into our waters by human actions. We do know the damage that unchecked spread and infestation of invasives does to native ecosystems (such as emerald ash borer, zebra mussels, purple loosestrife, kudzu in the south, etc, etc). We can anticipate the damage that will be done to Lake Iroquois if we allow the EWM infestation to proceed uncontrolled. Therefore, we must do the best we can with the knowledge, information, and expertise available to us. This plan is carefully thought out, rational, researched, balanced, and evidence-based. I strongly believe this is the right thing to do and I urge the DEC to approve this permit.

Response F-35: The Secretary acknowledges this comment.

Comment F-36: Following is information from Solitude, the company who will be doing the application if the permit is granted, and SePRO the maker of the herbicide.

"Nutrients within aquatic plants are naturally released into the water at the end of each season when the plants senesce. At that time of the year, algae blooms, due to nutrient fluxes, are generally not a concern because the cooling water temperature and reduced daylight hours won't support rapid algal growth.

It is true that contact herbicides that burn/rupture cells of target plants in the summer have the potential to cause a bloom from rapid nutrient fluxes in large treatment sites. However, the major benefits to milfoil treatment with ProcellaCOR is that it impacts the plants over a span of 3-6 weeks. The slow decline of the plants regulates the release of nutrients and drastically reduces the chance of causing a bloom. To date, we have not experienced any nutrient/algae issues after treatment with ProcellaCOR and that includes large block treatments (250+ contiguous acres).

Additionally, the literature tells us that controlling milfoil will slow the natural eutrophication process in the waterbody. Milfoil is much more effective at utilizing nutrients from the sediment than most native species and grows much faster. Therefore, if milfoil is allowed to expand in a waterbody, the natural eutrophication process (nutrient transfer from sediment to water from plant growth throughout the year and then die off in the fall) is greatly accelerated.

In summary, there is very little risk of a Cyanobacteria bloom occurrence due to ProcellaCOR treatment in the short-term and treating the milfoil will reduce risk of Cyanobacteria blooms due to accelerated eutrophication in the long term."

This information comes from the Lake Champlain Committee:

"…though allelopathy between milfoil and cyanobacteria, as well as the chemicals that cause it, have been observed in lab experiments, it has been more difficult to demonstrate effects in field experiments.

Many of our ideas about interactions between milfoil and Cyanobacteria are based upon carefully controlled laboratory experiments. Unfortunately, not all such ideas hold up in the real world and examples of cyanobacteria co-existing with milfoil and other plants can be found in Lake Champlain. Cyanobacteria blooms have plagued St. Albans Bay for decades while extensive milfoil growth has continued despite a sustained harvesting program."

https://www.lakechamplaincommittee.org/learn/lake-look/the-mutual-suffering-of-milfoil-and-

algae/

Response F-36: The Secretary acknowledges this comment.

Comment F-37: A dictionary definition of the word "infest" is "to inhabit or overrun in numbers large enough to be harmful, threatening or obnoxious." I think that pretty much describes the situation in the Lake. The milfoil growing in the Lake has slowly and steadily squeezed out the native plant life and is now the most abundant plant in the Lake – covering 70 acres or more and increasing each year. Milfoil is not a native plant – it is foreign invasive species and certainly does not contribute to a natural community in the Lake, contrary to what was written by her.

Lake Iroquois has not always been a weedy lake as she states. It may have been at one time, but the north end "weed bed" that she refers to was for years clear and navigable without problems.

It is true that eradication of the milfoil is probably not possible. But control and mitigation is, with thoughtful, careful, professional management. No one is trying to make the Lake "swimming pool" clean as mentioned by her. The goal is to try and keep the Lake useable for boating and recreation for now and future generations. If allowed to continue with no mitigation, I can see Lake Iroquois simply becoming an unusable bog.

ProcellaCOR is the herbicide targeting milfoil with promising results. Scientists are always striving for a better, more effective and safer herbicide. This is done through research and development and not with disregard for humanity.

I especially take issue with her very last sentence which states “It will not improve water quality, natural ecology or community resource of Lake Iroquois.” I don’t know where someone gets the information to make such a statement that may be accepted as fact by some, when indeed it isn’t.

Response F-37: The Secretary acknowledges this comment.

Comment F-38: It seems that decisions are being made on the basis of industry research, not an unbiased or reliable source of information.

Response F-38: The Secretary acknowledges this concern. However, given that SePRO ProcellaCOR® EC has been registered for use by the U.S. Environmental Protection Agency (EPA Registration Number 67690-80) and the Vermont Agency of Agriculture, Food and Markets, the Secretary must rely upon the technical conclusions made by these other governmental entities. In addition, should the permittee wish to pursue a treatment once the permit is issued, the permittee is required to submit an annual request for proposed treatment locations and may not conduct the treatment until receiving approval from the Secretary. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the resource or public good that may have resulted from a treatment, the findings made in this permit to authorize the use of ProcellaCOR® EC may be reviewed annually upon receiving the annual request.

Aquatic Nuisance Control Decision and Denial

Under 10 V.S.A. § 1455

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Applicant(s): Town of Williston c/o Richard McGuire – Town Manager (decision-maker) SOLitude Lake Management (operator) **Control Activity:** Pesticide (Herbicide – Sonar A.S.®)	**Permit Number:** 2240-ANC **Waterbody:** Lake Iroquois; Hinesburg, Richmond, Williston

Based upon the Findings contained in this decision, it is the decision of the Secretary of the Agency of Natural Resources (Secretary) that the project described herein, as set forth in the following findings and in the application on file with the Secretary, does not comply with the criteria of 10 V.S.A. § 1455, and is hereby DENIED.

a. Findings

1. Jurisdiction - 10 V.S.A. § 1455(a). Within waters of the state, no person may use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, unless that person has been issued a permit by the secretary. The project, as described in Permit Application #2240-ANC, proposed the use of a pesticide, Sonar A.S.®, to control the aquatic invasive species Eurasian watermilfoil (EWM), *Myriophyllum spicatum*, within Lake Iroquois located in Hinesburg, Richmond, and Williston. The Secretary has identified EWM as an aquatic nuisance pursuant to the statutory definition found at 10 V.S.A. § 1452(2). Therefore, the Department has jurisdiction under 10 V.S.A. Chapter 50.

2. Application Receipt & Review. A permit application for an Aquatic Nuisance Control permit submitted by the Town of Williston was received on November 14, 2016. The application was reviewed in accordance with the Department of Environmental Conservation's Permit Application Review Procedure, adopted May 22, 1996.

   The Secretary can issue an Aquatic Nuisance Control permit for the use of pesticides in waters of the State for the control of nuisance aquatic plants pursuant to 10 V.S.A. § 1455 (d) if the following findings can be made:

   (1) there is no reasonable non-chemical alternative available;

   (2) there is acceptable risk to the non-target environment;

   (3) there is negligible risk to public health;

   (4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and

   (5) there is a public benefit to be achieved from the application of a pesticide or, in the case of a pond located entirely on a landowner's property, no undue adverse effect upon the public good.

   The Secretary was unable to affirmatively find there was no reasonable non-chemical alternative available, that there was an acceptable risk to the non-target environment, and that there was a public benefit to be achieved from the application of a pesticide.

3. Background; Aquatic Nuisance Control Permit History. Control methods jurisdictional under 10 V.S.A. § 1455 for EWM have been used in Lake Iroquois, including the use of bottom barriers, powered mechanical devices, and the use of a biological control. ANC permits #1994-B01, #2009-B04, #2016-B06, #2016-B08, and #2206-ANC permitted the use of a bottom barrier. ANC permits #1999-H03, #2005-H07, #2014-H02, and #2016-H13 (2203-ANC) permitted the use of a powered mechanical device. ANC permit #2005-W01 permitted the use of a biological control (*Eurychiopsis lecontei*). All the above-mentioned ANC permits were issued for the control

of the aquatic invasive plant EWM, which was first identified in Lake Iroquois in 1990. Copies of a permit may be available upon request where records exist. Application #2240-ANC was the first application requesting the use of a pesticide to control EWM in Lake Iroquois.

4. Project Purpose. The purpose of the project was to control EWM to promote a diverse native plant community, to improve fish and wildlife habitat, and to support public recreational use of the lake.

5. No Reasonable Non-Chemical Alternative Available – 10 V.S.A. 1455(d)(1). Comments that were received during the public comment period emphasized how all reasonable non-chemical actions to control EWM in Lake Iroquois have not been pursued and that there are additional reasonable non-chemical alternative control methods available to achieve the project purpose. Permits were issued to the Lake Iroquois Association to conduct diver assisted suction harvesting (permit #2016-H13 issued on July 20, 2016) and to use bottom barriers (permit #2206-ANC issued on February 2, 2017). However, these control projects have only been used to a limited degree in efforts to create a navigation channel to open water from the Vermont Department of Fish & Wildlife public access area at the northwest portion of the lake. As a result, the Secretary cannot affirmatively find that there is no reasonable non-chemical alternative available that would achieve the project purpose. It has not been demonstrated that these previously permitted non-chemical control methods are inadequate to address the EWM issue in Lake Iroquois and achieve the stated project purpose. In addition to considerations of potential non-chemical alternatives, the Secretary considered how an applicant may develop a reasonable integrated pest management plan as a means of identifying various control methods given the long-term well-established population of EWM that is present in Lake Iroquois where lake-wide control efforts have not occurred since EWM was first discovered in the lake in 1990.

   In review of the public comments received related to this finding, the Secretary identified a potentially reasonable approach for addressing a lake-wide population of EWM. Baseline assumptions regarding the proposed project, as well as identifying ecological and water quality characteristics for Lake Iroquois, were made as a means to outline a reasonable approach for controlling EWM for this waterbody:

   - The control activity was proposed to target the aquatic invasive species EWM.
   - EWM has been established in Lake Iroquois since at least 1990.
   - The EWM population has spread throughout the lake, is a well-established population, and eradication is a highly unlikely outcome from control efforts.
   - A sustained lake-wide management approach using non-chemical or chemical means to control EWM has not occurred in Lake Iroquois, although permits have been issued for the use of non-chemical controls.
   - Lake Iroquois is 244 acres and the littoral zone covers 105 acres, which is 43% of the total lake surface area as identified in the application. Open water conditions comprise 139 acres, 57% of the total lake surface area.
   - Lower Pond is approximately 0.25 miles downstream of Lake Iroquois; it should be anticipated that Sonar A.S.® would flow into this waterbody should the pesticide be applied to Lake Iroquois.
   - As identified in the Vermont Lake Score Card related to phosphorus concentrations, Lake Iroquois is considered eutrophic (nutrient rich). Given this trophic state, there is an increased likelihood of there being elevated biological productivity, which will likely result in dense populations of aquatic plants, including EWM.
   - As identified in the Vermont Lake Score Card, the Lake Iroquois watershed is classified as being highly disturbed.
   - As identified in the Vermont Lake Score Card, the Vermont Inland Lake Shoreland and Habitat Score/USEPA National Lake Assessment Score ranks Lake Iroquois as being in poor condition. This ranking is a measure of the human activity within 15 meters of the lake's shoreline at ten random sites around the lake; it reflects how intensively and extensively a lake's shore is developed. The poor condition

indicates Lake Iroquois has significant development within the immediate shoreline, which reduces the natural resiliency of the waterbody and increases potential adverse impacts to the biological, chemical, and physical integrity of the waterbody.

While requesting to control EWM was reasonable, the Secretary has determined that the whole-lake use of a pesticide is not a reasonable approach to manage the species. A whole-lake pesticide treatment targets the entire littoral zone. This management approach will impact locations of native aquatic plant species that may be sensitive to the pesticide and is not capable of targeting limited locations within the littoral zone where public good uses, such as boating, fishing, or swimming, are being impacted by EWM. Given the increased biological activity and the poor condition of the lake based on shoreline development at Lake Iroquois, it is anticipated that dense aquatic plant populations will exist in the lake regardless of whether a whole-lake control project occurs. Therefore, a reasonable control project would be to target a specific area where a public good use of the water is impacted.

Aquatic invasive species are considered stressors on Vermont's surface waters. However, EWM is and will continue to be a part of the aquatic environment of Lake Iroquois for the foreseeable future. In response to these assumptions, a targeted approach using an integrated pest management plan to control nuisance levels of aquatic plants that are impacting public good uses is a reasonable approach to achieve the project purpose, rather than a whole-lake control approach.

To develop an integrated pest management plan for a species that has spread throughout a waterbody, is well-established, and where eradication is a highly unlikely outcome from control efforts, the following criteria need to be assessed in conjunction with the baseline biological, chemical, and physical characteristics of the waterbody and watershed to set expectations for what a control project may achieve:

- Identify the aquatic nuisance problem, the area(s) with the aquatic nuisance problem, and characterize the extent of the problem, including, for example, water use goals not attained (e.g. wildlife habitat, fisheries, native vegetation, and recreation).
- Identify locations of species that may be sensitive to a control project.
- Identify locations where wetlands may be present.
- Identify an action threshold to determine when a control project may be appropriate.
- Identify possible factors causing or contributing to the aquatic nuisance problem.
- Review the past management history of the aquatic nuisance.
- Develop an integrated pest management plan that incorporates short and long-term goals, anticipated levels of control, expectations achieved by a control project, and whether a control project will need to occur in perpetuity to maintain anticipated levels of control.
- Develop management alternatives, such as no action, prevention, mechanical or physical methods, cultural methods, biological control agents, or the targeted use of pesticides, to identify how different control projects may reach the goals of the integrated pest management plan. Management alternatives should be compatible with other water uses, not adversely affect natural lake functions, have a known and understood mechanism of control, be documented as low risk to natural ecosystem functions, and are predictable and repeatable in efficacy and outcome.
- Develop methods for evaluating the efficiency of the integrated pest management plan to act as a feedback loop for determining how future control efforts should proceed.
- Implement watershed and shoreline management strategies to address sources of phosphorus and to promote the long-term stability and resilience of the waterbody to help reduce the likelihood of nuisance populations from developing.

Based on the current conditions of Lake Iroquois and in response to public comments received, there are reasonable non-chemical alternative available to achieve the project purpose. Non-chemical alternatives for controlling nuisance populations of EWM could be strategically implemented to control a specific nuisance population and have reasonable short and long-term goals. Non-chemical alternatives such as bottom barriers, diver assisted suction harvesting, and mechanical harvesting could achieve those goals while limiting potential negative impacts. In conjunction with identifying an in-lake aquatic nuisance control management plan, addressing sources of phosphorus throughout the watershed should be considered as well due to phosphorus being a contributing factor to nuisance aquatic plant growth.

Therefore, the finding that there is no reasonable non-chemical alternative available cannot be made, and the application must be denied.

6. Acceptable Risk to the Non-Target Environment – 10 V.S.A. 1455(d)(2). Comments that were received during the public comment period raised concerns over potential impacts to the non-target environment. Based on the comments related to this finding, the Secretary identified the following as the non-target environment:

   - Aquatic plants and animals within the waterbody proposed for treatment and waters downstream of the waterbody.
   - Wetlands within the waterbody proposed for treatment and wetlands downstream of the waterbody.
   - Human use of waters treated with the pesticide. This includes, hydroponic farming, greenhouse and nursery plants, and all locations irrigated with waters treated with Sonar A.S.®.
   - The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact. The concept of ecological integrity is identified in the Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy.

   For determining what might be considered an acceptable risk to the non-target environment from the proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment:

   - A control project for an aquatic nuisance species has an impact on the ecological integrity of the waterbody regardless of the species being targeted as the non-target environment cannot be avoided completely.
   - Rare aquatic plant species have been recorded as being present in Lake Iroquois. Species observed include prickly hornwort (S2S3), *Ceratophyllum echinatum*, last observed 9/11/2014; Nuttall's waterweed (S3), *Elodea nuttallii*, last observed 8/30/2012; slender naiad (S2), *Najas gracillima*, last observed 9/17/1968; straight-leaf pondweed (S2S3), *Potamogeton strictifolius*, last observed 8/2/1993; Vasey's pondweed (S2), *Potamogeton vaseyi*, last observed 8/2/1993; and lesser bladderwort (S3), *Utricularia minor*, last observed 9/14/2012. Aquatic plants controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lake Iroquois include bladderwort, *Utricularia* spp.; common coontail, *Ceratophyllum demersum*; common elodea, *Elodea canadensis*; naiad, *Najas* spp.; pondweed, *Potamogeton* spp.; watermilfoil, *Myriophyllum* spp.; spatterdock, *Nuphar luteum* syn. *Nuphar variegata*; waterlily, *Nymphaea* spp.; and common duckweed, *Lemna minor*. Native vascular aquatic plants partially controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lake Iroquois include tape grass, *Vallisneria americana*; cattail, *Typha* spp.; smartweed, *Polygonum* spp.; and spikerush, *Eleocharis* spp.
   - A rare aquatic plant species, fruited bladderwort (S3), *Utricularia geminiscapa*, has been recorded as being present in Lower Pond and was last observed on 9/24/2003. Aquatic plants controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lower Pond include bladderwort, *Utricularia* spp.; common coontail, *Ceratophyllum demersum*; common elodea, *Elodea canadensis*; naiad, *Najas* spp.; pondweed, *Potamogeton* spp.; watermilfoil, *Myriophyllum* spp.;

spatterdock, *Nuphar luteum* syn. *Nuphar variegata*; waterlily, *Nymphaea* spp.; and common duckweed, *Lemna minor*. Native vascular aquatic plants partially controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lake Iroquois include tape grass, *Vallisneria americana*; cattail, *Typha* spp.; smartweed, *Polygonum* spp.; and spikerush, *Eleocharis* spp.

- Mapped Class II wetlands are located at the northern end of Lake Iroquois.
- Mapped Class II wetlands are located at the northern end of Lower Pond, which is the point at which the outlet stream for Lake Iroquois enters Lower Pond.
- Lake Iroquois and its waters are public, and it is reasonable to assume that all public waters may be used for irrigation, which is an identified use in the application.
- While the potential impact to every potential aquatic animal that may come into contact with Sonar A.S.® is not known, the treatment concentration target, 5-8 parts per billion of the active ingredient fluridone, has not been shown to present an unacceptable impact to aquatic animals (pages 6-9: 2240-ANC_TechnicalReferences_02062018).

Based on the comments that were received related to this finding and the subsequent review conducted by the Secretary, the proposed project presents an unacceptable risk to the non-target environment. Given that the EWM population has spread throughout the lake, is a well-established population, and eradication is a highly unlikely outcome from control efforts, attempts to control the entirety of the EWM population poses an unacceptable risk to stability of the ecological integrity of Lake Iroquois. While the target concentration of Sonar A.S.® was proposed to be at a concentration that would likely limit the impact on non-target aquatic plant species, the proposed whole-lake treatment would not be able to avoid non-target aquatic plant populations of species either controlled or partially controlled by Sonar A.S.® or avoid areas mapped as Class II wetlands where species that are sensitive to Sonar A.S.® are likely to be found at higher densities. By targeting the entire population of EWM over the course of one growing season, there would likely be a temporary but significant decrease in EWM densities as well as reductions of non-target aquatic plant species controlled or partially controlled by Sonar A.S.®. Additionally, this drop in aquatic plant density does have the potential to result in more available phosphorus within the lake that could then be readily utilized by algae, which could result in unintended algae blooms. As eradication of EWM is not the goal of the project or a feasible outcome from control efforts, EWM populations would recover and likely revert to the current state of Lake Iroquois over time, which consists of a lake-wide distribution of EWM. This reversion back to the current state would likely result in the same conditions that resulted in the submission of this permit application for a whole-lake treatment, thus creating a long-term continuous cycle of impact on the non-target environment within the entirety of the lake.

In addition to impacts on species and environments within and downstream of Lake Iroquois, the waters of Lake Iroquois were identified as being used for irrigation. The proposed treatment was to occur over 90-days, beginning in May. As identified on the Sonar A.S.® label, irrigation from a Sonar A.S.® treated area may result in injury to the irrigated vegetation. For those non-target environments irrigated with waters treated with Sonar A.S.®, the treatment poses an unacceptable risk to that non-target environment due to the prolonged duration of the treatment, which would have overlapped with the time of year where irrigation is likely to occur.

While EWM is a stressor on the ecological integrity of Lake Iroquois, the potential lake-wide impacts on the non-target environments as a result of a whole-lake treatment is greater than the impact from the existence of EWM in Lake Iroquois. Given that EWM will be a part of Lake Iroquois for the foreseeable future and that once EWM control efforts are initiated, those control activities would need to occur in perpetuity to maintain suppressed levels of EWM, the proposed whole-lake treatment poses an unacceptable risk to the non-target environment. Therefore, this finding cannot be made, and the application must be denied.

7. Public Benefit – 10 V.S.A. 1455(d)(5). In response to public comments, the Secretary considered the following criteria in determining whether there is a public benefit to be achieved from the application of the pesticide:

- Whether carrying out the project produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
    - Assessment: Tangible benefits to be achieved in the target waterbody primarily stemmed from the anticipated temporary decrease in the frequency of occurrence and biomass of EWM. This temporary decrease was anticipated to result in a tangible benefit for boating and swimming, as the littoral zone within the waterbody would likely have had a reduced abundance of aquatic plant biomass, which would have facilitated less impeded use. Lake Iroquois is 244 acres and the littoral zone covers approximately 105 acres, which is 43% of the total lake surface area as identified in the application. Open water conditions comprise 139 acres, 57% of the total lake surface area. The potential temporary tangible benefit to boating and swimming could have occurred at up to 43% of the total surface area of the lake while the remaining surface area would see no anticipated change. Regarding fishing as a public good use in relation to the proposed project, it remains undetermined as to whether the project would produce a tangible long or short-term benefit. EWM has been identified as not providing beneficial habitat for fish. However, a lake-wide reduction of EWM as a result of a treatment and the subsequent shift in aquatic plant population dynamics may have unintended consequences on fish populations. As a result, the Secretary cannot confirm there would be a tangible benefit to fishing. Potential impacts on the water resource are identified in finding a.6. of this decision. The Secretary has determined that the temporary tangible benefits to boating and swimming do not outweigh the potential impacts on the water resource.
- Whether the potential cumulative impacts from carrying out the control project adversely affect the water resource and the public that utilizes that resource.
    - Assessment: Additional cumulative impacts were considered that related to the water resource and how the public may utilize that resource. The Secretary has determined that the cumulative impacts from carrying out the control project would adversely affect the water resource and the public that utilizes that resource.
        - For property owners abutting Lake Iroquois and for property owners abutting the immediate surface waters downstream, which includes the 58-acre waterbody known as Lower Pond, which is approximately 0.25 miles downstream of Lake Iroquois, the VDH issued recommended water use restrictions for those properties, which includes temporary avoidance of treated water up to one mile from the outlet of Lake Iroquois for all uses, including boating, fishing, swimming, and domestic use. In addition, product use precautions from the Sonar A.S.® label recommends not using water from a treated area for irrigation for up to 30 days after application for established row crops, turf, or plants. The recommended water use precautions could remain in effect for approximately 90 days beginning in May and are unreasonably burdensome on individuals who use the water for irrigation and recreation.
        - Lake Iroquois is located within Zone 2 of the Champlain Water District Surface Water Source Protection Area. While it was not anticipated that Sonar A.S.® would reach the Champlain Water District's intake pipe, the waters of Lake Iroquois are considered to be a primary recharge area for the Champlain Water District. It was not anticipated that the project would have a cumulative impact that would adversely affect the surface water source protection area.
        - Lake Iroquois is not located within a Groundwater Source Protection Area.

- Whether measures to reduce impacts on the water resource have been taken.
    - Assessment: The project proposed to control EWM only, which is an aquatic invasive species. The target concentration of Sonar A.S.® was reduced to 5-8 ppb to reduce potential impacts to non-target species that are controlled or partially controlled by Sonar A.S.®.
- Whether the project is excessive for the stated purpose.
    - Assessment: Sustained aquatic nuisance control activities have not occurred in Lake Iroquois. Initiating a lake-wide EWM control effort in Lake Iroquois with a whole-lake treatment before more thoroughly undertaking less intrusive feasible alternatives is excessive. The project is considered excessive for the stated purpose.

Based upon review of the public good criteria, the Secretary has determined that the potential impact on the public good outweighs the perceived public benefit to be achieved from the application of a pesticide. Therefore, the Secretary cannot affirmatively find that there is a public benefit to be achieved from the application of a pesticide, and the application must be denied.

10. Public Notification – 10 V.S.A. 1455(h). An opportunity for the public to review and comment on this application was provided in accordance with the Department of Environmental Conservation's *Public Review and Comment Procedures for Aquatic Nuisance Control Permit Applications and General Permits*, adopted per 3 V.S.A. Chapter 25, on January 30, 2003. A public informational meeting on the draft permit was held on May 4, 2017. Public comments were received. A response to public comments has been issued with this decision.

11. References:

    SePRO Sonar AS® Specimen Label

    SePRO Sonar AS® Material Safety Data Sheet

    Surface Water Source Protection Areas Factsheet

    Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy

    Vermont Lake Score Card – Lake Iroquois

    Vermont Lake Score Card – How Lakes are Scored

b. Standard Conditions

Appeals. Pursuant to 10 V.S.A. Chapter 220, any appeal of this decision must be filed with the clerk of the Environmental Division of the Superior Court within 30 days of the date of the decision. An aggrieved person shall not appeal this decision unless the person submitted to the Secretary a written comment during the comment period or an oral comment at the public meeting conducted by the Secretary and the person may only appeal issues related to the person's comment to the Secretary unless otherwise outlined in 10 V.S.A. chapter 220. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Division; and must be signed by the appellant or the appellant's attorney. The appeal must give the address or location and description of the property, project, or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings available at www.vermontjudiciary.org. The address for the Environmental Division is: 32 Cherry Street; 2nd Floor, Suite 303; Burlington, VT 05401 Telephone: 802-951-1740.

c. Denial

By delegation from the Secretary, the Vermont Department of Environmental Conservation has made a determination that the control activity does not comply with the criteria of 10 V.S.A. § 1455 for an individual aquatic nuisance control permit.

In accordance with 10 V.S.A. § 1455, the Department hereby issues this decision and denial to the Town of Williston and SOLitude Lake Management for the above-named project.

Emily Boedecker, Commissioner
Department of Environmental Conservation

By: E P E Thomas 10/8/2018 1:31 PM

Perry Thomas, Manager
Lakes & Ponds Management and Protection Program
Watershed Management Division

Response Summary for Aquatic Nuisance Control Individual Permit Application

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Applicant: Town of Williston c/o Richard McGuire – Town Manager (decision-maker) SOLitude Lake Management (operator) **Control Activity:** Pesticide (Herbicide – Sonar A.S.®)	**Application Number:** 2240-ANC **Waterbody:** Lake Iroquois; Hinesburg, Richmond, Williston

The above referenced Aquatic Nuisance Control Individual Permit Application #2240-ANC denies the use of Sonar A.S.® to control Eurasian watermilfoil (EWM), *Myriophyllum spicatum*, in Lake Iroquois.

The draft permit was placed on public notice between March 20, 2017 and April 21, 2017. Additionally, a public information meeting was held in Hinesburg on May 4, 2017. Public comments were received during the notice period and at the public information meeting. In response to public comments, the Secretary determined that the application can no longer meet all of the findings and is hereby denied.

The following is a summary of comments received and the Secretary's responses to those comments. Where appropriate, comments have been paraphrased, consolidated, and categorized for clarity. Duplicative comments were combined where appropriate. Comments that were related to technical inquiries on how permit conditions would be overseen and implemented have been removed from this response summary as the application has been denied and therefore those comments are no longer applicable.

A. Comments Regarding Finding c.5. No Reasonable Non-Chemical Alternative Available – 10 V.S.A. 1455(d)(1)

Comment A-1: The applicant has not demonstrated that all reasonable non-chemical alternatives have been pursued to address issues with Eurasian watermilfoil in Lake Iroquois. Non-chemical control projects that have been pursued have only occurred or a short duration consisting of limited methods. Due to there being reasonable non-chemical alternatives available, the whole-lake application of Sonar A.S.® is unreasonable.

Response A-1: The Secretary has no defined threshold that identifies a point at which non-chemical or chemical aquatic nuisance control options may be pursued. Permits were issued to the Lake Iroquois Association for non-chemical aquatic nuisance control projects to conduct diver assisted suction harvesting (permit #2016-H13 issued on July 20, 2016) and to use bottom barriers (permit #2206-ANC issued on February 2, 2017). However, these control projects have only been used to a limited degree in efforts to create a navigation channel to open water from the Vermont Department of Fish & Wildlife public access area at the northwest portion of the lake. As a result, the Secretary cannot affirmatively find that there is no reasonable non-chemical alternative available that would achieve the project purpose. It has not been demonstrated that these previously permitted non-chemical control methods are inadequate to address the EWM issue in Lake Iroquois. In addition to considerations of potential non-chemical alternatives, the Secretary considered how an applicant may develop a reasonable integrated pest management plan as a means of identifying various control methods to help determine which aquatic nuisance control activities would be appropriate. Baseline assumptions regarding the proposed project, as well as identifying ecological and water quality characteristics for Lake Iroquois, were made as a means to outline a reasonable approach for controlling EWM for this waterbody:

- The control activity proposed to target the aquatic invasive species EWM.
- EWM has been established in Lake Iroquois since at least 1990.
- The EWM population has spread throughout the lake, is a well-established population, and eradication is a highly unlikely outcome from control efforts.

- A sustained lake-wide management approach using non-chemical or chemical means to control EWM has not occurred in Lake Iroquois, although permits have been issued for the use of non-chemical controls.
- Lake Iroquois is 244 acres and the littoral zone covers 105 acres, which is 43% of the total lake surface area as identified in the application. Open water conditions comprise 139 acres, 57% of the total lake surface area.
- Lower Pond is approximately 0.25 miles downstream of Lake Iroquois; it should be anticipated that Sonar A.S.® would flow into this waterbody should the pesticide be applied to Lake Iroquois.
- As identified in the Vermont Lake Score Card related to phosphorus concentrations, Lake Iroquois is considered eutrophic (nutrient rich). Given this trophic state, there is an increased likelihood of there being elevated biological productivity, which will likely result in dense populations of aquatic plants, including EWM.
- As identified in the Vermont Lake Score Card, the Lake Iroquois watershed is classified as being highly disturbed.
- As identified in the Vermont Lake Score Card, the Vermont Inland Lake Shoreland and Habitat Score/USEPA National Lake Assessment Score ranks Lake Iroquois as being in poor condition. This ranking is a measure of the human activity within 15 meters of the lake's shoreline at ten random sites around the lake; it reflects how intensively and extensively a lake's shore is developed. The poor condition indicates Lake Iroquois has significant development within the immediate shoreline, which reduces the natural resiliency of the waterbody and increases potential adverse impacts to the biological, chemical, and physical integrity of the waterbody.

While requesting to control EWM was reasonable, the Secretary has determined that the whole-lake use of a pesticide is not a reasonable approach to manage the species. A whole-lake pesticide treatment targets the entire littoral zone. This management approach will impact locations of native aquatic plant species that may be sensitive to the pesticide and is not capable of targeting limited locations within the littoral zone where public good uses, such as boating, fishing, or swimming, are being impacted by EWM. Given the increased biological activity and the poor condition of the lake based on shoreline development at Lake Iroquois, it is anticipated that dense aquatic plant populations will exist in the lake regardless of whether a whole-lake control project occurs. Therefore, a reasonable control project would be to target a specific area where a public good use of the water is impacted.

Aquatic invasive species are considered stressors on Vermont's surface waters. However, EWM is and will continue to be a part of the aquatic environment of Lake Iroquois for the foreseeable future. In response to these assumptions, a targeted approach using an integrated pest management plan to control nuisance levels of aquatic plants that are impacting public good uses is a reasonable approach to achieve the project purpose, rather than a whole-lake control approach.

To develop an integrated pest management plan for a species that has spread throughout a waterbody, is well-established, and where eradication is a highly unlikely outcome from control efforts, the following criteria need to be assessed in conjunction with the baseline biological, chemical, and physical characteristics of the waterbody and watershed to set expectations for what a control project may achieve:

- Identify the aquatic nuisance problem, the area(s) with the aquatic nuisance problem, and characterize the extent of the problem, including, for example, water use goals not attained (e.g. wildlife habitat, fisheries, native vegetation, and recreation).
- Identify locations of species that may be sensitive to a control project.
- Identify locations where wetlands may be present.
- Identify an action threshold to determine when a control project may be appropriate.

- Identify possible factors causing or contributing to the aquatic nuisance problem.
- Review the past management history of the aquatic nuisance.
- Develop an integrated pest management plan that incorporates short and long-term goals, anticipated levels of control, expectations achieved by a control project, and whether a control project will need to occur in perpetuity to maintain anticipated levels of control.
- Develop management alternatives, such as no action, prevention, mechanical or physical methods, cultural methods, biological control agents, or the targeted use of pesticides, to identify how different control projects may reach the goals of the integrated pest management plan. Management alternatives should be compatible with other water uses, not adversely affect natural lake functions, have a known and understood mechanism of control, be documented as low risk to natural ecosystem functions, and are predictable and repeatable in efficacy and outcome.
- Develop methods for evaluating the efficiency of the integrated pest management plan to act as a feedback loop for determining how future control efforts should proceed.
- Implement watershed and shoreline management strategies to address sources of phosphorus and to promote the long-term stability and resilience of the waterbody to help reduce the likelihood of nuisance populations from developing.

Based on the current conditions of Lake Iroquois and in response to public comments received, there are reasonable non-chemical alternative available to achieve the project purpose. Non-chemical alternatives for controlling nuisance populations of EWM could be strategically implemented to control a specific nuisance population and have reasonable short and long-term goals. Non-chemical alternatives such as bottom barriers, diver assisted suction harvesting, and mechanical harvesting could achieve those goals while limiting potential negative impacts. In conjunction with identifying an in-lake aquatic nuisance control management plan, addressing sources of phosphorus throughout the watershed should be considered as well due to phosphorus being a contributing factor to nuisance aquatic plant growth.

Therefore, the finding that there is no reasonable non-chemical alternative available cannot be made, and the application must be denied.

Comment A-2: Has the Secretary considered indirect means of reducing EWM populations in this assessment, such as planting lakeshore buffers to reduce stormwater and runoff from reaching the lake or to plant shade trees along the shoreline? What are reasonable alternatives to controlling EWM?

Response A-2: See Response A-1. The Secretary considers "cultural methods" of control as the manipulation of habitat to increase pest mortality by making the habitat less suitable to the pest. These potential indirect means of aquatic nuisance control may be achieved by altering the biological, chemical, or physical environments that result in nuisance populations. While cultural methods of control may not have a direct mechanism of control or be as predictable and repeatable in efficacy and outcome, these methods are often compatible with other water uses, will not adversely affect natural lake functions, be documented as low risk to natural ecosystem functions, and will provide co-benefits to the watershed and waterbody by improving the overall resiliency of that watershed. Cultural methods of control are best identified once the life history of the pest to be controlled is fully reviewed in order to selectively implement actions that will reduce available habitat for the pest. Examples of cultural methods of control for EWM are:

- Spread prevention efforts: This will decrease the likelihood of EWM fragments from potentially being generated or either leaving or entering Lake Iroquois. Avoiding boating through dense plant beds and boat at a speed of less than five miles per hour that does not create a wake only when boating within 200 feet from shore. Both actions reduce the potential for EWM to fragment and spread within the lake. Additional spread prevention efforts can be implemented by participating with the Vermont Public

Access Greeter Program, which is a courtesy boat inspection program with the goal of stopping the spread of aquatic plant fragments from either leaving or entering the lake.

- Watershed management: Participate in the Basin Planning Process to identify and enact projects within the watershed that will reduce phosphorus and sediment from reaching the waterbody. Reducing nutrient inputs will decrease available nutrients used for biological activity. Examples of projects that could be enacted at along the shoreline to reduce immediate sources of nutrients and sediment would be to restore naturally vegetated shorelines. Naturally vegetated shorelines have the potential to improve shoreline stability and shade sections of littoral habitat.

The Secretary's Aquatic Invasive Species Program can offer additional control methodologies and guidance on those activities. Information can be obtained on the following website: http://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives

Comment A-3: The control of milfoil is primarily an issue for power boats. The public beach and swimming area can be best served with the use of benthic barriers. The majority of public boat ingress in the lake are paddlers (kayaks, canoes, paddleboards), who are not pushing for the use of herbicides. Paddlers are not notably inhibited by milfoil.

Response A-3: See Response A-1. As a part of developing an integrated pest management plan, the plan should identify the aquatic nuisance problem, the area(s) with the aquatic nuisance problem, and characterize the extent of the problem, including, for example, water use goals not attained.

Comment A-4: One of the main justifications for the permit to apply herbicide is that milfoil is choking out the native plants and should be eradicated to allow native plants to return. As a brief history: Lake Iroquois was originally a small kettle pond surrounded by steep slopes and trees. Humans clear-cut the area around the pond, and grazed sheep and cattle on that land for many years. This caused tremendous run-off and nutrients flowing into the pond. In the 50's or 60's, individual citizens dammed the lake to enlarge it. The northern end was dredged, and the pond was artificially enlarged to make it Lake Iroquois. Because of the high nutrient load and shallow edges, the Lake has always been weedy and is disturbed by its very nature and existence. To speak of a native population is to ignore the decades of disturbance that have led to where we are now. In recent years, humans have introduced more and more and larger and larger motorboats into the lake. Many of them are Wake Boats with very high horsepower, designed to throw an enormous wake. This wake crashes against the shore and continues to erode the shoreline adding to the overall nutrient load and shoreline disturbance. Boats coming into the lake continue to introduce invasive species. Applying herbicide does nothing to solve these on-going problems created by human activity. Herbicide is just one more burdensome human intervention at the Lake. Right now, the lake has relatively clean water. The weeds are a recreational nuisance, not a water-quality issue. However, they also serve to discourage boaters from bringing large power boats into the lake. I would argue that these weeds are acting as a natural self-protective mechanism to reduce human disturbance on the lake. Once the lake is cleared of weeds, boating activity will increase enormously. Which will cause MORE harm, not less harm to the lake. In addition, the water itself, now relatively clean, will have been "dirtied" by chemicals. A water-quality issue indeed, and one with unknown consequences, not only for Lake Iroquois, but also for Sunset Lake, Patrick Brook, the LaPlatte River and even Lake Champlain. What happens if the milfoil develops a resistance to this chemical? Do we just switch to another? And another? Where does this end? Does human recreation really justify this level of intervention? If this is an invasive species problem, we should deal with it as we do species like Poison Parsnip. I do not see anyone suggesting that we spray herbicide over the many fields and roadsides choked by Poison Parsnip. Why is it ok to do it in the Lake?

Response A-4: See Response A-1. In addition, the authority under 10 V.S.A. § 1455 does not extend to regulating public good uses on a waterbody, such as boating activity. However, one may submit a petition to the Agency

of Natural Resources to amend the Use of Public Waters Rules for a particular body of water: http://dec.vermont.gov/watershed/lakes-ponds/rulemaking/recent-petition-decisions

Comment A-5: Sonar has been applied to other lakes in Vermont. Are these other lakes similar to Lake Iroquois in size and use? As you know, Lake Iroquois is small, shallow and populated heavily during the summer.

Response A-5: Lake Hortonia (Hubbardton and Sudbury), 479 acres, and Lake Beebe (Hubbardton), 111 acres, have been treated with Sonar AS, in 2015 and 2016 respectively. These treatments were conducted with the same product as proposed under the application for Lake Iroquois, 243 acres. Below are links to waterbody specific information.

Lake Iroquois Score Card:
https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_Current_TrendsAndStatus&ViewParms=False&LakeID=IROQUOIS

Lake Iroquois Plant List:
https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_2015_PlantList&ViewParms=True&LakeID=IROQUOIS

Lake Hortonia Score Card:
https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_Current_TrendsAndStatus&ViewParms=False&LakeID=HORTONIA

Lake Hortonia Plant List:
https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_2015_PlantList&ViewParms=True&LakeID=HORTONIA

Lake Beebe Score Card:
https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_Current_TrendsAndStatus&ViewParms=False&LakeID=BEEBE%20(HUBDTN)

Lake Beebe Plant List:
https://anrweb.vt.gov/DEC/IWIS/ReportViewer3.aspx?Report=LakeScoreCard_2015_PlantList&ViewParms=True&LakeID=BEEBE%20(HUBDTN)

Comment A-6: The applicants wish to convey an urgency in this matter that befits a crisis. EWM has been in the lake since 1990, and to some extent is cyclical. This is not a crisis, and immediate action is not needed to "save the lake." In years with dense plant growth, there were littoral areas in the lake where native pondweeds competed successfully with EWM. Do all other non-chemical options need to be exhausted before resorting to herbicides? The proliferation of EWM in 2016 may have been associated with the extreme dry weather and low water levels. Is one year of a non-chemical treatment sufficient to determine its effectiveness? With regard to what has been tried, it would seem that significantly fewer resources have been allocated in the past for non-toxic means than are being requested to pay for the pesticide treatment. We believe this represents a half-hearted attempt at non-toxic methods of control and would encourage a full and fair attempt be made to exhaust non-chemical treatments before resorting to toxic chemicals.

Response A-6: See Response A-1. The Secretary has no defined statutory or regulatory threshold that identifies a point at which non-chemical or chemical aquatic nuisance control options may be pursued. Individual permit applications are reviewed on a case by case basis to determine whether there are reasonable non-chemical alternatives available. Part of an integrated pest management plan is to develop methods for evaluating its efficiency, such as conducting an annual species location and density survey. Evaluations should act as a feedback loop for determining whether future control efforts are warranted to achieve the short and long-term goals outlined in the strategy.

Comment A-7: I know many lake communities have harvested milfoil and it can be used as a compost, a food additive for animals, and other uses. I am not sure if harvesting it is an effective way to eradicate EWM. Still I think that is a better alternative to chemicals in the lake. Are there any other alternatives to eradicating a nuisance plant like EWM? Is there a beetle that eats it?

Response A-7: There are non-chemical alternatives for controlling Eurasian watermilfoil. Controlling populations of EWM is different than eradication. Eradication of EWM in Lake Iroquois is not a reasonable goal as the population is lake-wide and has been established for several decades. Due to the current state of the population of EWM in Lake Iroquois, targeting specific populations of EWM to address and alleviate impacted public good uses is a reasonable management approach for the lake. Targeted control efforts can include control activities such as hand pulling, bottom barriers, diver assisted suction harvesting, and mechanical harvesting. Each control activity has varying degrees of success depending on specific site conditions and the goal of the project. The Secretary's Aquatic Invasive Species Program can offer additional information on these control methodologies and guidance on those activities. Information can be obtained on the following website: http://dec.vermont.gov/watershed/lakes-ponds/aquatic-invasives

B. Comments Regarding Finding c.6. Non-target Environment – 10 V.S.A. 1455(d)(2)

Comment B-1: Not only will Sonar A.S.® kill EWM, it will also impact other non-target aquatic plant species. How will this treatment impact the non-target environment, such as amphibians, reptiles, birds, mussels, or crustaceans? The whole-lake treatment could have short term benefits by controlling EWM. However, how will the whole-lake reduction in EWM impact the system and the accustomed to public good uses in the long term? Have potential impacts to Sunset Lake and other waters downstream been reviewed? The non-target environment does not only include environments within Lake Iroquois, but it also includes non-target environments that may be exposed to waters treated with the pesticide, such as a garden.

Response B-1: Sonar A.S.® is an herbicide used for the management of aquatic vegetation in fresh water. The label identifies that Sonar A.S.® selectivity is dependent upon dosage, time of year, stage of growth, method of application, and water movement. Watermilfoils, *Myriophyllum* spp., except variable-leaf milfoil, are species that are controlled by this product. The dosage concentration and the treatment start date had been selected for the Lake Iroquois project based on how previous treatments in other waterbodies in Vermont went. Lake Hortonia (Hubbardton and Sudbury), 479 acres, and Lake Beebe (Hubbardton), 111 acres, have been treated with Sonar A.S.®, in 2015 and 2016 respectively. Additionally, both waterbodies had been treated with Sonar A.S.® before the most recent treatments. Based on the outcomes of those treatments, a lower concentration of Sonar A.S.® has been shown to improve selectivity for controlling Eurasian watermilfoil while being more protective of other non-target species. However, the Secretary acknowledges that aquatic nuisance control projects will have an impact on the non-target environment to a certain degree. In order to review the potential impact to the non-target environment to determine whether there is an acceptable risk, the Secretary identified the following as the non-target environment:

- Aquatic plants and animals within the waterbody proposed for treatment and waters downstream of the waterbody.
- Wetlands within the waterbody proposed for treatment and wetlands downstream of the waterbody.
- Environments that could potentially utilize waters treated with the pesticide. This includes, hydroponic farming, greenhouse and nursery plants, and all locations irrigated with waters treated with Sonar A.S.®.
- The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact. The concept of ecological integrity is identified in the Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy.

For determining what might be considered an acceptable risk to the non-target environment from the proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment:

- A control project for an aquatic nuisance species has an impact on the ecological integrity of the waterbody regardless of the species being targeted as the non-target environment cannot be avoided completely.
- Rare aquatic plant species have been recorded as being present in Lake Iroquois. Species observed include prickly hornwort (S2S3), *Ceratophyllum echinatum*, last observed 9/11/2014; Nuttall's waterweed (S3), *Elodea nuttallii*, last observed 8/30/2012; slender naiad (S2), *Najas gracillima*, last observed 9/17/1968; straight-leaf pondweed (S2S3), *Potamogeton strictifolius*, last observed 8/2/1993; Vasey's pondweed (S2), *Potamogeton vaseyi*, last observed 8/2/1993; and lesser bladderwort (S3), *Utricularia minor*, last observed 9/14/2012. Aquatic plants controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lake Iroquois include bladderwort, *Utricularia* spp.; common coontail, *Ceratophyllum demersum*; common elodea, *Elodea canadensis*; naiad, *Najas* spp.; pondweed, *Potamogeton* spp.; watermilfoil, *Myriophyllum* spp.; spatterdock, *Nuphar luteum* syn. *Nuphar variegata*; waterlily, *Nymphaea* spp.; and common duckweed, *Lemna minor*. Native vascular aquatic plants partially controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lake Iroquois include tape grass, *Vallisneria americana*; cattail, *Typha* spp.; smartweed, *Polygonum* spp.; and spikerush, *Eleocharis* spp.
- A rare aquatic plant species, fruited bladderwort (S3), *Utricularia geminiscapa*, has been recorded as being present in Lower Pond and was last observed on 9/24/2003. Aquatic plants controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lower Pond include bladderwort, *Utricularia* spp.; common coontail, *Ceratophyllum demersum*; common elodea, *Elodea canadensis*; naiad, *Najas* spp.; pondweed, *Potamogeton* spp.; watermilfoil, *Myriophyllum* spp.; spatterdock, *Nuphar luteum* syn. *Nuphar variegata*; waterlily, *Nymphaea* spp.; and common duckweed, *Lemna minor*. Native vascular aquatic plants partially controlled by Sonar A.S.® as identified on the product label that have been observed to occur in Lake Iroquois include tape grass, *Vallisneria americana*; cattail, *Typha* spp.; smartweed, *Polygonum* spp.; and spikerush, *Eleocharis* spp.
- Mapped Class II wetlands are located at the northern end of Lake Iroquois.
- Mapped Class II wetlands are located at the northern end of Lower Pond, which is the point at which the outlet stream for Lake Iroquois enters Lower Pond.
- Lake Iroquois and its waters are public, and it is reasonable to assume that all public waters may be used for irrigation, which is an identified use in the application.
- While the potential impact to every potential aquatic animal that may come into contact with Sonar A.S.® is not known, the treatment concentration target, 5-8 parts per billion of the active ingredient fluridone, has not been shown to present an unacceptable impact to aquatic animals (pages 6-9: 2240-ANC_TechnicalReferences_02062018).

Based on the comments that were received related to this finding and the subsequent review conducted by the Secretary, the proposed project presents an unacceptable risk to the non-target environment. Given that the EWM population has spread throughout the lake, is a well-established population, and eradication is a highly unlikely outcome from control efforts, attempts to control the entirety of the EWM population poses an unacceptable risk to stability of the ecological integrity of Lake Iroquois. While the target concentration of Sonar A.S.® was proposed to be at a concentration that would likely limit the impact on non-target aquatic plant species, the proposed whole-lake treatment would not be able to avoid non-target aquatic plant populations of species either controlled or partially controlled by Sonar A.S.® or avoid areas mapped as Class II wetlands where species that are sensitive to Sonar A.S.® are likely to be found at higher densities. By targeting the entire population of EWM over the course of one growing season, there would likely be a

temporary but significant decrease in EWM densities as well as reductions of non-target aquatic plant species controlled or partially controlled by Sonar A.S.®. Additionally, this drop in aquatic plant density does have the potential to result in more available phosphorus within the lake that could then be readily utilized by algae, which could result in unintended algae blooms. As eradication of EWM is not the goal of the project or a feasible outcome from control efforts, EWM populations would recover and likely revert to the current state of Lake Iroquois over time, which consists of a lake-wide distribution of EWM. This reversion back to the current state would likely result in the same conditions that resulted in the submission of this permit application for a whole-lake treatment, thus creating a long-term continuous cycle of impact on the non-target environment within the entirety of the lake.

In addition to impacts on species and environments within and downstream of Lake Iroquois, the waters of Lake Iroquois were identified as being used for irrigation. The proposed treatment was to occur over 90-days, beginning in May. As identified on the Sonar A.S.® label, irrigation from a Sonar A.S.® treated area may result in injury to the irrigated vegetation. For those non-target environments irrigated with waters treated with Sonar A.S.®, the treatment poses an unacceptable risk to that non-target environment due to the prolonged duration of the treatment, which would have overlapped with the time of year where irrigation is likely to occur.

While EWM is a stressor on the ecological integrity of Lake Iroquois, the potential lake-wide impacts on the non-target environments as a result of a whole-lake treatment is greater than the impact from the existence of EWM in Lake Iroquois. Given that EWM will be a part of Lake Iroquois for the foreseeable future and that once EWM control efforts are initiated, those control activities would need to occur in perpetuity to maintain suppressed levels of EWM, the proposed whole-lake treatment poses an unacceptable risk to the non-target environment. Therefore, this finding cannot be made, and the application must be denied.

Comment B-2: The narrative portion of the application states that there are wetlands associated with Lake Iroquois, state wetland maps indicate wetlands and yet the draft permit says there are no wetlands. Has the acceptable risk to the numerous wetlands directly adjacent to the outflow of the lake and others downstream been evaluated?

Response B-2: The Vermont Watershed Management Division's Wetlands Program was consulted during the technical review of this project. Potential impacts to wetlands within Lake Iroquois and those wetlands downstream of the treatment area would likely consist of the potential reduction of Eurasian watermilfoil and other species sensitive to a Sonar A.S.® treatment. However, it was anticipated that concentrations of Sonar A.S.® would dissipate to a level where potential downstream non-target impacts would be minimal.

Comment B-3: I do note there are rare species associated with the waterbody, but do not see a Vermont Fish & Wildlife "takings permit" amended to the application. The application and its appended NEAR report disclose the presence a number of RTE. The herbicide Sonar is indiscriminate in its effects on all aquatic plants. RTE are usually the least hardy. RTE will be killed and are likely most unidentifiable in state of decomposition. The WMD should require the applicant and LIA to complete a VT Fish & Wildlife takings permit before considering issuance of the draft permit.

Response B-3: There are five recorded rare aquatic plant species in Lake Iroquois and no recorded threatened or endangered aquatic plant species. Takings permits may be issued by the Secretary of the Agency of Natural Resources for taking threatened or endangered species. A takings permit would not be applicable for the proposed use of Sonar A.S.® in Lake Iroquois as there are no recorded populations of threatened or endangered species.

Comment B-4: Has DEC reviewed plant communities for Lake Iroquois and Sunset Lake?

Response B-4: See Response B-1.

Comment B-5: The application of Sonar will not improve fish and wildlife habitat. It will damage present habitat to the point of changing it.

Response B-5: It is anticipated that there would have been a short-term impact to fish and wildlife habitat as the result of a Sonar A.S. treatment, which would have primarily consisted of alteration to fish and wildlife habitat due to shifting aquatic plant communities.

Comment B-6: The application and draft permit both fail to acknowledge, by reference or name, the existence of Lake Iroquois outfall, the receiving water bodies of upper and lower Sunset Lake "outside the pest management area" and their subsequent contribution of flowing waters to Patrick Brook which then courses through Hinesburg Village center and onto the LaPlatte River.

Response B-6: See Response B-1.

Comment B-7: According to the Williston town website, over 5 species of frogs and several other species of amphibians including the endangered Spotted Salamander are known to inhabit Lake Iroquois.

Response B-7: The Vermont Department of Fish & Wildlife confirmed that no rare, threatened or endangered amphibians are known from Lake Iroquois and that the Spotted Salamander is not listed as endangered. However, the Spotted Salamander is listed as a Species of Greatest Conservation Concern.

Comment B-8: I strongly disagree with item 1.) of Objectives/Goals on page 3. The application of Sonar will not improve fish and wildlife habitat. It will damage present habitat to the point of changing it.

Response B-8: EWM has been identified as not providing beneficial habitat for fish. However, a lake-wide reduction of EWM as a result of a treatment and the subsequent shift in aquatic plant population dynamics may have unintended consequences on fish populations. As a result, the Secretary cannot confirm there would be a tangible benefit to fish and wildlife habitat.

C. Comments Regarding Whether there is Negligible Risk to Public Health – 10 V.S.A. 1455(d)(3)

Comment C-1: There is significant risk to public health from the proposed use of fluridone and the known fluridone metabolites, such as NMF. We know that dilution is not the solution to pollution. Every year doctors and researchers raise the alarm that even small amounts of pesticides have harmful impacts, particularly on children. No pesticide is entirely safe. Like DDT and Roundup, we may find in the years ahead that fluridone has greater human health hazards than are now known.

Response C-1: The Secretary acknowledges that there is an inherent risk to using water treated with a pesticide and that there is opposition to the use of pesticides in water. At the request of the Secretary, the Vermont Department of Health (VDH), Radiological and Toxicological Science Program reviewed and provided recommendations pertaining to the risk of the proposed activity to public health, in which it examined potential concerns for public health that may be associated with exposure to Sonar A.S.® as well as to any potential fluridone metabolites. The VDH provided recommended water use conditions based upon review of current scientific information for potential health effects; half-life of the herbicide and inert compounds; complete dissolution rates; consideration of direct contact with treated waters and the way it may occur; and, several health protective assumptions. The review included standard risk assessment procedures, knowledge of previous chemical control efforts, and the assumption that only one product will be applied per

growing season. Based upon the VDH's evaluation and recommendations, it was determined that human exposure is not likely to result in an increase in the level of concern for public health.

The Secretary determined that the project posed a negligible risk to public health.

Comment C-2: According to the manufacturer, Sonar is supposed to be applied 0.25 mile away from any drinking water sources. We take our water from the lake for drinking and bathing. We know that other residents around the lake use the water for the same purposes. How can we be assured that the contractor hired to apply Sonar knows about each water source and to stay a safe distance away from it? I know that smaller applications can be made within the 0.25-mile limit. Who will monitor and reinforce this limit?

Response C-2: The Sonar A.S.® label identifies that Sonar A.S.® is not to be applied at a concentration greater than 20 parts per billion within one-fourth mile of any functioning potable water intake when within a lake or reservoir. The proposed target concentration of Sonar A.S.® for the Lake Iroquois treatment was between 5-8 parts per billion, which is within the treatment parameters identified on the label.

Comment C-3: I am writing to oppose the use of the herbicide Sonar A.S.® for control of the invasive nuisance plant Eurasian watermilfoil on Lake Iroquois (permit 2240-ANC). My primary concerns are those of long-term public health impact, primarily to the young children swimming in and living on the shores of the lake. As a year-round lakefront resident in Hinesburg, I do not want my four young children exposed unnecessarily to a chemical herbicide. There are currently 14 children living on my road alone. These children spend most of their summers swimming, paddling, sailing, water skiing, fishing, and often ingesting the waters of Lake Iroquois. In addition, as both DEC and ANR are aware, a number of homes draw drinking water from the lake. This application will undeniably expose the children of Lake Iroquois to a chemical, fluridone, and other potentially toxic breakdown products they would otherwise not encounter in natural life. I posit not that fluridone is a known human toxin but rather that its long-term health impact to this vulnerable, developing population is at present unknown and to the best of my knowledge lacking any serious investigation. In such a situation, as with any interventional, we must weigh potential benefits against risks, which includes consideration of the magnitude of benefit, severity of a realized risk, and likelihood of each. In a very simple consideration of this, there are two clear potential benefits: environmental conservation of natural aquatic plants and improved access for recreation. Regarding the former, fluridone' s mechanism of action is not targeted and will in fact affect all plant specifies, and though the proposed concentrations are hoped to affect milfoil while sparing native species, several reports indicate this cannot be assumed with any certainty. And to the latter, certainly removal of plant life will improve access to recreation. However, there are several risks to public health of chemical application, some acute and other late. If we focus only on the potential late effects and assume acute risks are nil, improved access to recreation simply cannot outweigh the risk. Though currently unquantifiable, realization of the potential severity of this outcome is simply too high; that is, any late human health effect in relation to the proposed benefit should be unequivocally unacceptable. To my knowledge no scientific, peer-reviewed reports exist addressing late health effects of exposure to fluridone and its breakdown products to developing, vulnerable children. I request this application (permit 2240-ANC) be rejected at the very least until the Vermont Secretary of Health can assess these potential impacts and make its report available to the public for review and comment.

Response C-3: See Response B-1 and C-1.

Comment C-4: Experts Disagree about Safety and Effectiveness: We are not scientists, but we have read widely varying views about the proposed herbicide and its effects. Scientists are not in agreement on this issue. Some profess that it is safe for humans and the environment in specified doses while others raise alarm about its use, even in low lose. These conflicting reports merit attention and careful consideration. All too often, we humans have trusted only to discover later that the scientific advice had not delved deeply enough

into the complexity of the issues. Regarding this chemical treatment, we have read that humans are not to drink the treated water for a brief time and yet the water should not be used on shrubs and trees for a full month after treatment. We read that the chemical breaks down in sunlight and yet it will reside at the floor of the lake in depths where there is little sun penetration. It is at those depths that our neighbor's potable water intakes lie. Their filtering systems are effective in clearing harmful bacteria but would be impotent against this herbicide. We have read that, in other lakes which have been treated, the invasive aquatic plants have begun to develop resistance to herbicides, leaving an even worse problem than before.

Response C-4: See Response C-1.

Comment C-5: Will my well water be impacted by the treatment?

Response C-5: See response to C-1 regarding potential risk to public health. The application has been denied and therefore this comment is no longer applicable.

Comment C-6: Is NMF safe?

Response C-6: See Response C-1.

Comment C-7: Please clarify what negligible risk is.

Response C-7: The Secretary considers a project to have a negligible risk when the risk to the environment and public health is so minimal that only inconsequential harm is expected to occur as a result of the proposed control activity.

Comment C-8: According to the Wisconsin Dept. of Natural Resources (2012) fact sheet, fluridone requires 45-90 days of contact time to be effective. Wouldn't that mean that the lake should not be accessible the entire summer (~90 days)? The half-life is 4-97 days, so again, to be safe, presumably 3 months of time is the minimum required before it might be safe to go back in the water (or longer, since 97 days just represents the half-life).

Response C-8: The Sonar A.S.® label does not identify any water use restrictions following the application of Sonar A.S.®, except for irrigation purposes. However, to minimize unnecessary exposure to Sonar A.S.®, the VDH provided the Secretary with additional water use advisories and recommendations, which are no longer applicable as the application is denied.

Comment C-9: The Wisconsin fact sheet says that the EPA has requested additional studies on the degradation products NMF and 3- trifluoromethyl benzoic acid. Doesn't that mean that we really don't know whether these degradation products are safe?

Response C-9: As there is an inherent risk to using water treated with fluridone, the VDH provided the Secretary with additional water use advisories and recommendations to minimize unnecessary exposure if the treatment were to take place. In addition, based on the photolysis and behavior of fluridone in aquatic systems, the concentration of fluridone resulting from a Sonar A.S. ® treatment with a target concentration of 8 ppb should not be sufficient to result in the formation of NMF above a detection limit of 2 ppb. Under a realistic worst-case scenario, a concentration of greater than 30 ppb of fluridone would be needed to form 2 ppb of NMF.

Comment C-10: Our water source uses a sand filter to draw the water into the house pipe. If sunlight is required to break down the Sonar, how will we know that the chemical has broken down sufficiently when our sand filter is 15 feet below the surface where it receives little to no sunlight and can sequester the chemical within the sand? The Wisconsin fact sheet states that fluridone residues in sediments reach a maximum in 1-4 weeks and decline in 4 months to a year, so presumably our filter shouldn't be used for up to a year! And how would we know it was safe to use it again? With regards to other shady areas of the lake, how is it possible that the Sonar will break down sufficiently in these areas?

Response C-10: The application has been denied and therefore this comment is no longer applicable. However, fluridone primarily degrades through photolysis, biodegradation, and least significantly by volatilization.

Comment C-11: I am a sailor in a boat that sits low in the water and I do end up in the drink once in awhile. I am not familiar with fluridone on the lake (the herbicide in the jug mix SePRO Sonar A.S.®) and wonder how toxic it is and how long it lasts?

Response C-11: The proposed treatment anticipated a concentration of Sonar A.S.® of 5-8 parts per billion for 90 days. The active ingredient, fluridone, is within Cancer Classification Group E: Evidence of Non-carcinogenicity for Humans (USEPA Office of Pesticide Programs, Health Effects Division, Science Information Management Branch: "Chemicals Evaluated for Carcinogenic Potential" (April 2006)). https://pubchem.ncbi.nlm.nih.gov/compound/43079#section=Toxicity

D. Comments Regarding Finding c.8. Long-range Management Plan – 10 V.S.A. 1455(d)(4)

Comment D-1: Without an enforceable means of limiting the reintroduction of EWM from boats coming from into Lake Iroquois the Long-Range Management Plan will be ineffective and regular fluridone treatments may be needed. The financial costs for long range management beyond the five years has not been recognized and there is no assurance that taxpayers will authorize funds even for the next five years.

Response D-1: Updates to 10 V.S.A. § 1454 Transport of aquatic plants and aquatic nuisance species, occurred in 2017, which further clarified an enforceable means to restrict the movement of aquatic species.

How the Permittee finances a control project, as identified in the long-range management plan, is not a consideration when reviewing this finding.

Comment D-2: Item 2 of Objectives/Goals on page 3 is vague and ambiguous on the duration of the permit and permit conditions. It is imminently uncertain if this is a permit to treat 1 year, 5 years, 6 years or longer? Why does the application nor draft permit not mention the eventual but absolute intention to also use a second herbicide such as triclopyr?

Response D-2: See Response A-1. The methods used for the control of an aquatic nuisance should proceed in accordance to an integrated pest management plan. This plan should develop methods for evaluating the efficiency of the integrated pest management plan to act as a feedback loop for determining how future control efforts should proceed. The plan should have short and long-term goals where annual determinations on the status of nuisance targeted for control influences the types of control methods used in future years.

Comment D-3: There is no clear long-range management plan developed which incorporates a schedule of pesticide minimization.

Response D-3: As identified in the application, the long-range management plan consists of the following:

"The long-range management plan for controlling EWM in Lake Iroquois will incorporate a schedule of pesticide minimization through the efforts to utilize the non-chemical control program upon review of

annual plant survey results. The results of each annual survey will drive the control effort in the following year. According to water scientists, it is not possible to definitively predict how a waterbody will respond to chemical treatment, therefore we plan to base decisions for each year on the data derived from the annual plant survey. After initial herbicide treatment and based on survey results, mechanical means and/or hand pulling will be able to address isolated re-occurrences of EWM. It is hoped that EWM populations will be reduced to a point where non-chemical control techniques are appropriate, including handpulling, bottom barriers, or suction harvesting. These will all be used before pursuing additional chemical control options. The appropriate methodology for EWM control efforts are based on plant density survey results that will be discussed annually during the winter months."

Comment D-4: We were told at the Town Meeting that the Lake Iroquois Association was planning a one-time application potentially this year, but the article in the paper says that there may be subsequent applications in May, June and July. This is information that was not shared with Town and therefore may have influenced the vote to spend $30,000 supporting this action. We were told at the Town Meeting that there is a 5-year plan, but again, the citizens were only told about one application this year.

Response D-4: The proposed Sonar A.S.® treatment consisted of maintaining a concentration of the active ingredient, fluridone, at 5-8 parts per billion for 90 days or longer (the treatment period). To maintain that concentration, booster treatments typically occur over the 90-day treatment period.

Comment D-5: One of our other concerns is that ultimately the Milfoil will grow back unless steps are taken to prevent this. These steps will require better attention to problems with soil erosion, run-off, phosphorous and other pollutants, as well as reducing heavy motor boat activity that may re-introduce the Milfoil into the lake and contribute to spread of the weeds by propeller and boat action. I believe that the DEC and the towns surrounding Lake Iroquois should spend their valuable resources on education and other non-chemical means to reduce the weeds (divers, suctioning, mats) and control their growth.

Response D-5: See Response A-1 and A-2.

Comment D-6: I would like to be provided with more information on the residual effects of the chemicals planned to be used and the goal of these treatments, which I understand involves a five-year period of applications. Will this remove the milfoil and for how long?

Response D-6: It was anticipated that EWM populations would have been reduced after a Sonar A.S.® treatment in Lake Iroquois for several years. Future control projects would have been guided in accordance with Response D-3, which incorporates concepts similar to an integrated pest management plan. It is encouraged that the applicants and Lake Iroquois Association collaboratively work with the Secretary to identify an integrated pest management plan for Lake Iroquois.

Comment D-7: The LIA has not demonstrated an acceptable long-range management plan, which incorporates a schedule of pesticide minimization. While the Town of Williston has nominally signed the permit application, it has not declared its willingness to step in and assume leadership for this project. The Town of Hinesburg, home to the majority of residences on the lake, never signed onto this proposal at all, and has never expressed a willingness to take it over should the need arise. At the same time, the LIA has no prior track record for raising the necessary funds to accomplish such a large and expensive project. Unlike other lakes, for example, Lake Dunmore, the LIA has no endowment, no business sponsorships and no long-term commitment of funds from any source. The LIA will likely find it extremely difficult, year after year, to raise the enormous sums necessary to follow through with this proposal. Furthermore, the LIA has no evidence

from prior projects to show that it has successfully managed and sustained the kind of large-scaled financial commitments necessary to carry out a long-range management plan.

Response D-7: 10 V.S.A. § 1455 Aquatic nuisance control permit, does not require a Permittee to demonstration how a control project will be funded. How the Permittee finances a control project, as identified in the long-range management plan, is not a consideration when reviewing this finding.

Comment D-8: Once the Lake Iroquois weeds have been killed, large motorboats -- including wakeboard boats carrying invasive species in their bilge tanks -- will continue to trailer into the Lake, perhaps even increasing in number because of the relative absence of weeds. Renewed infestation with invasive species is all but guaranteed. Additionally, milfoil has been shown in many other lakes to quickly develop resistance to fluridone over a short period of time. The milfoil will then bounce back with a vengeance. This situation would likely lead to the use of additional herbicides, rather than to "pesticide minimization" as required by the permit application.

Response D-8: 10 V.S.A. § 1455 Aquatic nuisance control permit, does not identify a limit to the frequency at which a pesticide can be used. See Response A-1 and A-2.

E. Comments Regarding Finding c.9. Public Benefit – 10 V.S.A. 1455(d)(5)

Comment E-1: The LIA herbicide use permit application fails to establish a strong public benefit to be achieved from the application of fluridone. Clearly, invasive species are a problem in Vermont, not only in lakes, but also on land throughout the entire State. Right now, the water quality in Lake Iroquois is relatively good. The lake has recently seen a new nesting pair of loons return for several years to its water. The lake is known for its variety of birds, for its fishing potential and for the many creatures whose life it sustains. Many paddlers, nature lovers and fishermen enjoy the lake. The weeds are a nuisance, primarily to swimmers and motorboat users on the lake. Killing all broad-leafed plants in Lake Iroquois will negatively impact many of its other uses. And applying herbicide will negatively impact water quality as well. Weighing the benefit of enhanced swimming and boating against the potential problems, which use of the herbicide fluridone might cause, leads to the conclusion that a strong public benefit is anything but assured. Has a cumulative impact assessment been conducted? It is unclear if a cost: benefit analysis has been done. Has the collateral damage (including animals and people) to the watershed been adequately studied? It is unclear if the benefit for all has been considered - is this to protect lakeside property owners' values, or other values?

Response E-1: In response to public comment, the Secretary considered the following criteria in determining whether there is a public benefit to be achieved from the application of the pesticide:

- Whether carrying out the project produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
    - Assessment: Tangible benefits to be achieved in the target waterbody primarily stemmed from the anticipated temporary decrease in the frequency of occurrence and biomass of EWM. This temporary decrease was anticipated to result in a tangible benefit for boating and swimming, as the littoral zone within the waterbody would likely have had a reduced abundance of aquatic plant biomass, which would have facilitated less impeded use. Lake Iroquois is 244 acres and the littoral zone covers approximately 105 acres, which is 43% of the total lake surface area as identified in the application. Open water conditions comprise 139 acres, 57% of the total lake surface area. The potential temporary tangible benefit to boating and swimming could have occurred at up to 43% of the total surface area of the lake while the remaining surface area would see no anticipated change. Regarding fishing as a public good use in relation to the proposed project, it remains undetermined as to whether the project would produce a tangible long or short-term benefit. EWM has been identified as not

providing beneficial habitat for fish. However, a lake-wide reduction of EWM as a result of a treatment and the subsequent shift in aquatic plant population dynamics may have unintended consequences on fish populations. As a result, the Secretary cannot confirm there would be a tangible benefit to fishing. Potential impacts on the water resource are identified in finding a.6. of this decision. The Secretary has determined that the temporary tangible benefits to boating and swimming do not outweigh the potential impacts on the water resource.

- Whether the potential cumulative impacts from carrying out the control project adversely affect the water resource and the public that utilizes that resource.
    - Assessment: Additional cumulative impacts were considered that related to the water resource and how the public may utilize that resource. The Secretary has determined that the cumulative impacts from carrying out the control project would adversely affect the water resource and the public that utilizes that resource.
        - For property owners abutting Lake Iroquois and for property owners abutting the immediate surface waters downstream, which includes the 58-acre waterbody known as Lower Pond, which is approximately 0.25 miles downstream of Lake Iroquois, the VDH issued recommended water use restrictions for those properties, which includes temporary avoidance of treated water up to one mile from the outlet of Lake Iroquois for all uses, including boating, fishing, swimming, and domestic use. In addition, product use precautions from the Sonar A.S.® label recommends not using water from a treated area for irrigation for up to 30 days after application for established row crops, turf, or plants. The recommended water use precautions could remain for approximately 90 days beginning in May are unreasonably burdensome on individuals.
        - Lake Iroquois is located within Zone 2 of the Champlain Water District Surface Water Source Protection Area. While it was not anticipated that Sonar A.S.® would reach the Champlain Water District's intake pipe, the waters of Lake Iroquois are considered to be a primary recharge area for the Champlain Water District. It was not anticipated that the project would have a cumulative impact that would adversely affect the surface water source protection area.
        - Lake Iroquois is not located within a Groundwater Source Protection Area.
- Whether measures to reduce impacts on the water resource have been taken.
    - Assessment: The project proposed to control EWM only, which is an aquatic invasive species. The target concentration of Sonar A.S.® was reduced to 5-8 ppb to reduce potential impacts to non-target species that are controlled or partially controlled by Sonar A.S.®.
- Whether the project is excessive for the stated purpose.
    - Assessment: Sustained aquatic nuisance control activities have not occurred in Lake Iroquois. Initiating a lake-wide EWM control effort in Lake Iroquois with a whole-lake treatment before more thoroughly undertaking less intrusive feasible alternatives is excessive. The project is considered excessive for the stated purpose.

Based upon review of the public good criteria, the Secretary has determined that the potential impact on the public good outweighs the perceived public benefit to be achieved from the application of a pesticide. Therefore, the Secretary cannot affirmatively find that there is a public benefit to be achieved from the application of a pesticide, and the application must be denied.

Comment E-2: The proposed use of herbicides will adversely affect the drinking water of the residents of Lake Iroquois as well as people who obtain their drinking water form downstream sources such as Sunset Lake. Water treated with the herbicide will also impact how the water is used for gardening and watering house plants.

Response E-2: See Response B-1 and E-1.

Comment E-3: Algae have been shown to increase after fluridone use, once the plants are gone and no longer absorbing nutrients from the lake. Extensive algae blooms will negatively impact life in the lake. And poisonous blue-green algae blooms may prove toxic not only to lake-dwelling animals, but also to dogs and humans entering the lake.

Response E-3: See Response E-1. Algae is a form of primary production within the freshwater environment. The presence of algae is a natural part of the freshwater environment, especially within eutrophic systems, which Lake Iroquois is (see Response A-5 for the Lake Iroquois Score Card).

Comment E-4: I am writing to you as a Hinesburg resident, who has just learned of the plans to use Sonar in Lake Iroquois this summer in order to deal with the milfoil. I have also learned that this will affect my ability to drink water in my home, water my plants, garden, recreate, and keep my pets safe. I live in Hinesburg almost solely for the purpose of giving my four-month-old puppy a place to be outside and run around. The lake is vital to my quality of life and it is one of the main reasons why I chose to live in Hinesburg even though I work in Burlington. Implementing this current plan to use Sonar in the lake will not only make my quality of life, and the reason I pay my taxes to Hinesburg, lesser, I fear it will also endanger my dog. I agree that milfoil is a nuisance, and that the lake would probably be more enjoyable without it, but it appears to me that the solution to the problem is worse. I would rather deal with the nuisance of milfoil, than the danger of the Sonar. I still swim in, paddle on, and exercise my pet with the milfoil just fine. There is also no guarantee that the milfoil won't simply be brought back by a careless visitor with a boat. This form of treatment may not seem like a big deal to the people who are not directly involved, but it will have a huge impact on the daily lives of those who live on and around the lake. I strongly suggest that you to rethink your plan and consider the effect that it will have on the entire community of Hinesburg and the people who use the lake, either for recreation or a place to bring their pets. Please look at all the angles of your plan and take a look into the effects that it will have on the greater community.

Response E-4: See Response E-1.

Comment E-5: I am imploring you and the state to reanalyze the cost-benefit analysis here, and to err on the side of keeping people safe instead of pleasing a few who would enjoy their recreation slightly more. Not having milfoil would be a luxury to some, while using the Sonar would be an endangerment to those like me. Please do not but me in danger for others' luxury.

Response E-5: See Response E-1.

F. Procedural Comments

Comment F-1: Why does “Written Notification” (page 8) only seem to apply to waterfront property owners on Lake Iroquois when it is known fact Lake Iroquois has a discharge and that 40% of rural Vermont households use shallow wells for drinking water supply. I feel this upcoming treatment of Lake Iroquois is completely inappropriate. There has been little to no information disseminated to the people living on the lake, getting their drinking water from the lake, or downstream from the lake about this process and how it will affect

them. I fail to see how a few vocal people can get a public body of water to be treated with a chemical that affects drinking, swimming, watering lawns and gardens without any outreach prior to approval.

Response F-1: An opportunity for the public to review and comment on this application was provided in accordance with the Department of Environmental Conservation's *Public Review and Comment Procedures for Aquatic Nuisance Control Permit Applications and General Permits*, adopted per 3 V.S.A. Chapter 25, on January 30, 2003. To increase the opportunity for the public to participate in the decision-making process, Act 150 went into effect January 1, 2018, which replaces the Department of Environmental Conservation's *Public Review and Comment Procedures for Aquatic Nuisance Control Permit Applications and General Permits*, adopted per 3 V.S.A. Chapter 25, on January 30, 2003. Act 150 standardizes the permitting process for the Department of Environmental Conservation's permits and requires applications, draft decisions, and decisions to be posted to the Environmental Notice Bulletin (https://enb.vermont.gov/), which is a web based public notification site where one is able to sign up for public notifications of their choice. In addition, the Aquatic Nuisance Control webpage provides guidance on who needs to be notified of a project proposing the use of a chemical as: "Any property owner that abuts that lake, lake section, or surface water where the proposed activity may occur. In addition, property owners that abut the surface water receiving effluent that may potentially be affected by a decision on the application."

Comment F-2: The process used for public input was inadequate given the nature of this project. The public should have improved notification of pending projects and more involvement with the decision-making process for a project that can have short and long-term impacts on the environment and the people within the watershed.

Response F-2: See Response F-1.

Comment F-3: Once this chemical goes into the lake, it cannot be removed. And the Lake Iroquois Association is committing to a long-term continuation of chemical treatment. Why does the state allow 5 or 6 people to make such a monumental decision, affecting hundreds or even thousands of other people? Not to mention, the impact on fish and mammals and amphibians living in the lake. Why does the state delegate such an important task to a small, volunteer organization like this? What if the current board steps down or loses interest or moves away? Who will take over responsibility for this ongoing project? What if the chemical is applies incorrectly? Who is overseeing it? What kind of enforcement will there be? And if something goes wrong, who will be liable? Who is ultimately responsible if damage occurs as a result of this chemical application?

Response F-3: 10 V.S.A. § 1455 Aquatic nuisance control permit, does not identify parameters as to who may apply to use a pesticide. Provided the findings can be met, a permit shall be issued. The Vermont Agency of Agriculture, Food and Markets regulates the use of pesticides and all pesticide applicators shall be certified by the Vermont Agency of Agriculture, Food and Markets in Category Five – Aquatic Pest Control. For authorizations under 10 V.S.A. § 1455, the permittee and those operating under a permit are the parties responsible for ensuring the project occurs in accordance with the authorization. Noncompliance with an authorization under 10 V.S.A. § 1455 is addressed by the Lakes and Ponds Program and the Environmental Enforcement Office.

Comment F-4: The Lake Iroquois Association proposes to keep using this chemical indefinitely for years to come. Who will take responsibility for this enormous undertaking. And who will make sure it is done right?

Response F-4: See Response F-3.

Comment F-5: Will a website be created for notification purposes?

Response F-5: The application has been denied and the comment is no longer applicable.

Comment F-6: Should the towns develop a notification system?

Response F-6: This comment is outside the scope of review under Aquatic Nuisance Control.

Comment F-7: The "Public Information Notification" requirements fail to rise to the level of notification required by, and given, by the U.S. Fish and Wildlife Service Notice for a similar application of pesticide. It also fails to inform reviewers of the draft permit that treatment dates are subject to change to weather conditions, flows, or technical problems. The severity, seriousness, and scope of these notifications were not presented at the 2017 Hinesburg Town Meeting and remain unknown to citizens, property owners, and intended vacationers until so notified.

Response F-7: See Response F-1.

Comment F-8: There are many home gardeners, vegetable farmers and nurseries located downstream within the LaPlatte watershed that may use fluridone treated water for irrigation. How will these homeowners and businesses downstream be notified that the manufacturer cautions against using the water for irrigation for 30 days?

Response F-8: The application has been denied and therefore this comment is no longer applicable.

Comment F-9: A chemical treatment of the lake water is a step which affects many people in many ways. While Lake Iroquois Association has indeed offered some information to its membership, local lakeshore property owners and some others, there are many many people who remain unaware of the pending permit. In addition, of those who are aware of this pending action, there are many who have deep unresolved concerns. It is vital that the broad public be given a chance for robust discussion.

Response F-9: See Response F-1.

Comment F-10: Although we have been involved with the milfoil issue for some time, we heard by happenstance about the "notice period" for the pending permit 2240. We are not questioning whether the permittee followed Vermont's public notice regulations, but we are indeed questioning those very rules in this modern age; we feel strongly that it is unreasonable to proceed under these circumstances. Many people who own property on the shoreline have and still are unaware of the pending permit, and thus have had no opportunity to review the situation or voice their opinions. We ourselves know of several shoreline property owners who are advertising or have already booked seasonal rentals for their camps, and they are just now learning of the possible plan to treat the water with chemicals. This proposed treatment will drastically affect their situation: guests coming to bucolic Vermont will be told they cannot swim, must drink bottled water - it may well cause the owner to lose much of the season and cause irreprovable economic harm. And it is not only the shoreline property owners who are affected. Lake Iroquois is a Vermont resource and public treasure. People come from all over to access the lake at the boat access. There has certainly not been a broad public awareness or discussion of issues related to the pending permit. There is so much more to say. We appreciate that there will be a public information session in early May, but this too is woefully inadequate. One evening in one location. Some people will have unavoidable conflicts which prevent their attendance (that is in fact the case with us!) and one evening is not sufficient to address all the uncertainties and inadequacies and problems mentioned above. Enough. Our deeply held conviction is that this process

has not been appropriate for the State to rule in favor of the pending permit. Please consider the many issues related to chemical treatment and deny the permit. If at a later date, the permittee wishes to apply again after the many issues have been addressed, that option remains. To permit action now would be a grave mistake.

Response F-10: See Response E-1 and F-1.

Comment F-11: "The informational notification shall be provided to all abutting property owners to Lake Iroquois and within one mile of the effluent…" The application and draft permit fail to acknowledge and recognize that Lake Iroquois has an effluent or discharge of any distance nor does it pinpoint the end point of "within one mile of the effluent" leaving this critical determination until after the public comment closes.

Response F-11: The application has been denied and therefore this comment is no longer applicable.

Comment F-12: "Herbicide Concentration Monitoring" sampling locations to be given one week prior to treatments is provided only to the Secretary, without any defined exactitude, but certainly not to all effected parties who are subject to the notification requirements, nor to the public who may review this application in need of confidence that timely and accurate monitoring will actually be accomplished.

Response F-12: The application has been denied and therefore this comment is no longer applicable.

Comment F-13: Specific Condition 8.) F. & H. "…, by laboratory analysis," is an open-ended condition not requiring standard laboratory methods and procedures by a reputable third party laboratory as has been required in other northern climate like-wide applications of Sonar. The use of SePRO Corporation FasTEST kits and subsequent SePro laboratory is a tacit State of Vermont product endorsement and presumably illegal. The public and effected parties, perhaps not LIA officers, are essentially excluded from the communications, tests results, and laboratory results, shared between the contractor and the Secretary. This is an unprecedented closed circle arrangement when the State is permitting an application of a pesticide to a drinking water supply.

Response F-13: The application has been denied and therefore this comment is no longer applicable.

Comment F-14: Standard Condition 3.) "Decision-makers & Operators as Permittees". It is patently clear and stated in the application that there are numerous decision-makers & operators involved in the application of the presumed herbicide. However, no completed WMD "Notice of Addition of Permittee" forms are attached to the permit application for the LIA Board, LIA volunteers, or Mr. Jamie Carroll which is a violation of this permit process.

Response F-14: It is not required that all decision-makers and operators involved with a control project be identified when an application is submitted. However, all decision-makers and operators that are responsible for the control activity are required to be added to a permit to operate under the permit.

Comment F-15: I do see in the above referenced document that "Upon receipt of a complete application for an individual aquatic nuisance control permit, the "Secretary" shall classify the proposed control activity as posing either negligible or more than negligible environmental risk. Furthermore, for all other waters (i.e., not private) I see that the application fails 2 of 5 conditions, no Class I or II wetlands and no known occurrences of RTE in the area to be controlled. It follows that if the 5 conditions are not met (2 are not met) "the controlled activity shall be determined to pose more than negligible risks". I don't see this determination included in draft permit #2240-ANC.

Response F-15: The Public Review and Comment Procedures for Aquatic Nuisance Control Permit Applications and General Permits does not require the determination of the proposed control activity as posing either negligible or more than negligible environmental risk to be added to the findings of a decision.

G. Other Comments *(Such as construction detail questions and questions which are outside of our scope of review)*

Comment G-1: Violation of State of Vermont Pesticide General Permit (PGP). The application and attachments include serial references to multiple parties. The application form lists SOLitude Lake Management as the applicator and is signed by Marc Bellaud. The State of Vermont accepts no legal responsibilities for damages (draft permit b.8. page 4). The herbicide manufacturer Sonar A.S.® label states (Inherent Risks of Use, page 5) "… all such risks will be assumed by buyer". The PGP requires and provides completion for Notice of Addition of Permittee form. Given the understanding(s) presented in the application the application also needs to include such completed forms for all participating volunteers, for the members of the LIA Board, and specifically for Jamie Carroll.

Response G-1: An authorization under 10 V.S.A. § 1455 does not relieve a permittee from obtaining all other approvals and permits prior to commencement of activity, or the responsibility to comply with any other applicable federal, state, and local laws or regulations. The proposed treatment would have required that the Operator, SOLitude Lake Management, apply for PGP coverage as identified under Section 1.2.2b.

Comment G-2: This is an untested herbicide.

Response G-2: SePRO's Sonar A.S.® is a registered herbicide with the U.S. Environmental Protection Agency (Registration Number 67690-4) and the Vermont Agency of Agriculture, Food and Markets.

Comment G-3: Block E. 3.) require the submission of the product label & Material Safety Data Sheet (MSDS). No MSDS or SDS for Sonar was attached to the application.

Response G-3: The application has been denied and therefore this comment is no longer applicable. However, the MSDS for Sonar A.S.® can be found here: https://www.sepro.com/Documents/Sonar-AS_SDS.pdf

Comment G-4: The Back-Up…Sonar A.S.® (fluridone) Treatment Plan is riddled with error and artifacts from the contractor's previous plans as follows:

- The "specific plans for 2015" (sic) head the table on page 6 instead not 2017.
- The application rate can't be calculated properly when the stated lake volume of Lake Iroquois is 8991 acres feet on the State of Vermont's web page for Lake Iroquois whereas it appears as 4636 acre feet in this plan.
- "Quantity of Herbicide to be Applied" (page 6) as 35 gallons of Sonar A.S.®, 140 lbs. of active ingredient, is disingenuous as the contractor does not have an exact quantity how much Sonar will be needed to reach the desired range as the approach is admitted to be trial and error. One 35 gallon drum, is an approximate estimate, because that's the size of a standard shipping container.
- "Dose Calculations" - (page 6) why is it…"That the lake will be divided into distinct treatment basins" does not synchronize with any other similarly oriented critical detail in this entire application.
- "Treatment Timing" - (page 7) as described does not make any sense. The explanation given is duplicative, misplaced, or meant to mislead. "Treatment Timing" is not given for Sonar A.S.®, as it was for Sonar One which was administratively obsoleted.
- FasTEST Monitoring - (page 7) Describes the wrong lake(s), wrong roads, and wrong volunteer organization.

Response G-4: The application has been denied and therefore this comment is no longer applicable.

Comment G-5: "Target Concentrations" paragraph authorizes pesticide use up to five times during the treatment year. The LIA presented to the attendees at the Town of Hinesburg on March 6, 2017, that the herbicide Sonar to Lake Iroquois would consist one single treatment. As written Article 10 of the presented Town budget did not specify that the tendered appropriation of Hinesburg funds by its citizens would include the herbicide application to Lake Iroquois. However, it did entangle the Town of Hinesburg in any subsequent deliberations over this application.

Response G-5: This comment is outside the scope of review under Aquatic Nuisance Control.

Comment G-6: The day(s) Sonar is released into Lake Iroquois and its downstream receiving waters State of Vermont statutes, V.S.A 159 Section 6617, requires any person who has knowledge of a release or a suspected release, and maybe subject to liability for a release, shall (sic) immediately notify the VT Agency of Natural Resources via the Sites Management Section of the Waste Management and Prevention Division. The responsible party is required to take necessary response actions to address the release which are enormous.

Response G-6: Authorizations under 10 V.S.A. § 1455, Aquatic Nuisance Control, can approve the control of an aquatic nuisance with pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices in waters of the State.

Comment G-7: The Federal Clean Water Act (CWA) unambiguously includes biological pesticides, and chemical pesticides with residuals, are within the definition of "pollutant". While it's unclear whether the State of Vermont's expired Pesticide General Permit (PGP) is in effect, or the newly proposed PGP, it's clear, although not admitted, Sonar, the pollutant, will be released to other waters of the State without permit.

Response G-7: See Response G-1.

Comment G-8: Finding 3.) "Background; Aquatic Nuisance Control Permit History". It is not clear what entity (town) applied for the multitude of ANC permits issued, nor is it clear in what part of Lake Iroquois the permitted activities took place. Application #2240-ANC is a lake-wide application (all towns) of herbicide which is unprecedented, and radically different from previous or existing permits.

Response G-8: One may submit a request to the Secretary for copies of the permits identified under Finding c.3. of the decision.

Comment G-9: The permit does not improve water quality. Use of herbicides will introduce toxic chemicals into the lake that are not presently in the water. The lake water is remarkably clean in terms of human toxins, with the primary pollutants being phosphorus and nitrogen. The herbicide and its degraded components will remain in the pond floor along with additional plant material, resulting in a negative effect on water quality.

Response G-9: See Response E-1.

Comment G-10: Another justification for the application of herbicide on the lake is that it is necessary in order to preserve property values. I believe just the opposite. I am concerned about trying to market my property once it is sitting on a chemically-treated lake. With believe just the opposite. I am concerned about trying to market my property once it is sitting on a chemically-treated lake. With the three applications planned for this summer, assuming a mere 30 day cautionary period for each, (the half-life is said to be up to 97 days)

that still means I can't use the water or even go into the water for the entire summer. And I draw my household water from the Lake. I will not feel safe using it all summer. And potential buyers would likely be very concerned about the potential health effects down the line. How are shoreline property values considered in the review process?

Response G-10: Shoreline property values are outside the scope of review under Aquatic Nuisance Control.

Comment G-11: Use of herbicides will exacerbate lakeshore erosion problems. By "opening up" the lake to increased power boating, the use of herbicides will result in greater wave erosion of lakeshore areas. This is already a significant problem on the lake – e.g. a number of property owners have built vertical "sea walls" to address erosion. These vertical walls reflect waves and add to the erosion problems. In addition, the recent introduction of "wake boats" has increased shoreline erosion considerably. Erosion problems could be addressed with lakeshore buffers and trees, but these actions are not a part of applicants' proposal.

Response G-11: This comment is outside the scope of review under Aquatic Nuisance Control. The authority under 10 V.S.A. § 1455 does not extend to regulating public good uses on a waterbody, such as boating activity. However, see response A-2 regarding potential cultural methods of control.

Comment G-12: Applicants have asserted that the milfoil problem has reached a crisis. Milfoil was first detected in the lake in 1990, so it has been present for over 25 years. Interestingly, in 2016, there were littoral areas of the lake where native pond weed competed successfully with the milfoil. To some extent the problem is cyclical; and it is a problem the lake has seen over many years. The elements that have led to the high levels of milfoil presently have been propellers chopping up the plants and spreading them around the lake, increased shoreline erosion, the stripping of lakeshore buffers and shade tree cover, and problems with erosion resulting from development of buildings, roads and other impervious surfaces in the watershed.

Response G-12: See Response A-1 and A-2. The Secretary acknowledges how aquatic plants have variable and fluctuating population dynamics. When seeking to control an aquatic plant, the Secretary encourages using an integrated pest management approach as outlined in Response A-1 as a means to adapt control methods to fluctuating aquatic plant populations. A part of developing an integrated pest management plan is to identify the possible factors causing or contributing to the aquatic nuisance problem; develop a plan that incorporates short and long-term goals, anticipated levels of control, expectations achieved by a control project, and whether a control project will need to occur in perpetuity to maintain anticipated levels of control; develop management alternatives, such as no action, prevention, mechanical or physical methods, cultural methods, biological control agents, or the targeted use of pesticides, to identify how different control projects may reach the goals of the integrated pest management plan; and to develop methods for evaluating the efficiency of the integrated pest management plan to act as a feedback loop for determining how future control efforts should proceed.

Comment G-13: It is recommended that approval of the permit be denied or delayed until applicants take significant steps to build buffers and to deal with nutrient loading, including erosion, in the lake. If the permit is to be issued, there are elements that could improve the proposal:

1. The proposal is essentially self-policing and requires the applicants to report their own noncompliance. This is a problem. The permit should be immediately revoked by its terms for any noncompliance, with a restriction of at least 5 years before another application for herbicides might be considered. Otherwise, the delays involved in an enforcement action effectively means there is little sanction for noncompliance and no effective hammer for compliance.

2. Approval of herbicides should be coupled with a ban on wake boats in Lake Iroquois or in all Vermont lakes and ponds of less than 300 acres. These watercrafts, with displacements exceeding 6000 pounds, do not

belong on small bodies of water. Their use in these waters not only severely damages shorelines, but also has a significantly higher risk of transporting invasive species in their water ballast tanks.

3. The permit should address dealing with the increased plant material and chemical degradations on the pond floor once plants are killed with herbicides. Suction harvesting has the distinct advantage of removing some of the phosphorus imbedded in the plant material when milfoil is harvested. Herbicide treatment leaves all this plant material in the lake along with the degraded chemicals.

Response G-13: See Response A-1 and G-11.

Comment G-14: To me, this permit, if allowed, allows for a special interest group, boaters, water skiers, fishermen, to use taxpayer dollars to fund continued use of Lake Iroquois for their interest. The chemical treatments remove milfoil, a problem 99% introduced to their interest. The chemical treatments remove milfoil, a problem 99% introduced to the lake on boats, transported in from other infected bodies of water. I ask how can the milfoil be removed when the source of infestation, boats, be permitted to continue to use the lake? Boats chop up the milfoil when it grows near the surface, allowing the milfoil to reproduce further through the cuttings. It seems a reasonable assumption to me, that as long as boats are allowed access to the lake, milfoil will be present and need to be removed regardless of prior chemical treatments. In upcoming years will area voters be asked to fund $100,000 or more annually to treat the lake to permit special interests groups use of the lake?

Response G-14: See Response G-11.

Comment G-15: I firmly disagree with this proposed lake-wide treatment and all its ramifications. Based on the available data, there is nothing that positively supports this option but rather the long-term and short-term negative consequences (impact drinking water, the health of the lake, other environmental concerns, wildlife, recreation, and tourism). Personally, this action could completely change my ability to rent out my home.

Response G-15: The Secretary acknowledges that there is an inherent risk to using water treated with a pesticide and that there is opposition to the use of pesticides in water. See Response E-1.

Comment G-16: Why was Sonar One replaced with Sonar A.S.®?

Response G-16: At the time the application was submitted, Sonar One was a product that had never been approved for use in Vermont under an Aquatic Nuisance Control Individual Permit whereas Sonar A.S.® has been approved and use in Vermont. The applicant requested to use Sonar A.S.® to help with the review of the project.

Comment G-17: For people that are concerned over well water contamination, should there be testing available to those that want it?

Response G-17: The application has been denied and therefore this comment is no longer applicable.

Comment G-18: What EWM control efforts have occurred in Lake George, NY.

Response G-18: Information on EWM control efforts at Lake George can be found here: https://lgpc.ny.gov/invasive-species-management

Comment G-19: How will this treatment impact rental homes and how should treatment information be distributed to renters?

Response G-19: The application has been denied and therefore this comment is no longer applicable. However, permittees are required to develop a public informational notification to be distributed to shoreline property owners. Aa a part of that notification, a statement informing all property owners that if their property is leased, rented, or used at any time during treatment and/or while the use advisories are in effect, the property owner is responsible for properly informing all transient users.

Comment G-20: Should Sonar A.S.® be dyed to provide visual notification?

Response G-20: The application has been denied and therefore this comment is no longer applicable.

Comment G-21: Who will be conducting the water sampling?

Response G-21: The application has been denied and therefore this comment is no longer applicable. However, it is the Permittee's responsibility to follow the herbicide concentration monitoring conditions.

Comment G-22: How will Sunset Lake be sampled?

Response G-22: The application has been denied and therefore this comment is no longer applicable.

Comment G-23: Will the same water use restriction recommendations also apply to Sunset Lake?

Response G-23: The application has been denied and therefore this comment is no longer applicable. However, as a means to minimize unnecessary exposure to a treatment, water use advisories and recommendations apply to the target waterbody and up to one mile downstream of the outlet.

Comment G-24: Why is the sampling plan not included with the application?

Response G-24: A sampling plan had not been specifically identified as an application requirement.

Comment G-24: The State is proposing this project.

Response G-24: The State is not the applicant or proposing this project; the applicant for the project was the Town of Williston.

Comment G-25: In answer to this void - for ourselves, neighbors, and the Town of Hinesburg - I attach, in addition to extensive comments, 3 pages of correspondence, data, and map resulting from the planned installation of the box culvert under Pond Road in 2005, information in the public domain, that indicates the culvert design flow rate for Q2.33 (mean annual flood) is 70 cubic feet of water per second which translates to more than 45 million gallons per day. I request the State and application contractor present and prove their calculations of lake volume vs. chemical concentration vs. time for the duration of this project in advance of permit issuance.

Response G-25: The application has been denied and therefore this comment is no longer applicable. All pesticide applicators are to be certified by the Vermont Agency of Agriculture, Food and Markets in Category Five – Aquatic Pest Control and apply pesticides in accordance with the label.

Comment G-26: Block E. 5.) Requires application rate. "5-8 ppb targeted" does not disclose the actual range of rates (concentrations) and exposures that initially take place in-lake under this application. No calculations are provided. There is no acknowledgement that Lake Iroquois outfall constantly discharges, nor that the application of herbicide is planned for the three highest months of averaged annual rainfall for the area.

Response G-26: See Response G-25.

Comment G-27: At the Hinesburg Town Meeting this past March, a vote was taken to give $30,000 to the Lake Iroquois Association to use in its efforts to eradicate milfoil. Please understand, this was NOT a vote in favor of herbicide use. It was a vote to support the effort to eradicate milfoil. At the meeting, the LIA spokesman said that only ONE application in May was planned, and that perhaps no other applications would ever be required. Already, the message has changed. It now seems that three applications are planned for this summer alone. And more planned for subsequent summers if the need arises. I believe citizens of Hinesburg reasonably assumed that there would be further discussion around the methods used for milfoil eradication. Again, it does not seem right for 5 or 6 people to make a decision with such far-reaching consequences.

Response G-27: This comment is outside the scope of review under Aquatic Nuisance Control. Furthermore, the application under review has been denied.

Comment G-28: The Lake Iroquois Association is a loose, completely voluntary and very small organization. I am a former Lake Iroquois Association board member. I stepped down because I don't support this project, and it has become the focus of the group. The Lake Iroquois Association does not have the depth and knowledge to take on such a big project with such potentially far-reaching consequences. The board does not have any expertise in this area. And these volunteers may step down at any time, walking away from the project and leaving everyone on the Lake stranded with the consequences. A project like this needs a solid, permanent, professional organization not only to steward it but also to take full responsibility over time. The Lake Iroquois Association is absolutely not such an organization.

Response G-28: This comment is outside of the scope of review under Aquatic Nuisance Control. Furthermore, the application under review has been denied.

Permittee Information	
Permittee: United States Fish and Wildlife Service Permit Number: 3051-ANC-C	Control Activity: Pesticide (Lampricide) Waterbody: Lamoille River in Colchester and Milton

a. Specific Conditions

Based upon the Findings contained in this permit, the Secretary of the Agency of Natural Resources (Secretary) has determined that the proposed aquatic nuisance control activity will comply with 10 V.S.A. § 1455 and is hereby approved. The control activity shall be carried out in accordance with the Approved Application, the additional permit terms and conditions contained herein, and such amendments as may be approved in writing by the Secretary, and the following specific conditions:

1. Pesticide Use. The use of lampricides TFM-HP (EPA Registration Number 6704-45 – active ingredient TFM, 3-Trifluoromethyl-4-nitrophenol, sodium salt), TFM-Bar (EPA Registration Number 6704-86 – active ingredient TFM, 3-Trifluoromethyl-4-nitrophenol), and Bayluscide 20% Emulsifiable Concentrate (EPA Registration Number 6704-92 – active ingredient Niclosamide, Aminoethanol Salt) (treatment), are authorized to target sea lamprey, *Petromyzon marinus*, in the waters of the Lamoille River in Colchester and Milton. These pesticides shall be registered with the U.S. Environmental Protection Agency and the Vermont Agency of Agriculture, Food and Markets at the time of use and handled, applied, and disposed of in conformance with all state and federal regulations.

2. Certified Applicator. All applicators of the authorized pesticides shall be certified by the Vermont Agency of Agriculture, Food and Markets in Category Five – Aquatic Pest Control.

3. Agency Notification. Notification shall be provided at least 30 days in advance of the scheduled treatment date to the Secretary of the Agency of Natural Resources and to the Agency of Agriculture, Food & Markets to coordinate pesticide use inspection at the time of treatment. The Secretary shall be notified the day prior to the scheduled treatment regarding whether the treatment will proceed as scheduled. The permittee shall contact Erica Cummings, Agrichemical Research and Policy Specialist, of the Agency of Agriculture, Food & Markets at 802-917-2073 or erica.cummings@vermont.gov, or her replacement, to coordinate.

4. Treatment Location, Monitoring, & Procedures. Treatment(s) and subsequent lampricide concentration and target/non-target monitoring shall be carried out in the Lamoille River in accordance with the following procedures, or as approved by the Secretary. Except for samples collected for water use advisory purposes, TFM concentrations shall be determined with a photospectrometer accurate to within 0.1 parts per million (ppm). Procedures shall be updated as necessary to minimize potential adverse impacts on the resource and to ensure compliance with this permit. All updates to the following procedures shall be submitted to the Secretary for approval.

   A. T*reatment Strategy and Methodology* under Appendix A – 7 through A – 11 in the Approved Application.

   B. Standard Operating Procedures (February 2019) in the Approved Application Appendix.

   C. Contingency Plan for Accidental Spillage of Lampricides during Lake Champlain Sea Lamprey Control Operations (February 2019) in the Approved Application Appendix.

   D. Water Use Advisory Zone Monitoring Plan for Lampricide Treatments of the Poultney/Hubbardton River, Lewis Creek, LaPlatte River, Winooski River, Lamoille River, Stone Bridge Brook, and the Missisquoi River (June 2019) in the Approved Application Appendix.

   E. Prior Notification, Posting and Water Supply Plan for Lake Champlain Lampricide Applications (March 2019) in the Approved Application Appendix.

5. Treatment Frequency. During the effective period of this permit, two treatments are authorized; the first between Labor Day 2020 and by the end of December 31, 2020 and the second between Labor Day 2024 and December 31, 2024, unless approved otherwise by the Secretary. If the 2020 or 2024 treatment must be postponed until 2021 or 2025, that rescheduled treatment must occur between Labor Day and by the end of December 31 provided the permit is still in effect.
6. Treatment Concentration & Duration. As determined by an on-site toxicity test conducted on or after September 1 of the year of the treatment, lampricide shall be applied to maintain a 9-hour lethal concentration (1.0 x Minimum Lethal Concentration (MLC) or greater) in all downstream areas from the primary application point within the treatment area. The treatment shall not exceed 1.3 x MLC to sea lamprey. TFM shall not be applied into the Lamoille River at a single location for longer than 14 consecutive hours. If applicable, a sodium chloride (NaCl) pulse used to conduct a time travel analysis to refine TFM concentrations shall not exceed the Vermont Water Quality Standard of 230 mg/L.
7. Water Temperature. On the day of treatment, the water temperature at the primary application point must be at or above 2° C or the treatment shall not proceed.
8. Stream Flow. The river flow rate shall be monitored from the USGS 04292500 LAMOILLE RIVER AT EAST GEORGIA, VT gauge during a treatment. River flow downstream of Peterson Dam shall be maintained below 1,800 cubic feet per second (cfs), if feasible, until completion of the post mortality survey.
9. Lake Level. The treatment shall not occur unless the surface elevation of Lake Champlain is at or below 98.0 feet National Geodetic Vertical Datum (NGVD) 1929 as measured at USGS 04294500 LAKE CHAMPLAIN AT BURLINGTON, VT.
10. Water Use Advisories and Recommendations. Beginning on the day of treatment, the following water use advisories and recommendations apply to the zones of the Lamoille River as identified within the *Water Use Advisory Zone Monitoring Plan for Lampricide Treatments of the Poultney/Hubbardton River, Lewis Creek, LaPlatte River, Winooski River, Lamoille River, Stone Bridge Brook, and the Missisquoi River* (June 2019), or its approved replacement:
    A. Public Water Supplies: The water should not be used for drinking or food or beverage preparation until measurements of TFM are below the reporting limit of 100 parts per billion (ppb) in any public water supply finished water sample.
    B. Private Water Supplies: The water should not be used for drinking or food or beverage preparation until measurements of TFM are below the reporting limit of 100 ppb in areas where there may be private water supplies.
    C. The water should not be used for swimming until measurements of TFM are below 3.9 ppm.
    D. The permittee shall inform the public of the water use advisories and recommendation contained in this section in accordance with the plans as identified under conditions a.5.D. and a.5.E. of this permit.
    E. All laboratory analyses for TFM regarding public use advisories and notifications shall be conducted with a minimum detection limit of 5 parts per billion (ppb) or less.
    F. A website shall be maintained (https://www.fws.gov/lcfwro/sealamprey/lamprey_control_information.html) and a toll-free phone line (1-888-596-0611) for the public to check on the current status of the public water use advisories and recommendations.
11. Post-Treatment Surveys. Post-treatment non-target/target surveys shall occur in accordance with condition a.4. of this permit. In addition, preliminary results shall be made available to the Secretary within 24 hours of

completion. If preliminary results indicate a significant level of impact on non-target organisms, then a full reach survey may be requested by the Secretary. When possible, all specimen of mudpuppy (*Necturus maculosus*) mortalities shall be collected and preserved in a manner to ensure continued study.

12. Potable Water. On the day of treatment and until water use advisories identified under condition a.10.B. have lifted, the permittee shall supply potable water upon request to those who depend upon the treated waters for domestic use to prepare food or drink within the advisory zones as identified within the *Water Use Advisory Zone Monitoring Plan for Lampricide Treatments of the Poultney/Hubbardton River, Lewis Creek, LaPlatte River, Winooski River, Lamoille River, Stone Bridge Brook, and the Missisquoi River* (June 2019), or its approved replacement.

13. Annual Reporting.

    A. An annual report shall be submitted to the Secretary by May 1st of the year following a treatment and shall include at a minimum:

        i. Batch numbers and the quantity used of TFM HP, TFM Bar, and Bayluscide 20% Emulsifiable Concentrate.

        ii. Results from the on-site toxicity test and MLC determination.

        iii. Total treatment duration.

        iv. Summary of water chemistry monitoring data.

        v. Summary of stream flow data.

        vi. All non-target, non-lamprey post-treatment mortality survey data.

        vii. A proportional representation of each lamprey species in post treatment collections.

        viii. Other observations, corrective actions taken; and recommendations (if any).

    B. Post treatment larval survey results shall be submitted to the Secretary by December 31st of the year following the year of treatment.

b. Standard Conditions

1. Co-Permittee Status. Any individual or entity other than the permittee that is engaging in the permitted jurisdictional activity shall notify the Secretary to obtain co-permittee status prior to any such work. Notification of the addition or termination of co-permittee status shall occur using a form provided by the Secretary. A co-permittee shall be subject to all terms and conditions in this permit.

2. Aquatic Species Spread Prevention. Prior to any control activity occurring, all equipment, including but not limited to boats, trailers, vehicle, and gear, that has been in or on any other waterbody, shall be decontaminated in accordance with the *Voluntary Guidelines to Prevent the Spread of Aquatic Invasive Species through Recreational Activities*, Aquatic Nuisance Species Task Force, November 2013, or its replacement.

3. Modification. This permit may be modified or amended upon request by the permittee or by the Secretary. If the Secretary determines that modification is appropriate, only the conditions subject to modification shall be reopened. Any modification under this condition shall be pursuant to 10 V.S.A. Chapter 170 and any rules adopted thereunder.

4. Notice of Termination. The permittee may terminate the control activity as approved by this permit by submitting a notice of termination. The notice of termination shall include, at a minimum, the permit number for which termination is sought; the basis for the notice; the permittee's name and contact

information; and a signed and dated certification statement by an authorized representative of the permittee confirming the notice of termination.

5. Rare, Threatened, or Endangered Species. Encounters with any rare, threatened, or endangered species shall be reported to the Secretary immediately. If determined necessary by the Secretary, an Endangered & Threatened Species Taking Permit, per 10 V.S.A. § 5408, shall be obtained prior to commencement or continuance of the control activity.

6. Duty to Comply and Enforcement. The permittee(s) shall comply with all terms and conditions of this permit. Any permit noncompliance shall constitute a violation of 10 V.S.A. § 1455 and may be cause for any enforcement action and revocation, modification, or suspension of the permit. It shall not be a defense for the permittee(s) in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit.

7. Twenty-Four Hour Non-compliance Reporting. Unless provided otherwise by this permit, the permittee shall report any noncompliance which may endanger public health or the environment. Any such information shall be provided within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance, its cause; the period of noncompliance including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; as well as steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

8. Reporting & Correspondence. All requisite correspondence directed to the Secretary pertaining to this permit, including notifications, surveys and reports, shall be submitted via email to ANR.WSMDShoreland@vermont.gov or mailed to the following address:

   Lake & Shoreland Permitting
   Watershed Management Division
   1 National Life Drive, Davis 3
   Montpelier, VT 05620-3522

9. Compliance with Other Regulations. This permit does not relieve the permittee from obtaining all other approvals and permits prior to commencement of activity, or from the responsibility to comply with all other applicable federal, state, and local laws or regulations. In accordance with Fish and Wildlife Board Rule 641, adopted pursuant to 10 V.S.A. § 4145(a), a Special Use Permit from the Commissioner of Fish and Wildlife is required if a Vermont Department of Fish & Wildlife Access Area is used for the access of equipment or removal of aquatic plants associated with conducting an authorized control activity under this permit.

10. Duty to Reapply. If the authorized activity is anticipated to continue after the expiration date of this permit, the permittee shall reapply for coverage under a new permit at least 75 days prior to the expiration date of this permit.

11. Access to Property. By acceptance of this permit, the permittee agrees to allow representatives of the state of Vermont, at reasonable times and upon presentation of credentials, to enter upon the permittee's property, or to otherwise access the authorized control activity, to inspect to determine compliance with this permit.

12. Legal Responsibilities for Damages. The Secretary, by issuing this individual permit, accepts no legal responsibility for any damage direct or indirect of whatever nature and by whoever suffered arising out of the approved activity.

13. Reopener. If after granting this permit the Secretary determines that there is evidence indicating that an authorized activity does not comply with the requirements of 10 V.S.A. Chapter 50, the Secretary may reopen and modify this permit to include different limitations and requirements.

14. Revocation. This permit is subject to the conditions and specifications herein and may be suspended or revoked at any time for cause including: failure by the permittee to disclose all relevant facts during the application process which were known at that time; misrepresentation of any relevant fact at any time; non-compliance with the conditions and specifications of the permit; or a change in the factors associated with the control activity such that the Secretary can no longer make all applicable findings.

15. Rights and Privileges. This permit does not authorize any damage to public or private property or invasion of private rights or the violation of federal, state, or local laws or regulations. In addition, this permit does not convey any title or interest to the lands lying under public waters or waters affected.

16. Appeals. Pursuant to 10 V.S.A. Chapter 220 and the Vermont Rules for Environmental Court Proceedings, any appeal of this decision must be filed with the clerk of the Environmental Division of the Superior Court within 30 days of the date of the decision. An aggrieved person shall not appeal this permit unless the person submitted to the Secretary a written comment during the applicable public comment period or an oral comment at the public meeting conducted by the Secretary. Absent a determination of the Environmental judge to the contrary, an aggrieved person may only appeal issues related to the person's comments to the Secretary as prescribed by 10 V.S.A. § 8504(d)(2). The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Division; and must be signed by the appellant or the appellant's attorney. The appeal must give the address or location and description of the property, project, or facility with which the appeal is concerned and the name of the applicant or any permit involved in the appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For further information, see the Vermont Rules for Environmental Court Proceedings available at www.vermontjudiciary.org. The address for the Environmental Division is: 32 Cherry Street; 2nd Floor, Suite 303; Burlington, VT 05401 Telephone #: 802-951-1740.

c. Findings

1. Jurisdiction - 10 V.S.A. § 1455(a). Within waters of the State, no person may use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, unless that person has been issued a permit by the Secretary. The control activity, as described in permit application #3051-ANC-C, involves the use of a pesticide, TFM-HP, TFM-BAR, and Bayluscide 20% Emulsifiable Concentrate (lampricide), to control sea lamprey, *Petromyzon marinus*, within the waters of the Lamoille River in Colchester and Milton. Therefore, the Secretary has jurisdiction under 10 V.S.A. Chapter 50.

2. Application Receipt & Review. An Aquatic Nuisance Control Individual Permit application submitted by the United States Fish and Wildlife Service (permittee) was received on March 10, 2020. It was reviewed in accordance with the Department of Environmental Conservation's Permit Application Review Guidance, adopted March 14, 2019. The Secretary can issue an Aquatic Nuisance Control permit for the use of pesticides in waters of the State for the control of aquatic nuisances pursuant to 10 V.S.A. § 1455 (d) if the following findings can be made:

   (1) there is no reasonable non-chemical alternative available;

   (2) there is acceptable risk to the non-target environment;

(3) there is negligible risk to public health;

(4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and

(5) there is a public benefit to be achieved from the application of a pesticide or, in the case of a pond located entirely on a landowner's property, no undue adverse effect upon the public good.

The Secretary has determined that findings c.6.-c.10. can be made. Therefore, the Secretary shall issue a permit for the use of pesticides in waters of the State for the control of aquatic nuisances.

3. Background; Aquatic Nuisance Control Permit History. Permits #2009-C05 (expired 9/11/2014) and #2010-C05 (expired 9/13/2015) have previously been issued for the use of lampricide to control sea lamprey in the Lamoille River.

4. Project Description. The project is for the use of the aquatic pesticide TFM-HP (EPA Registration Number 6704-45 – active ingredient TFM, 3-Trifluoromethyl-4-nitrophenol, sodium salt), TFM-Bar (EPA Registration Number 6704-86 – active ingredient TFM, 3-Trifluoromethyl-4-nitrophenol), and Bayluscide 20% Emulsifiable Concentrate (EPA Registration Number 6704-92 – active ingredient Niclosamide, Aminoethanol Salt) to control sea lamprey ammocoetes (larvae) in the Lamoille River. The sea lamprey (*Petromyzon marinus*) is a fish that parasitizes other fish, scarring or killing its host. Data indicates that sea lamprey populations negatively impact coldwater and some warmwater fisheries in Lake Champlain.

   An eight-year experimental sea lamprey control program, co-sponsored by the permittee, the Vermont Department of Fish and Wildlife, and the New York State Department of Environmental Conservation (NYSDEC), was conducted in Lake Champlain between 1990 and 1997. The experimental program illustrated the efficacy of TFM in effectively reducing numbers of sea lamprey to levels resulting in an enhancement of the Lake Champlain salmonid fishery.

   The permittee has established wounding rate goals of 15 or fewer lamprey wounds per 100 Atlantic salmon (*Salmo salar*) and 25 or fewer lamprey wounds per 100 lake trout (*Salvelinus namaycush*). These wounding rate goals were set in 1990 as described in the Final Supplemental Environmental Impact Statement – A Long-Term Program of Sea Lamprey Control in Lake Champlain (FSEIS), page 4. These wounding rate goals are based on experience and historic data that indicated these species could withstand and persist at those levels of lamprey wounds. The most recent lamprey wounding data is from November 2019, which are 20 wounds per 100 Atlantic salmon and 57 wounds per 100 lake trout. While lamprey wounds have been reduced since their high mark in 2006, target wounding rates to achieve the project purpose are not being met.

   The Lamoille River is a tributary of Lake Champlain where sea lamprey control is used here as a part of the long-term sea lamprey control program for Lake Champlain. The Lamoille River was previously treated with lampricide in 2009 and 2013. A larval survey for sea lamprey was conducted in 2019 and spanned the length of Lamoille River between the Peterson Dam to where it flows into Lake Champlain. The survey found 19 sea lamprey within approximately 0.025% of potential habitat.

   To conduct a treatment in the Lamoille River, a target in-stream TFM concentration of no greater than 1.3 times the minimum lethal concentration (MLC) to sea lamprey is proposed during the 12 to 14-hour treatment period as determined by an on-site toxicity test is. The MLC is defined as the minimum concentration of TFM required to kill 99.9 percent of sea lamprey ammocoetes (larvae) during a 9-hour exposure time. The previously issued Aquatic Nuisance Control permits for lampricide in the Lamoille River (2009-C05 and 2010-C05) both approved a target in-stream TFM concentration of no greater than 1.3 x MLC while the actual MLC for the 2009 lampricide treatment occurred at 1.2 x MLC and the 2013 lampricide

treatment occurred at 1.1 x MLC. Optimum control of TFM toxicity to sea lamprey is achieved when water temperature is above 2° C, the surface elevation of Lake Champlain is at or below 98 feet 1929 NGVD, and the Lamoille River does not discharge more than 1,800 cubic feet per second (cfs) below the Peterson Dam.

The permittee intends on conducting two treatments, each one after Labor Day in 2020 and in 2024. The proposed application point for TFM is at the Peterson Dam in Milton. TFM has been shown to degrade in water in the presence of sunlight to a concentration of one-half strength in a period of three to four days at pH levels similar to those encountered in the Lamoille River and Lake Champlain.

5. Control Activity Purpose. The purpose of the control activity is to manage sea lamprey populations within Lake Champlain to improve fishing opportunities.

6. No Reasonable Non-Chemical Alternative Available – 10 V.S.A. 1455(d)(1). The USFWS uses an integrated pest management approach to determine appropriate long-term control strategies on a stream-specific basis (Section V. of the FSEIS). A brief summary and overview of the wide variety of new and emerging non-chemical alternative control techniques that are being investigated and invested in can be found on the Commission's Future of Sea Lamprey Control website.

   The Status Report for the Lake Champlain Sea Lamprey Alternatives Workgroup summarizes nine studies conducted from 2002 through 2006 which assess potential alternatives to lampricide. Since then, projects such as pheromone-assisted trapping, micro-elemental natal stream statolith signatures, and identifying cross-sectional flow patterns in streams to target the trapping of out-migrating transformers have been undertaken. To date, these efforts have not resulted in development of additional, feasible alternative control methods. In addition, recent studies conducted in Lake Champlain and the Great Lakes, focusing on the use of pheromones as attractants to manipulate spawning runs, have not progressed to the point of an applicable management technique.

   Despite the completed and ongoing research on non-chemical controls methods, the use of barriers and traps to block and intercept spawning-phase sea lamprey remains the only currently feasible, non-pesticide control alternative in the Lake Champlain Basin. The use of barriers (both seasonal and permanent) is limited to streams where suitable sites are available and where significant adverse impacts of barriers on other aquatic organisms can be mitigated. Barriers are being used in Vermont's tributaries to Lake Champlain under Aquatic Nuisance Control permit #2014-S01. Under that permit, barriers and traps are installed seasonally in Pond Brook, Trout Brook, and Sunderland Brook. While barriers and traps can reasonably be used in smaller tributaries, chemical lampricide application remains the only feasible method of control within large tributaries.

   The Secretary has determined there is no reasonable non-chemical alternative available.

7. Acceptable Risk to the Non-Target Environment – 10 V.S.A. 1455(d)(2). The Secretary considers the following as the non-target environment:

   - Aquatic plants and animals within the waters of the treatment area.
   - Wetlands within the waterbody proposed for treatment.
   - Human use of waters treated with the pesticide.
   - The ecological integrity of the waterbody, which is the culmination of how the biological, chemical, and physical integrity of the waterbody interact. The concept of ecological integrity is identified in the Vermont Department of Environmental Conservation Watershed Management Division's Statewide Surface Water Management Strategy.

For determining what might be considered an acceptable risk to the non-target environment from a proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment:

- A control activity for sea lamprey will have an impact on the ecological integrity of the waterbody as the non-target environment cannot be avoided completely.
- The following threatened and endangered aquatic animal species have been recorded as being present in the Lamoille River. For threatened and endangered species, the Secretary will require that an Endangered and Threatened Species Takings Permit be obtained by the permittee prior to any treatment taking place.
    - Cylindrical papershell (*Anodontoides ferussacianus*), S1S2 – Endangered – Species of Greatest Conservation Need
    - Eastern Sand Darter (*Ammocrypta pellucida*), S1 – Threatened – Species of Greatest Conservation Need)
    - Fluted-shell (*Lasmigona costata*), S2 – Endangered – Species of Greatest Conservation Need
    - Fragile papershell (*Leptodea fragilis*), S2 – Endangered – Species of Greatest Conservation Need
    - Giant floater (*Pyganodon grandis*), S2S3 – Threatened – Species of Greatest Conservation Need
    - Lake sturgeon (*Acipenser fulvescens*), S1 – Endangered – Species of Greatest Conservation Need
    - Pink heelsplitter (*Potamilus alatus*), S2 – Endangered – Species of Greatest Conservation Need
    - Pocketbook (*Lampsilis ovata*), S2 – Endangered – Species of Greatest Conservation Need
- The following rare aquatic animal species have been recorded as being present in the Lamoille River:
    - Mudpuppy (*Necturus maculosus*), S2 – Special Concern – Species of Greatest Conservation Need
    - Silver lamprey (*Ichthyomyzon unicuspis*), S2? – Special Concern – Species of Greatest Conservation Need
- Mapped Class II wetlands border portions of the shoreline downstream of the primary lampricide application point in the Lamoille River. As the Lamoille River flows into Lake Champlain, it flows through the Class I Sandbar wetland.
- The Lamoille River and its waters are public, and it is reasonable to assume that all public waters may be used for irrigation.
- Impacts of lampricides on the non-target environment are explained in Section VII. A. of the FSEIS and are summarized below.

Consideration of the eleven state-listed threatened or endangered species is included in a separate review of the Endangered and Threatened Species Takings Permit application for the use of lampricide within the Lamoille River. An Endangered and Threatened Species Takings Permit from the Agency of Natural Resources must be obtained prior to using lampricide within the Lamoille River.

Benefits of the sea lamprey control program to the non-target environment include increased survival and condition of Atlantic salmon (*Salmo salar)* and lake trout (*Salvelinus namaycush*).

All lampricide treatments permitted in Vermont tributaries to Lake Champlain from 1990 to the present were administered at levels between 0.8 and 1.5 x MLC, as determined by on-site toxicity testing. Treatment-caused mortality for aquatic animal non-target species is generally low with a few exceptions. While a few

non state-listed aquatic animal species have demonstrated sensitivity to lampricide, the Secretary found that their extensive distributions and/or ample population densities have ensured recolonization following lampricide treatment-caused mortality in Vermont waters.

For each treatment, a post-treatment non-target mortality survey will be conducted within 36 hours of the lampricide block passage within the locations identified in Figure 5 in the Approved Application (Appendix A - 11 / Project Description). All visible river-bottom in each section will be inspected and observations of non-target organism mortalities, except lamprey, will be recorded. Non-target assessment sections comprise 23% of the treated reaches. All dead fish (excluding lampreys), amphibians, mussels, and other large invertebrates encountered will be identified and enumerated, when possible. Organisms not identified in the field will be collected, when possible, and retained for identification. Dead lamprey larvae will not be counted during the post treatment mortality survey. However, the first 30 encountered in each transect will be retained and identified. Assessment of treatment effects on lamprey populations will be accomplished by means of a larval survey completed within one year following the treatment. Larval surveys following treatments provide a more direct and statistically sound means of comparison with pre-treatment population surveys. The Secretary will assess survey results to ensure the acceptable risk to the non-target environment finding can continue to be met.

Amphibians

The distribution of the mudpuppy in Lake Champlain is known largely due to observed mortalities from lampricide treatments. Otherwise there are scattered records of occurrence throughout the Lake Champlain valley of Vermont. This secretive, nocturnally active species is very difficult to sample efficiently, which has contributed to a lack of occurrence and density information for this species.

TFM toxicity tests and treatment cage studies conducted on mudpuppies have indicated that at the proposed treatment concentrations, no mortality should be expected for this species. However, mortalities have been recorded following Vermont TFM treatments. A single dead mudpuppy mortality was observed following the 2008 lampricide treatment in the Missisquoi River. This mortality was the first verified record of this species in the Missisquoi River. Mudpuppy mortality occurred during both the 1990 and 1994 TFM treatments of Lewis Creek. Following the 1990 treatment (1.0 x MLC), 23 dead mudpuppies were found, with 18 found following the 1994 treatment (~1.1 x MLC). No dead mudpuppies were found following the 2002 (1.1-1.3 x MLC), 2006, or 2010 treatments (1.2 x MLC) of Lewis Creek. In the Lamoille River, 508 dead mudpuppies were found after the 2009 treatment (1.2 x MLC), while juveniles comprised 77% of the mortalities, over 100 of these mudpuppies were adults. No dead mudpuppies were found after the 2013 Lamoille River treatment (1.1 x MLC). All 29 dead mudpuppies observed following the 2004 Winooski River lampricide treatment (1.0 x MLC to 1.1 x MLC) as well as the 19 individuals noted following the 2008 Winooski River treatment (1.0 x MLC to 1.3 x MLC) were juveniles ranging from 34 to 169 mm total length. In 2011, the permittee's Marquette Biological Station conducted a cage study with captive, reared mudpuppy juveniles that were approximately 40 mm in length. The study resulted in 3 mortalities among 63 test organisms for an overall mortality rate of 4.8%. The mudpuppies were held at 3 separate locations during a TFM treatment that ranged in concentration from 1.3 x MLC to 1.5 x MLC.

The permittee and the Vermont Department of Fish and Wildlife implemented a study in 2002 to determine effective collection methods and provide information on mudpuppy populations in Lewis Creek and the LaPlatte River. No mudpuppies were successfully collected from either river during this study.

The 30-year record of post-treatment mortality survey data in Lake Champlain tributaries provides variable evidence for the effects of lampricide treatments on mudpuppies. Results of post-treatment mortality survey data for TFM treatment concentrations that ranged from 1.0 x MLC to 1.3 x MLC have shown that TFM concentrations as low as 1.0 x MLC have resulted in mudpuppy mortality. These results have also shown both

declining mudpuppy numbers, no evidence of decline, or no negative impact from lampricide treatments over time. Due to the many variables that can contribute to mudpuppy population persistence and abundance, and that not every river and lampricide treatment are identical, it is agreed that post-treatment mudpuppy mortality survey data alone is not a reliable tool for assessing mudpuppy population impacts and stability. However, conducting a pre and post lampricide treatment population assessments (e.g., mark-recapture method) would be a more appropriate approach to assess mudpuppy population stability when judging the effects of a lampricide treatment on a population.

While mudpuppies are challenging to sample for, this pre and post lampricide treatment survey approach was successfully conducted in the Lamoille River by the Vermont Cooperative Fish and Wildlife Research Unit using modified minnow traps. Through these efforts, 80 mudpuppies were trapped and released from December 2008 through May 2009; 75 of these were tagged. The Lamoille River was treated with lampricide at 1.2 x MLC on October 1st, 2009. The post-treatment mortality survey found 508 dead mudpuppies of which juveniles (25-200 mm total length) represented 77% of the collection. Following the treatment, with the objective to assess the population-scale impact from the treatment, the trapping effort was repeated from December 2009 through May 2010. This replicated post-treatment survey effort resulted in the collection of 81 mudpuppies. Ten of these mudpuppies were tagged recaptures from the previous effort conducted in the winter of 2009.

Post-treatment mortality survey data show conflicting trends of long-term effects on the numbers of mudpuppies in lampricide-treated rivers and are unreliable as an assessment technique. In the Lamoille River (2009) where localized high mortality occurred during the treatment, a pre and post study showed no appreciable effect on mudpuppy population numbers. Due to concerns over the population stability of mudpuppies in the Lamoille River as a result of lampricide treatments, the Vermont Department of Environmental Conservation consulted with the Vermont Department of Fish and Wildlife on this issue. Based on the available data, the Vermont Department of Fish and Wildlife finds that the proposed treatment concentration of no greater than 1.3 x MLC may cause young-of-year and yearling mudpuppy mortalities but would have limited impacts on older breeding-age classes and that the population of mudpuppies in the Lamoille River should remain stable with ongoing lampricide treatments. As a result, the Secretary can currently make the finding that there is an acceptable risk on the non-target environment in regard to the mudpuppy population in the Lamoille River.

Regarding other amphibian species, there was one Eastern Newt (*Notophthalmus viridescens*), 3 unidentified adult frogs, and 1 unidentified frog tadpole mortalities observed following the 2009 Lamoille River treatment and no observed mortalities after the 2013 treatment.

Fishes

As a group, non-state-listed fishes present in the Lamoille River are generally more resistant to TFM than are threatened and endangered species. Observed non state-listed, non-target fish mortality has been low in past treatments of Vermont rivers at TFM concentrations of 1.0 to 1.3 x MLC. Toxicity data for the 99% TFM-HP/Bayluscide mix exists for several of the fish species in Lamoille River. Toxicity for the lampricide mix is similar as to TFM alone with these species. Channel catfish appear to be more sensitive to the mix while the remaining species exhibit no observable effect concentrations of over 2.0 x MLC. Northern pike (*Esox lucius*) mortality (61 individuals) was reported near the mouth of Lewis Creek following the 2002 TFM treatment. While the block of TFM at the mouth of Lewis Creek had become diluted, the time of exposure was increased due to the slower stream velocity at lake level, which possibly accounted for this mortality. Northern pike mortality ranged from 0-22 for the other three treatments. No northern pike mortalities were reported following the 2004 Winooski River or 2007 Poultney River treatments. A treatment concentration of 1.3 x MLC in the Lamoille River should not significantly affect northern pike populations because this species is

common and widely distributed in the Lake Champlain basin. Two species of darters show sensitivity to TFM: the logperch (*Percina caprodes*) and the tessellated darter (*Etheostoma olmstedi*). There is no available 99:1 TFM/niclosamide mix toxicity data for these two species. Agency population studies on Lewis Creek following the 1990 and 1994 treatments indicated that losses for these two darters were very low in relation to their densities in Lewis Creek. The logperch is considered somewhat common in the Lake Champlain drainage and the tessellated darter is common statewide.

The silver lamprey is not a federally or state-listed species but is classified as a rare species of special concern and a species of greatest conservation need. This species is very sensitive to TFM and it is expected that there will be a significant negative impact to silver lamprey population in the Lamoille River immediately after a lampricide treatment. However, as with sea lamprey, numbers of silver lamprey generally recover during the four-year period following a lampricide treatment. Based on a survey of the Lamoille River in 2019, silver lamprey numbers are currently at their highest sampled densities since records of sampling began in 2005. The permittee routinely monitors all lamprey numbers in tributaries proposed for treatment before and after each treatment and provides the Secretary with that data.

Aquatic Macroinvertebrates

The Department of Environmental Conservation has conducted impact studies of non-target macroinvertebrate communities from both Lewis Creek and Trout Brook before and after TFM treatments. In general, the studies' findings have shown that short-term impacts to a few sensitive macroinvertebrate species occurred, but all affected macroinvertebrate species were observed to recover to before-treatment densities within one year of a TFM treatment.

As a group, mussels are moderately sensitive to TFM. The non-state-listed mussels found in the Lamoille River, the eastern lamp mussel (*Lampsilus radiata*) and the eastern Elliptio (*Elliptio complanata*), are currently common in the Champlain Valley. While the eastern Elliptio is somewhat more resistant than the eastern lamp mussel to the effects of TFM, the proposed treatment concentration (1.3 x MLC) is not anticipated to cause significant mortality for either species.

Aquatic Plants and Wetlands

TFM was originally patented as an herbicide that required 15-25 ppm in standing water and 100 ppm in flowing water to control common aquatic plants such as *Anacharis* or *Ceratophyllum*. *Elodea* and *Myriophyllum* have also been recorded as being impacted by TFM. Inhibition of up to 50% of the growth of algae populations at sea lamprey control concentrations may occur where diatoms are most sensitive and blue-green algae most tolerant.

While aquatic plants can be impacted by TFM, negative impacts on aquatic plants and aquatic plants within wetlands are anticipated to be minor and temporary. Plant productivity is naturally in decline during a fall treatment period, TFM concentrations used are lower than concentrations that will impact aquatic plants, and aquatic plants will only be exposed to a passing block of TFM in a river and a reduced/dissipating concentration of TFM in standing waters.

Human Use of Treated Waters

Human use of waters treated with TFM for irrigation in agricultural fields or gardens may result in damage to certain cultivated crops. Damage has been observed in young cucumber and cantaloupe plants, and minor leaf spotting on young green bean and tomato plants following irrigation for 12 hours with water containing 10 mg/l of TFM. No effect on lettuce, radish, sweet corn, or potato has been observed.

While agricultural fields or gardens could be impacted by TFM, negative impacts are anticipated to be minor and temporary or nonexistent due to a reduced need or no need for irrigation during a fall treatment period.

The Secretary has determined that there is an acceptable risk to the non-target environment.

8. Public Health – 10 V.S.A. 1455(d)(3). At the request of the Secretary, the Vermont Department of Health (VDH), Radiological and Toxicological Sciences Division reviewed the risk of the proposed activity to public health, in which it examined potential concerns for public health that may be associated with exposure to lampricide. The VDH's review of the project is as follows:

   "In 2019, the Department received the final report on the 90-day oral toxicity study on TFM. The study was conducted according to the design agreed to by the TFM workgroup and meets the EPA Office of Pesticides 90-day guideline. This study was used to derive an updated drinking water health advisory of 100 ppb, as well as an updated recreational water value of 3.9 ppm for TFM. A description of the study and the process to derive the drinking water health advisory follows:

   Male and female rats were given TFM at target doses of 1, 3, 10, 30 and 100 mg/kg/day in drinking water for 90 days and allowed to recover for 28 days. Data were collected on a comprehensive set of endpoints: body weight, functional observation battery and grip strength, locomotor activity, estrus cycle, ophthalmology, clinical pathology, clinical chemistry, hematology, coagulation, urinalysis, macroscopic findings, organ weights, and microscopic findings. There were no adverse findings during the study, and no TFM-related changes in any endpoint. In other words, there was no toxicity observed at the highest achieved dose levels in male or female rats (86.5 and 77.2 mg/kg/day, respectively).

   Therefore, the highest no observed adverse effect level (NOAEL) is 77.2 mg/kg/day based on the absence of toxicity in female rats after 90 days of exposure to TFM in drinking water. Standard procedure for developing an oral reference dose (RfD) was, followed by dividing the NOAEL by uncertainty factors. The following uncertainty factors are applied to the NOAEL to derive an oral reference dose: UFA= 10 to account for interspecies variation; UFH= 10 to account for intraspecies variation; UFS= 3 to account for the use of a subchronic study; UFD= 10 to account for database uncertainty. The composite UF is 3,000. The NOAEL of 77.2 mg/kg/day divided by the composite UF of 3,000 yields an RfD of 0.02573 mg/kg/day.

   In accordance with the Health Department's process for deriving a drinking water health advisory, the RfD is combined with a body weight adjusted water intake rate of 0.175 L/kg/day. A factor of 1000 is used to convert from milligrams per liter (ppm) to micrograms per liter (ppb). A Relative Source Contribution (RSC) of 70% is employed for TFM. There are potential sources of exposure to TFM other than drinking water, such as recreational exposure. The use of 70% RSC leaves 30% of the estimated RfD (mg/kg/day) to come from these other sources of exposure. The equation is: (0.02573 mg/kg/day) x (1/0.175 L/kg/day) x 1000 x 0.7 = 103 ppb ≈ 100 ppb. The drinking water health advisory for TFM is 100 ppb.

   Based on the evaluation of impacts to public water systems conducted by the applicant and by DEC, no public water systems in Vermont are expected to exceed 100 ppb of TFM due to the proposed applications. The applicant proposes to notify riparian landowners to offer bottled water if their water source is from the treated rivers. Swimming should not occur in treated waters until the TFM concentrations are below 3.9 ppm.

   Thus, the proposed treatments of the two rivers with TFM are expected to result in negligible risk to public health. Based on a review of the confidential statements of formulation, it is reasonable to conclude that human exposure to the inert compounds contained in TFM at the concentrations that would result under the conditions proposed by the applicants is not likely to result in an increase in the level of concern for public health."

   To minimize unnecessary pesticide exposure to the public, public use of waters within the treatment advisory zones are not recommended on the day of treatment. The permittee will notify shoreline property owners within the treatment advisory zone, post all public access points adjacent to the treatment area with

notification signs, and provide a website for the public to review information on the project and concentration monitoring results. Lampricide will not be applied until after Labor Day to avoid the primarily summer recreation period. Water use advisory zones and the concentration monitoring protocol can be found within the *Water Use Advisory Zone Monitoring Plan for Lampricide Treatments of the Poultney/Hubbardton River, Lewis Creek, LaPlatte River, Winooski River, Lamoille River, Stone Bridge Brook, and the Missisquoi River* as identified in the Approved Application Appendix.

The Secretary accepts the VDH's recommendations, has included permit conditions accordingly, and has determined that there is negligible risk to public health.

9. Long-range Management Plan – 10 V.S.A. 1455(d)(4). Sea lamprey have spread throughout Lake Champlain, are well-established, and eradication is a highly unlikely outcome from control efforts. Sea lamprey will continue to be a part of the aquatic environment of Lake Champlain for the foreseeable future. As a result, a targeted use of chemical and non-chemical control methods as a part of an integrated pest management plan to control nuisance levels of sea lamprey has been developed in accordance with the FSEIS.

   The Secretary has determined that a long-range management plan has been developed that incorporates a schedule of pesticide minimization by utilizing an integrated pest management plan.

10. Public Benefit – 10 V.S.A. 1455(d)(5). The Secretary considered the following criteria in determining whether there is a public benefit to be achieved from the application of the pesticide:

    - Whether carrying out the control activity produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
        - Assessment: Tangible benefits to public good uses are likely to be associated with an increased opportunity for fishing, which in turn may increase other public good uses related to fishing, such as boat-related recreation. Tangible benefits to public good uses have been determined to outweigh potential impacts on the water resource.
    - Whether the potential cumulative impacts from carrying out the control activity adversely affect the water resource and the public that utilizes that resource.
        - Assessment: Additional cumulative impacts were considered that relate to the water resource and how the public may utilize that resource. The Secretary has determined that the cumulative impacts from carrying out the control activity are not anticipated to affect the water resource and the public that utilizes that resource.
            - The drinking water health advisory for TFM is 100 ppb and swimming should not occur in treated waters until the TFM concentrations are below 3.9 ppm. It is not anticipated that TFM concentrations will reach or exceed these concentrations for a long period of time. Any impacts on how the public utilizes the water resource is anticipated to be minor and temporary. Shoreline property owners within the water use advisory zones will be notified of the treatment and that potable water will be supplied by the permittee upon request to those who depend upon the treated waters within the water use advisory zones for domestic use to prepare food or drink. Water use advisory zones and the concentration monitoring protocol can be found within the *Water Use Advisory Zone Monitoring Plan for Lampricide Treatments of the Poultney/Hubbardton River, Lewis Creek, LaPlatte River, Winooski River, Lamoille River, Stone Bridge Brook, and the Missisquoi River* as identified in the Approved Application Appendix.

- The Lamoille River is adjacent to the North Harbor Groundwater Source Protection Area, but it is not within a Groundwater Source Protection Area or a Surface Water Source Protection Area.

- Whether measures to reduce impacts on the water resource have been taken.
  - Assessment: The control activity proposed to control sea lamprey only. The target in-stream TFM concentration will be no greater than 1.3 times the minimum lethal concentration to sea lamprey where the treatment period will not exceed 14 hours. To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the resource or public good that may have resulted from a treatment, the permittee will submit an annual report to the Secretary. The permittee has developed a *Contingency Plan for Accidental Spillage of Lampricides During Lake Champlain Sea Lamprey Control Operations* that can be found in the Approved Application Appendix.

- Whether the control activity is excessive for the stated purpose.
  - Assessment: The use of lampricide as a part of an ongoing integrated pest management plan to manage an established population of sea lamprey is not considered excessive for the stated purpose.

Based upon review of the public good criteria, the Secretary has determined that the tangible benefits to the public good outweigh the potential negative impacts. The Secretary finds that there is a public benefit to be achieved from the application of a pesticide.

11. 10 V.S.A. § 1455(h) – Public Notification. Upon receipt of the application, the Secretary proceeded in accordance with the permit process as identified under 10 V.S.A. Chapter 170.

d. Authorization

By delegation from the Secretary, the Vermont Department of Environmental Conservation has made a determination that the above activity qualifies for an individual aquatic nuisance control permit. The Permittees are authorized per 10 V.S.A. § 1455(i) subject to the conditions herein specified.

This permit shall be effective on the day of signing and expire five years thereafter.

Peter Walke, Commissioner
Department of Environmental Conservation

By: _____
Oliver Pierson, Program Manager
Lakes & Ponds Management and Protection Program
Watershed Management Division

Aquatic Nuisance Control Individual Permit – Response to Comments

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
LAKES & PONDS PROGRAM

Permittee: United States Fish and Wildlife Service	Control Activity: Pesticide (Lampricide)
Permit Number: 3051-ANC-C	Waterbody: Lamoille River in Colchester and Milton

The above referenced Aquatic Nuisance Control Individual Permit #3051-ANC-C approves the use of lampricide to control sea lamprey, *Petromyzon marinus*, in the Lamoille River in Colchester and Milton.

The Secretary of the Agency of Natural Recourses (Secretary) placed the draft permit on public notice between August 31, 2020 and September 30, 2020 and held a public meeting on the draft permit on September 17, 2020 in accordance with the permit process as identified under 10 V.S.A. Chapter 170. Public comments were received during the notice period. The following is a summary of comments received and the Secretary's responses to those comments. Where appropriate, comments have been paraphrased, consolidated, and categorized for clarity. Duplicative comments were combined where appropriate.

1. Comment from the United States Fish and Wildlife Service (permittee): Based on our experience, information included in the Environmental Impact Statement ("A Long-term Program of Sea Lamprey Control in Lake Champlain"), lack of any documented mortalities to mudpuppies during the 2013 lampricide treatment in the Lamoille River, and our review of the draft permit, we do not find that Special Condition 14 "Mudpuppy Population Assessment Study" is justified or feasible based on the findings in the permit including your own finding that "there is an acceptable risk on the non-target environment in regard to the mudpuppy population in the Lamoille River." We request that Vermont Department of Environmental Conservation modify the permit to remove Special Condition 14. With that special condition included, we cannot accept the permit and will not be able to undertake the activity to control sea lamprey in the Lamoille River.

We note the standard "Reopener" condition in this permit (Standard Condition 13) allows the Secretary to reopen and modify this permit to include different limitations and requirements should there be significant impacts from the control activity that you determine no longer comply with the requirements of 10 V.S.A. Chapter 50.

We remain committed to a cooperative sea lamprey control program that is guided by the best available science. Outside of the permit process, we would be willing to cooperate with the Agency of Natural Resources, Vermont Fish and Wildlife Department, Vermont Department of Environmental Conservation and others to investigate the feasibility of improved mudpuppy population assessments, should that be warranted.

1. Response: The Secretary acknowledges the findings of this comment and agrees to remove specific condition a.14. and subsequent discussion of that condition in finding c.7. from the draft permit related to the *Mudpuppy Population Assessment Study*. The Secretary is currently still able to conclude that there is an acceptable risk to the non-target environment with the removal of this condition.

In removing this specific condition, the Secretary acknowledges the permittee's willingness to investigate the feasibility of improved mudpuppy population assessments, should that be warranted. In the event that mortality of non-target species from a treatment is determined to pose an unacceptable risk to the non-target environment, the Secretary may reopen or revoke the permit in accordance with standard conditions b.13. or b.14.:

> b.13. Reopener. If after granting this permit the Secretary determines that there is evidence indicating that an authorized activity does not comply with the requirements of 10 V.S.A. Chapter 50, the Secretary may reopen and modify this permit to include different limitations and requirements.
>
> b.14. Revocation. This permit is subject to the conditions and specifications herein and may be suspended or revoked at any time for cause including: failure by the permittee to disclose all relevant facts during the

application process which were known at that time; misrepresentation of any relevant fact at any time; non-compliance with the conditions and specifications of the permit; or a change in the factors associated with the control activity such that the Secretary can no longer make all applicable findings.

2. Comment: I am very pleased to see Condition 14 regarding monitoring of the Mudpuppy population in the draft permit. Over 500 Mudpuppies have been killed in previous treatments of the Lamoille River and USF&WS should show that this level of mortality is sustainable. Many professional herpetologists and wildlife biologists fear that it is not sustainable and that the Mudpuppy will disappear from the Lamoille River as it appears to have done in Lewis Creek. One very big difference between Lewis Creek and the Lamoille River is that the Lamoille River has generated more reports of this species than any other body of water in Vermont and appears to be our best habitat in the state for our native population. It would be shame to lose that population or reduce it to insignificant levels.

I really hope that USF&WS will be required to perform these mark/recapture studies as opposed to Vermont Fish and Wildlife. The Nongame Division of Vermont Fish and Wildlife has taken on Mudpuppy responsibilities in the past but they are very short on money and personnel and they are not the permittee. USF&WS personnel and monies should be used for the study.

2. Response: See Response 1.

3. Comment: I would ask that lampricide applications on the Lamoille River be terminated because of ecological ramification of the poisoning. Furthermore this approach violates a key provision in the widely accepted, Governance principles for Wildlife Conservation in the 21st Century (Decker, et al.). It seems that the push to continue applications is focused on meeting needs of a particular customer above all other customers while extracting a tremendous toll on the ecological integrity of a waterway, already under stress.

I ask that this decision be grounded in serving all citizens by first protecting the ecological resource versus an approach that chooses species to be winners or losers.

The Vermont Agency of Natural Resources should not allow any future treatments of the Lamoille River since it appears to be the largest population of rare native Mudpuppies in Vermont, since the treatments have killed many Mudpuppies in that river, and continued lampricide treatments in that river may well eliminate or greatly reduce that population of rare salamanders.

We need a new approach grounded in 21st century schools of thought regarding natural systems management over managing for a species regardless of the impact on natural systems.

3. Response: The Secretary acknowledges this comment. In order to issue an Aquatic Nuisance Control permit, the Secretary must find that:

(1) there is no reasonable nonchemical alternative available;

(2) there is acceptable risk to the nontarget environment;

(3) there is negligible risk to public health;

(4) a long-range management plan has been developed which incorporates a schedule of pesticide minimization; and

(5) there is a public benefit to be achieved from the application of a pesticide or, in the case of a pond located entirely on a landowner's property, no undue adverse effect upon the public good.

Based upon the materials provided by the permittee in the application and the subsequent review of those materials, the Secretary has determined that all five findings can be made. Therefore, a permit shall be issued.

4. Comment: In the interests of open government and transparency, it is my hope that the agency will take the opportunity to identify who or what is the primary customer in this process. That is, who or what is the most important "customer" the agency is serving in the most paramount way. There will undoubtedly be many secondary customers however the identification of the primary customer (there can be only one). This

declaration is important for agency accountability and transparency, and I urge that the final decision be clear about just who or what that is.

This exercise will I believe help the team making the decision to be clear in its thinking about its decision. If no primary customer is identified, the foundation for any decision will be weakened.

I hope you will consider this issue in your deliberations and in your communications with the public. It holds the agency's feet to the fire in a most functional way.

4. Response: See Response 3. The Secretary is required to assess whether there is a public benefit to be achieved from the application of a pesticide. The following questions are asked to review this finding:

- Whether carrying out the control activity produces tangible benefits to public good uses, such as boating, fishing, and swimming, that outweigh potential impacts on the water resource.
- Whether the potential cumulative impacts from carrying out the control activity adversely affect the water resource and the public that utilizes that resource.
- Whether measures to reduce impacts on the water resource have been taken.
- Whether the control activity is excessive for the stated purpose.

Since the review of this finding requires a certain degree of subjective judgment, the Secretary reviews how the public at large may benefit from the project as opposed to identifying specific “customers”. It has not been determined that it is necessary for the Secretary to identify specific “customers” in order to review the statutory criteria.

5. Comment: The applicant (USFWS) should be required to conduct and fund a long-term monitoring study of the mudpuppy population in the Lamoille River and that future treatments of the Lamoille River with lampricides should only be allowed if USFWS can show that the mudpuppy population will remain robust and healthy despite continued treatments. In addition, this long-term monitoring should begin prior to the first proposed (2020) treatment, to gain some baseline, pre-treatment data on mudpuppy current populations. This initial (2020) treatment should be delayed until several years of data can be collected to come up with an initial population estimate.

5. Response: See Response 1.

6. Comment: I would like the State of Vermont to deny this permit to the USFWS due to the effects on non-target species and a lack of evidence that sea lamprey are invasive in the Champlain basin. Lampricide destroys non-target species including other lamprey species and amphibians. The well documented destruction of over 500 mud puppies in 2009 should be enough to understand that this type of treatment should never be used. Damaging one system to help promote fishing of stocked species in Champlain is unfortunate. In "Genetic models reveal historical patterns of sea lamprey population fluctuations within Lake Champlain 2015" the evidence for sea lamprey being native is stronger than a founder event in recent history. I have seen little evidence, other than anecdotal, that sea lamprey are invasive. It appears that the decision to poison the Lamoille and other tributaries is a political one.

If this permit is issued, the State of Vermont should require two things:

1. the USFWS fund and independent study of population genetics to better understand if sea lamprey are native.

2. the USFWS should be required to fund and independent study of effects on non-target species.

The precautionary principle states that you do not take an action unless you know what the consequences are; can the state of Vermont say that it has all the information to allow this to continue?

6. Response: See Response 3. While it is identified in the Vermont Surface Water Management Strategy that invasive species are a stressor on our surface waters, it is not a requirement for the aquatic nuisance species being targeted for control under an Aquatic Nuisance Control permit application be an invasive species.

10 V.S.A. § 1455(a): A person shall not use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices in waters of the State to control nuisance aquatic plants, insects, *or other aquatic nuisances, including lamprey*, unless that person has been issued a permit by the Secretary.

As defined under 10 V.S.A. § 1452, an aquatic nuisance means an undesirable or excessive substances or populations that interfere with the recreational potential or aquatic habitat of a body of water, including rooted aquatic plants and animal and algal populations.

7. Comment: I am concerned that the lampricide treatments in the Lamoille River have resulted in a great threat to the river's other invertebrate and vertebrate species, including mudpuppies salamanders—an endangered species in Vermont. I agree that there is genuine concern over whether mudpuppies can sustain the current level of mortality much longer.

7. Response: The mudpuppy (Necturus maculosus), is ranked in the State of Vermont as a rare S2 species of Special Concern and a Species of Greatest Conservation Need. It has not been listed as a threatened or endangered species in Vermont. Based upon review of the permit application materials, it has been determined that the project poses an acceptable risk to the non-target environment, which included review of amphibians, fishes, and aquatic macroinvertebrates.

8. Comment: I would prefer the USFWS investigate and pursue other non-chemical approaches for managing sea lamprey. We can't afford to risk another amphibian die-off in the Lamoille river. A moratorium on chemical lampricides should be enforced until a non-destructive treatment can be developed.

8. Response: Finding c.6. of the permit that reviews whether there is no reasonable non-chemical alternative available, the Secretary found:

The USFWS uses an integrated pest management approach to determine appropriate long-term control strategies on a stream-specific basis (Section V. of the FSEIS). A brief summary and overview of the wide variety of new and emerging non-chemical alternative control techniques that are being investigated and invested in can be found on the Commission's Future of Sea Lamprey Control website.

The Status Report for the Lake Champlain Sea Lamprey Alternatives Workgroup summarizes nine studies conducted from 2002 through 2006 which assess potential alternatives to lampricide. Since then, projects such as pheromone-assisted trapping, micro-elemental natal stream statolith signatures, and identifying cross-sectional flow patterns in streams to target the trapping of out-migrating transformers have been undertaken. To date, these efforts have not resulted in development of additional, feasible alternative control methods. In addition, recent studies conducted in Lake Champlain and the Great Lakes, focusing on the use of pheromones as attractants to manipulate spawning runs, have not progressed to the point of an applicable management technique.

Despite the completed and ongoing research on non-chemical controls methods, the use of barriers and traps to block and intercept spawning-phase sea lamprey remains the only currently feasible, non-pesticide control alternative in the Lake Champlain Basin. The use of barriers (both seasonal and permanent) is limited to streams where suitable sites are available and where significant adverse impacts of barriers on other aquatic organisms can be mitigated. Barriers are being used in Vermont's tributaries to Lake Champlain under Aquatic Nuisance Control permit #2014-S01. Under that permit, barriers and traps are installed seasonally in Pond Brook, Trout Brook, and Sunderland Brook. While barriers and traps can reasonably be used in smaller tributaries, chemical lampricide application remains the only feasible method of control within large tributaries.

The Secretary has determined there is no reasonable non-chemical alternative available.

9. Comment: Amphibian experts, and the VT endangered species committee, have clearly recognized that previous lampricide treatments have been devastating to mudpuppy populations. The lack of official data on this matter is a result of lack of resources devoted to studying this problem, the failure to conduct pre-treatment surveys, and the lack of remaining mudpuppies left to survey post-treatment. The biology and physiology of

these salamanders make them obviously vulnerable to such chemical treatments. Lampricide treatments should be prohibited until the USFWS has conducted rigorous study, definitively showing that the treatments used will not cause harm to the extremely sensitive mudpuppy population.

9. Response: See Response 1. Finding c.7. of the permit that reviews whether there is an acceptable risk to the non-target environment, specifically related to mudpuppies, the Secretary found:

The distribution of the mudpuppy in Lake Champlain is known largely due to observed mortalities from lampricide treatments. Otherwise there are scattered records of occurrence throughout the Lake Champlain valley of Vermont. This secretive, nocturnally active species is very difficult to sample efficiently, which has contributed to a lack of occurrence and density information for this species.

TFM toxicity tests and treatment cage studies conducted on mudpuppies have indicated that at the proposed treatment concentrations, no mortality should be expected for this species. However, mortalities have been recorded following Vermont TFM treatments. A single dead mudpuppy mortality was observed following the 2008 lampricide treatment in the Missisquoi River. This mortality was the first verified record of this species in the Missisquoi River. Mudpuppy mortality occurred during both the 1990 and 1994 TFM treatments of Lewis Creek. Following the 1990 treatment (1.0 x MLC), 23 dead mudpuppies were found, with 18 found following the 1994 treatment (~1.1 x MLC). No dead mudpuppies were found following the 2002 (1.1-1.3 x MLC), 2006, or 2010 treatments (1.2 x MLC) of Lewis Creek. In the Lamoille River, 508 dead mudpuppies were found after the 2009 treatment (1.2 x MLC), while juveniles comprised 77% of the mortalities, over 100 of these mudpuppies were adults. No dead mudpuppies were found after the 2013 Lamoille River treatment (1.1 x MLC). All 29 dead mudpuppies observed following the 2004 Winooski River lampricide treatment (1.0 x MLC to 1.1 x MLC) as well as the 19 individuals noted following the 2008 Winooski River treatment (1.0 x MLC to 1.3 x MLC) were juveniles ranging from 34 to 169 mm total length. In 2011, the permittee's Marquette Biological Station conducted a cage study with captive, reared mudpuppy juveniles that were approximately 40 mm in length. The study resulted in 3 mortalities among 63 test organisms for an overall mortality rate of 4.8%. The mudpuppies were held at 3 separate locations during a TFM treatment that ranged in concentration from 1.3 x MLC to 1.5 x MLC.

The permittee and the Vermont Department of Fish and Wildlife implemented a study in 2002 to determine effective collection methods and provide information on mudpuppy populations in Lewis Creek and the LaPlatte River. No mudpuppies were successfully collected from either river during this study.

The 30-year record of post-treatment mortality survey data in Lake Champlain tributaries provides variable evidence for the effects of lampricide treatments on mudpuppies. Results of post-treatment mortality survey data for TFM treatment concentrations that ranged from 1.0 x MLC to 1.3 x MLC have shown that TFM concentrations as low as 1.0 x MLC have resulted in mudpuppy mortality. These results have also shown both declining mudpuppy numbers, no evidence of decline, or no negative impact from lampricide treatments over time. Due to the many variables that can contribute to mudpuppy population persistence and abundance, and that not every river and lampricide treatment are identical, it is agreed that post-treatment mudpuppy mortality survey data alone is not a reliable tool for assessing mudpuppy population impacts and stability. However, conducting a pre and post lampricide treatment population assessments (e.g., mark-recapture method) would be a more appropriate approach to assess mudpuppy population stability when judging the effects of a lampricide treatment on a population.

While mudpuppies are challenging to sample for, this pre and post lampricide treatment survey approach was successfully conducted in the Lamoille River by the Vermont Cooperative Fish and Wildlife Research Unit using modified minnow traps. Through these efforts, 80 mudpuppies were trapped and released from December 2008 through May 2009; 75 of these were tagged. The Lamoille River was treated with lampricide at 1.2 x MLC on October 1st, 2009. The post-treatment mortality survey found 508 dead mudpuppies of which juveniles (25-200 mm total length) represented 77% of the collection. Following the treatment, with the objective to assess the population-scale impact from the treatment, the trapping effort was repeated from December 2009 through May 2010. This replicated post-treatment survey effort resulted in the collection of 81 mudpuppies. Ten of these mudpuppies were tagged recaptures from the previous effort conducted in the winter of 2009.

Post-treatment mortality survey data show conflicting trends of long-term effects on the numbers of mudpuppies in lampricide-treated rivers and are unreliable as an assessment technique. In the Lamoille River (2009) where localized high mortality occurred during the treatment, a pre and post study showed no appreciable effect on mudpuppy population numbers. Due to concerns over the population stability of mudpuppies in the Lamoille River as a result of lampricide treatments, the Vermont Department of Environmental Conservation consulted with the Vermont Department of Fish and Wildlife on this issue. Based on the available data, the Vermont Department of Fish and Wildlife finds that the proposed treatment concentration of no greater than 1.3 x MLC may cause young-of-year and yearling mudpuppy mortalities but would have limited impacts on older breeding-age classes and that the population of mudpuppies in the Lamoille River should remain stable with ongoing lampricide treatments. As a result, the Secretary can currently make the finding that there is an acceptable risk on the non-target environment in regard to the mudpuppy population in the Lamoille River.

10. Comment: It has been recommended by state experts based on best available science that the mudpuppy be recognized as a State endangered species.

10. Response: Listing species as State threatened or endangered is beyond the scope of review under Aquatic Nuisance Control permitting. More information on threatened and endangered species of Vermont may be found on the Vermont Department of Fish & Wildlife's website: https://vtfishandwildlife.com/node/181

10 V.S.A. Chapter 123: Protection Of Endangered Species
http://legislature.vermont.gov/statutes/fullchapter/10/123

10 App. V.S.A. § 10 Vermont endangered and threatened species rule:
http://legislature.vermont.gov/statutes/section/10APPENDIX/001/00010

11. Comment: Non-game species should be protected. Fish & Wildlife spends so much time and money growing wildlife and fish to satisfy special interests and ignores other species that need attention.

11. Response: 10 V.S.A. § 1455(i)(3) identifies that an Aquatic Nuisance Control permit shall "contain additional conditions, requirements, and restrictions as the Secretary deems necessary to preserve and protect the quality of the receiving waters, to protect the public health, and to minimize the impact on the nontarget environment. Such conditions may include requirements concerning recording, reporting, and monitoring." When reviewing whether there is an acceptable risk to the non-target environment, all aquatic plants and animals within the waters of the treatment area (other than the target species) are considered the non-target environment and are reviewed accordingly. Measures to reduce negative impacts on the non-target environment include how:

- The control activity proposed to control sea lamprey only.
- The target in-stream TFM concentration will be no greater than 1.3 times the minimum lethal concentration to sea lamprey where the treatment period will not exceed 14 hours.
- To ensure compliance with this permit and to assess any unforeseen or unanticipated adverse impacts on the resource or public good that may have resulted from a treatment, the permittee will submit an annual report to the Secretary.

12. Comment: What Impacts does lampricide have on other aquatic organisms?

12. Response: Finding c.7. of the permit identifies the following regarding impacts to the non-target environment:

Fishes

As a group, non-state-listed fishes present in the Lamoille River are generally more resistant to TFM than are threatened and endangered species. Observed non state-listed, non-target fish mortality has been low in past treatments of Vermont rivers at TFM concentrations of 1.0 to 1.3 x MLC. Toxicity data for the 99% TFM-HP/Bayluscide mix exists for several of the fish species in Lamoille River. Toxicity for the lampricide mix is similar as to TFM alone with these species. Channel catfish appear to be more sensitive to the mix while the remaining

species exhibit no observable effect concentrations of over 2.0 x MLC. Northern pike (*Esox lucius*) mortality (61 individuals) was reported near the mouth of Lewis Creek following the 2002 TFM treatment. While the block of TFM at the mouth of Lewis Creek had become diluted, the time of exposure was increased due to the slower stream velocity at lake level, which possibly accounted for this mortality. Northern pike mortality ranged from 0-22 for the other three treatments. No northern pike mortalities were reported following the 2004 Winooski River or 2007 Poultney River treatments. A treatment concentration of 1.3 x MLC in the Lamoille River should not significantly affect northern pike populations because this species is common and widely distributed in the Lake Champlain basin. Two species of darters show sensitivity to TFM: the logperch (*Percina caprodes*) and the tessellated darter (*Etheostoma olmstedi*). There is no available 99:1 TFM/niclosamide mix toxicity data for these two species. Agency population studies on Lewis Creek following the 1990 and 1994 treatments indicated that losses for these two darters were very low in relation to their densities in Lewis Creek. The logperch is considered somewhat common in the Lake Champlain drainage and the tessellated darter is common statewide.

The silver lamprey is not a federally or state-listed species but is classified as a rare species of special concern and a species of greatest conservation need. This species is very sensitive to TFM and it is expected that there will be a significant negative impact to silver lamprey population in the Lamoille River immediately after a lampricide treatment. However, as with sea lamprey, numbers of silver lamprey generally recover during the four-year period following a lampricide treatment. Based on a survey of the Lamoille River in 2019, silver lamprey numbers are currently at their highest sampled densities since records of sampling began in 2005. The permittee routinely monitors all lamprey numbers in tributaries proposed for treatment before and after each treatment and provides the Secretary with that data.

Aquatic Macroinvertebrates

The Department of Environmental Conservation has conducted impact studies of non-target macroinvertebrate communities from both Lewis Creek and Trout Brook before and after TFM treatments. In general, the studies' findings have shown that short-term impacts to a few sensitive macroinvertebrate species occurred, but all affected macroinvertebrate species were observed to recover to before-treatment densities within one year of a TFM treatment.

As a group, mussels are moderately sensitive to TFM. The non-state-listed mussels found in the Lamoille River, the eastern lamp mussel (*Lampsilus radiata*) and the eastern Elliptio (*Elliptio complanata*), are currently common in the Champlain Valley. While the eastern Elliptio is somewhat more resistant than the eastern lamp mussel to the effects of TFM, the proposed treatment concentration (1.3 x MLC) is not anticipated to cause significant mortality for either species.

Aquatic Plants and Wetlands

TFM was originally patented as an herbicide that required 15-25 ppm in standing water and 100 ppm in flowing water to control common aquatic plants such as *Anacharis* or *Ceratophyllum*. *Elodea* and *Myriophyllum* have also been recorded as being impacted by TFM. Inhibition of up to 50% of the growth of algae populations at sea lamprey control concentrations may occur where diatoms are most sensitive and blue-green algae most tolerant.

While aquatic plants can be impacted by TFM, negative impacts on aquatic plants and aquatic plants within wetlands are anticipated to be minor and temporary. Plant productivity is naturally in decline during a fall treatment period, TFM concentrations used are lower than concentrations that will impact aquatic plants, and aquatic plants will only be exposed to a passing block of TFM in a river and a reduced/dissipating concentration of TFM in standing waters.

13. Comment: Lamprey have been shown to be native to this region, and native species should not be eliminated for the sake of stocked and introduced non-native fish species. The "damage" the lamprey cause to "trophy" fish is minimal compared to the destruction of native animals negatively impacted by lampricides.

13. Response: See Response 6.

14. Comment: Scientific evidence, not public opinion, should be the greatest influence on the conservation an management of public resources. Previous studies have demonstrated no significant reduction in lamprey scarring in game fish as a result of TFM treatments, whereas significant mortality to a largely uncharacterized population of Mudpuppies was demonstrated. Placing the physical appearance of game fish above the viability of a native population sets a dangerous precedent of misguided priorities. Furthermore this type of decision fails to fully consider ecological stability at the community level and therefore is not following best practices in conservation and management.

14. Response: The Secretary acknowledges this comment.

15. Comment: The Vermont Endangered Species Committee (some of the folks that know the most about this salamander) have recommended that lampricide treatments no longer be permitted as a result of their non-target impacts. It really seems irresponsible for the VT ANR to continue to permit lampricide treatment in the Lamoille River knowing that is home to the majority of the native mudpuppies in Vermont. The State should be doing everything it can to protect this species and increase its population, and not allow activities that do just the opposite.

15. Response: See Response 7. While the mudpuppy is listed as a species of Special Concern (species status should be watched and does not denote legal protection) and a Species of Greatest Conservation Need (as identified in the Vermont Wildlife Action Plan; does not denote legal protection), actions to pursue conservation of the mudpuppy are beyond the scope of review under Aquatic Nuisance Control permitting.

16. Comment: This should be a 100-year permit for the sake of a valuable fishery to the state's economy.

16. Response: 10 V.S.A. § 1455(i)(4) identifies that an aquatic nuisance control permit issued under this section shall be valid for the period of time specified in the permit and not to exceed five years for chemical control.

17. Comment: Stop wasting taxpayers money appeasing malcontents and justify pay outs to special council and do what you know already works!

17. Response: The Secretary acknowledges this comment.

18. Comment: Comments in support of and opposed to the project were received.

18.Response: The Secretary acknowledges these comments.

19. Comment: Sea lamprey control has improved our Lake Champlain and tributaries fishery 10-fold in the past 20 years. I know there is opposition from a few groups over mudpuppy concerns but I as an avid fishermen, I still see plenty of mudpuppy to know they are not endangered at all, which bring up the question, what has the State of Vermont done to study populations of them over the last 20 years? Sea lamprey control is a must for Lake Champlain to have a healthy fishery and generate tourism to Vermont.

19. Response: The Secretary acknowledges this comment. See Response 9 regarding mudpuppy surveying in Vermont.

20. Comment: Lake Champlain fishery has enough stresses on it due to invasive species not to mention the frequent sewage waste discharges. Lamprey infestation is something we can take action against in a safe and effective manner.

20. Response: The Secretary acknowledges this comment.

21. Comment: When I was a kid and there was no good lamprey control and every fish we caught had two - three lamprey on it when it came in the boat. The fish were weak and look awful and to get a lake trout over 10 lbs was nearly impossible. I'm now a charter captain on Lake Champlain and have been for ten years. We see bigger and healthier fish then ever before. This means one thing a higher demand to come here and fish generating thousands of dollars to the Vermont economy. If we miss even one year of treatment it could send use back to square one (small, weak and ugly looking fish). We see and catch mudpuppies all over Lake

Champlain even with the constant lamprey control we have over the last several years! Please issue the permit to protect the fish in our fishery.

21. Response: The Secretary acknowledges this comment.

22. Comment: It's hardly surprising that the process for leaving a comment for this permit process is obscure and complicated, given that there is little chance that said comments will likely be ignored. But since there is no better way to formally address the failures embodied in the proposed spreading of deadly chemical agents in Vermont rivers, this will be my strenuous objection.

22. Response: The permit application process related to the review and public notification of an application is identified under 10 V.S.A. Chapter 170. Upon receipt of application #3051-ANC-C, the Secretary proceeded in accordance with that statute.

23. Comment: First, it is altogether inappropriate to continue to use such thoughtless and crude management strategies in the hope that one will, by some chance, achieve an overly broad objective. Ecology is not as simple as this approach assumes. This reflects the type of efforts that were common decades ago. The only refinement is the mistaken belief that the chemicals used now may do less damage than in the past. The idea of trying to manage past mistakes by using the same tools is simply lazy and reflects a refusal to learn. This could also be considered a fault of the stated objective of trying to achieve a healthy fish population by killing indiscriminately. In this I refer to the documented killing of a very large number of mudpuppies, a threatened species, and the total failure to consider this problem in future management. Under no circumstances should a permit for applying a biocide to Vermont waters be approved unless and until the applicants have offered a serious plan to avoid further damage to this species, and prove responsible for monitoring such a plan.

23. Response: See Response 3.

24. Comment: The Vermont Fish and Wildlife Department routinely states that its mission is the conservation of ALL SPECIES in the State of Vermont. And yet, when it comes to the mudpuppy, it, in cooperation with the United States Fish and Wildlife Service, who also should know better, put sportfisherman's interests ahead of conservation of all species. My understanding is that the last time the Lamoille River was treated, over 500 individuals of mudpuppies were killed by the TFM chemical. This is unconscionable.

If the USFWS and VTF&W continue lampricide treatments, especially in the Lamoille River, they should fund and implement a mudpuppy conservation plan, that studies the species and plans for its long-term conservation. After that, the plan should be implemented, with appropriate staffing to manage it and see that it succeeds in its objective. Anything less than that, in my view, is conservation malpractice, and the biologists who engage in such behavior should be ashamed.

24. Response: See Response 9.

25. Comment: I support the treatment of sea lampreys as a method to sustain and improve the Lake Champlain fisheries. As an avid fisherman of the lake, these invasive species do a number to the health of the cold water species. Science supports the safety of humans and other wildlife and organisms in the surrounding areas. Do not fold to the pressure of special interest groups. Although their heart is in the right place, their theories defy science and will do more damage to the ecosystem. I stand for what is right and data that is backed by science and I ask others to also stand up to these special interest groups.

25. Response: The Secretary acknowledges this comment.

26. Comment: The local economy needs this program in order to keep the fishery alive, with no lamprey control we will have no sportfish left in this lake, It has already happened here before the last time they stopped the program.

26. Response: An economic assessment of the project is beyond the scope of review under Aquatic Nuisance Control permitting.

27. Comment: The mudpuppy is not listed as threatened or endangered, this is just another attempt by certain parties within the government of the state of Vermont to push their own agenda, which is to stop lamprey control by any means. Please do not capitulate to their demands. If the state wants to study mudpuppies than let them do it, they need to stop trying to slide it into a condition of a permit for the federal government. This is the textbook example of "quid pro quo". Imagine if you went to the town to get a permit to redo your front porch, they issue you a permit, BUT, only if you repave the road in front of your house at your cost!!!!! Really VT? You basically pay nothing into this program, yet get all the benefits from it as it is federally funded. Now you want to slap a gift horse in the mouth, really VT? Don't let Vermont fishing go the way of VT hunting were everybody goes and spends their money hunting elsewhere, fishing is basically all we have left.

27. Response: See Response 1.

28. Comment: Please find a safer way to control invasive species that does not endanger native species such as mudpuppies.

28. Response: See Response 8.

29. Comment: As a constituent of the state of Vermont, I am making a public comment to reconsider the use of the lampricide scheduled to be used in 2020 and 2024. While it is a well-known fact that lamprey are causing considerable damage to Vermont's existing wildlife, use of this type of lampricide can effect up to 8 non-target, threatened and/or endangered species such as the mudpuppy salamander. It is known hat in 2009, 528 specimens were found dead after the 2009 treatment which only covered 5% of the treatment area leading to believe with reasonable certainty that many more were unintentionally killed by the lampricide. It is also known that this species has been requested to be listed as threatened by the VT Endangered Species Committee on three separate occasions. It is obvious that the lamprey issue need to be resolved, however moving forward using a means that has proven to affect species other than that of its intended use, especially those under threat, appears to be a negligent move to Vermont wildlife that is already threatened. I understand this is an issue that needs resolution, however I would like to suggest the deferment of this type of lamprey treatment until a more sustainable and evidence based solution is made with the integrity of Vermont's ecology is put forward.

29. Response: See Response 3, 9, and 11.

30. Comment: As an avid outdoorsman who has fished on Lake Champlain my whole life, I can tell you the worst possible thing you can do to the lake is allow a nonnative species go unchecked. There have been multiple occasions this year when I've had 24+ inch mature sea lamprey attached to the back of my boat with the motor running. I have the videos to prove it. Please don't allow these pests to become more of a problem than they already are.

30. Response: The Secretary acknowledges this comment.

31. Comment: I have enjoyed many, many hours fishing the waters of Lake Champlain and its tributaries. The current Sea Lamprey control program headed by the U.S. Fish and Wildlife Service along with Vermont and New York DEC have made Lake Champlain a world class fishery. It has allowed the restoration of the endangered native lake sturgeon and relieved pressure on other species that had been lamprey victims in the past, particularly, the cold water species. This unique fishery is second to none drawing fishermen from across the country as well as Canada. The cost benefit to the economy and jobs is most important in continuing this program. Please continue this valuable work.

31. Response: The Secretary acknowledges this comment.

32. Comment: I'm writing to share my concerns about the Aquatic Nuisance Control draft permit for the USFW lampricide treatment of the Lamoille River, for this year and 2024. With my education in Ecology as an Alum of Sterling College in VT, and with my knowledge working with reptiles and amphibians in the field of Animal Care, I am worried about the long term conservation of the Mudpuppy Salamander, and the possible local extirpation of the species because of mortality caused by the use of TFM. As you know, the VT Endangered Species Committee

has requested that this species be listed as threatened 3 times, and that the use of lampricide on the Lamoille (where 70% of mudpuppy sightings have occurred, according to the VT Herp Atlas) not continue. Mudpuppies are regarded as an S2, rare species of special concern and SGCN, and are thought to be native to VT only in portions of Lake Champlain and these lower river systems in the Lake Champlain basin. The native populations are not found anywhere else in VT, and because Mudpuppies have external gills throughout their life, they are very susceptible to chemical pollution.

After reading through the draft permit, I do not see how there is an "acceptable risk" to non-target species impacted by lampricide. I also understand that the applicant interprets the population data on Mudpuppies differently than the bulk of the independent scientific community. In section C, under Amphibians, the permit states that there is a "lack of occurrence and density information on this species". The remainder of the section seems to imply that there is variable data, and that no conclusion can be drawn about trends of survivability or mortality over time, and this is why treatment should be permitted. The only pre and post Mudpuppy surveys sighted on the Lamoille River were from 2008-2010, which provide a limited view of species distribution, especially when taking into account that a large number of the Mudpuppies killed in the 2009 lampricide treatment on the Lamoille were juveniles, and that Mudpuppies take up to 6 years to mature before being able to reproduce and contribute to the sustainability of a population. This would make "ensured recolonization," of the species hard to predict, which the permit doesn't take into account. This lack of data leaves the burden of proof with other parties to protect the species, and not with the permittee.

Moreover, exactly how is "acceptable risk" defined when little data is known about a species population? Is 10% mortality acceptable? 20% mortality? With the data that is available (including the 2011 cage study), what is the range of Mudpuppy survivability or mortality over time? Can USFW provide that data as a condition of the permit? If not, how has the permittee demonstrated, according to 10 V.S.A. § 1455, that there is an "acceptable risk" to the non-target environment, lastly and especially, if the comprehensive population study of the species impacted is to begin after the control activity begins this fall? Why can't USFW do the population study first, so there is more data, before moving ahead with the lampricide treatment, to spare an unknown impact on a rare and uncommon species?

I would suggest USFW should be required to conduct long term monitoring of Mudpuppies in the river and provide funding for the study. If they are to receive future permits for lampricide on the Lamoille, their studies should show that the population of Mudpuppies there continues to be robust after lampricide treatments. Otherwise, those treatments should not be permitted.

Thank you considering my comments on this issue. This is a very important environmental issue that is not straightforward or simple, but I hope that the needs of one of our game species (Atlantic Salmon), does not usurp the protection of one of our non-game species, the Mudpuppy.

32. Response: See Response 1 and 3. The review of the statutory criteria requires a certain degree of subjective judgment. Therefore, "acceptable risk" cannot be specifically quantified. For determining what might be considered an acceptable risk to the non-target environment from a proposed treatment, the Secretary made several baseline assumptions related to the non-target environments potentially affected by the proposed treatment, which are explained in finding c.7. of the permit.

33. Comment: As the issuing of the permit in question is a foregone conclusion, I am writing to voice my opinion that USFWS needs to do more to better understand the impact TFM has on Mudpuppy populations. Assertions that the reduced Mudpuppy mortality in rivers such as Lewis Creek are due to better chemical application practices are not supported by the evidence as nobody has been able to locate a Mudpuppy in that river using any method in approximately two decades. Similarly, the sharp reduction in Mudpuppy post-treatment mortality observations in the Lamoille River following the 2013 treatment could mean the population in that river is following a similar trend (or it could mean the treatment was less lethal). There is simply not enough data to claim everything is fine and the Mudpuppy populations can handle it – the burden to provide evidence for that claim is on the applicant. If USFWS and the state re-stated their position on Mudpuppies and honestly claimed that for reasons X, Y, and Z, significant stress to Mudpuppy populations is an acceptable risk to protect game fish

populations I could almost get on board with that, but pretending there isn't a potential problem with insufficient data to make that claim is unacceptable.

Furthermore, when is the last time there has been a public discussion about whether it is acceptable to be treating Vermont rivers with pesticides well into the 21st century? In my opinion, TFM chemical treatments are an outdated, old-school, single species approach to management. The goals of the lampricide program may be better accomplished through ecosystem management. While the state's position is that Sea Lamprey are invasive in Lake Champlain, there is plenty of evidence suggesting the species is, in fact, native. Their elevated population size would then be the result of an imbalance in the ecosystem, so solving the problem requires an ecosystem approach, not a toxic band aid.

Lamprey ammocoetes thrive in sandy or silty substrates, and we all know there is an unnatural level of siltation in the rivers they currently breed in. Since the lamprey population has been successfully reduced by killing ammocoetes through repeated TFM applications, it stands to reason that larval survival is a limiting factor in their population growth and that reducing sedimentation in rivers may also limit the lamprey population. Furthermore, the same sediments that may promote a robust lamprey population also inhibit the successful reproduction of species impacted by lamprey predation, including Lake Trout (which do not successfully reproduce in the watershed for a variety of reasons) and Lake Sturgeon. Lake Sturgeon are also known to be voracious predators of ammocoetes. The massive amount of money the state and federal government spend on the lampricide program would be put to better use by fixing the underlying problem that promotes lamprey reproduction and limits the reproduction of game species, as well as the lamprey's natural predators.

33. Response: See Response 1, 3, and 6.

34. Comment: First, I want to provide feedback on statements in the permit application regarding TFM concentrations and mudpuppy mortalities. The application states:

"Based on the available data, the Vermont Department of Fish and Wildlife finds that the proposed treatment concentration of no greater than 1.3 x MLC may cause young-of-year and yearling mudpuppy mortalities but would have limited impacts on older breeding-age classes and that the population of mudpuppies in the Lamoille River should remain stable with ongoing lampricide treatments. As a result, the Secretary can currently make the finding that there is an acceptable risk on the non-target environment in regard to the mudpuppy population in the Lamoille River."

Based on available data, the first sentence is a big assumption. Therefore, I disagree with the finding of the second sentence. No one knows whether TFM treatments will have limited effect on adult mudpuppies, especially in the long term. There is arguably more anecdotal evidence that treatments will result in population decline or extirpation over time (e.g., Lewis Creek). In replying to legitimate concerns about mudpuppy mortalities observed following TFM treatments, the applicants often make statements such this one, provided in the endangered and threatened (E&T) species taking permit application: "Fewer mudpuppy mortalities found following a treatment are an indication of fewer mudpuppies being killed during that lampricide treatment, alone. When mortalities are low or not found, it is possible that fewer or no individuals are present or it is possible that more individuals survived the treatment. Absence of evidence is not evidence of absence, nor is it proof of survival." Mudpuppies frequently turn up dead following TFM treatments. The number of mudpuppy mortalities can vary over time in some systems, and in others¬–notably Lewis Creek and the Winooski River–the numbers decline over time. The burden of proof that such results do not demonstrate mudpuppy declines is on the applicant releasing a chemical into the system that kills mudpuppies. In the absence of rigorous evidence, the parsimonious explanation in locations like Lewis Creek is that mudpuppies have declined (or become extirpated) as a direct result of repeated treatments with a chemical that has been definitively shown, during actual field applications, to kill mudpuppies.

It is good news that we captured a similar number of adults during the trapping season that followed the 2009 treatment (although see my comments below about the difference in sex ratios observed between the two sampling seasons). Additionally, a limited trapping effort of one week in mid-March 2020 (which was cut short by the Covid-19 pandemic), which resulted in 36 mudpuppy captures, provides further encouraging news that the

mudpuppy population may still be doing relatively well in the Lamoille River. The lack of mortalities following the 2013 TFM treatment may also be promising. However, the lack of observed mudpuppy mortalities in 2013 is not necessarily good news. Those observations could indicate a treatment within a "Goldilocks zone" that was effective at killing lamprey ammocetes, while leaving mudpuppies unscathed. However, those results may indicate that there were far fewer mudpuppies available to unintentionally kill in 2013 (i.e., a similar proportion of the population was killed in 2009 and 2013, but due to smaller population size in 2013, fewer mudpuppies died). A similar trend—albeit with far fewer initial mudpuppy mortalities—occurred following treatments of Lewis Creek, where the highest number of mortalities occurred following the first treatment in 1990, then fewer mortalities in 1994, and then no mortalities detected following all subsequent treatments (to my knowledge). These results are not promising, especially given that recent eDNA sampling has failed to detect mudpuppy DNA in water samples from Lewis Creek.

The TFM-induced mortality event following the 2009 treatment of the Lamoille was mainly comprised of juveniles. However, there are several caveats, such as the fact that only a very limited amount of the river bottom was visible during the 2009 post treatment non-target mortality surveys. This point was also brought up in statements provided in the E&T species taking permit application: "Significant mudpuppy mortality occurred in 2009 (528 counted), which represented a fraction of the treated area." The evasive response was frustrating: "The entire visible treated area of the Lamoille River from Peterson Dam to the mouth was surveyed by boat and shore in 2009." "Visible" is the operative word. The Lamoille River below the Peterson Dam is deep, wide, and often contains a lot of suspended sediment, so visibility into the water is often highly limited. During the 2009 post-treatment surveys, we could only see the river bottom along shallow portions of the river margins. In large part because of those conditions, the true number of mortalities, and life stage composition of that full suite of mortalities, is unknown. Another concern: on average, mudpuppies reach sexual maturity in six years. If juvenile mudpuppies are more susceptible to TFM-induced mortality, and future treatments are conducted at the typical interval of every four years, there is increased potential for TFM-induced mudpuppy population decline.

Only two TFM treatments have been applied to the Lamoille so far: the first of which resulted in a large mudpuppy mortality event, the second of which did not. The reason for this difference is not known. The official estimate is that the treatment concentration between 2009 and 2013 only differed by 0.1x the MLC for lamprey ammocetes. Perhaps the 2013 treatment truly involved only a slightly lower TFM concentration than the treatment in 2009, and this slightly lower TFM concentration ending up being just below a threshold that results in substantial mudpuppy mortality in the Lamoille River. Alternatively, the TFM concentration in 2009 may have been higher than reported: not due to intentional misreporting, but rather incomplete mixing and hot spots not identified via water sampling. Finally, the mudpuppy population in the Lamoille River prior to TFM treatments may have been so large, even if the 2009 treatment decimated the population, that enough mudpuppies remained in the system that our relatively limited trapping efforts could not detect the population decline.

The application also states:

"TFM toxicity tests and treatment cage studies conducted on mudpuppies have indicated that at the proposed treatment concentrations, no mortality should be expected for this species. However, mortalities have been recorded following Vermont TFM treatments."

The expectation of no mudpuppy mortalities following treatments at the proposed concentrations is simply not borne out by the evidence. Mudpuppy mortalities have frequently been detected following TFM applications at concentrations that cage and lab studies would suggest result in few, if any, mortalities. Put another way, non-target mortality observations following TFM treatments of tributaries often directly contradict the few laboratory and cage studies that have investigated the effects of TFM on mudpuppies. Clearly, there is a disconnect between lab-based controlled studies, and even some cage experiments during treatments, compared with what happens in practice throughout a treatment reach. As the applicant stated as part of another response in the T&E permit: "Many variables, some known and accounted for and others yet unknown, can affect how organisms respond under different conditions." This is likely true, and a reality that needs to be

openly acknowledged when assessing actual risk of treatments to non-target species of greatest conservation need.

One possibility for the differences in the number of mudpuppy mortalities observed following treatments when compared with cage and lab studies could be incomplete mixing of TFM within the entire treatment reach or higher TFM concentrations than those detected via water sampling (e.g., those conducted at only select points, as shown in Figure 4 of Appendix A). For example, the reduction in treatment concentration from 2009 (1.2x MLC reported) to 2013 (1.1x MLC reported) may have been larger than the reported difference, due to limited water sampling or other factors.

The confounding results between mortalities detected following TFM treatments and more controlled experiments with mudpuppies lends support to the possibility that TFM concentrations during field treatments may occasionally be higher than estimated. For example, the application mentions "In 2011, the permittee's Marquette Biological Station conducted a cage study with captive, reared mudpuppy juveniles that were approximately 40 mm in length. The study resulted in 3 mortalities among 63 test organisms for an overall mortality rate of 4.8%. The mudpuppies were held at 3 separate locations during a TFM treatment that ranged in concentration from 1.3 x MLC to 1.5 x MLC." If, indeed, TFM concentrations of 1.3–1.5x MLC result in minimal juvenile mortalities, the large number of juvenile moralities resulting from a supposedly 1.2x MLC in the Lamoille River in 2009 are highly perplexing.

Following experiments by Boogaard et al. (2003), the authors stated "Results from laboratory toxicity tests with the lampricides on adult mudpuppies revealed that treatments at or slightly above the MLC for sea lamprey would not significantly impact adult mudpuppy populations. Observed NOECs for adult mudpuppies were 1.6 times greater than observed MLCs for sea lamprey in tests with TFM and were 1.5 times greater in tests with TFM/1% niclosamide." Again, if a TFM concentration of 1.5x MLC for lamprey ammocetes will result in insignificant adult mortality, it is very surprising to observe at least 120 dead adult mudpuppies immediately following a treatment of that was supposedly 1.2x MLC. However, the authors go on to state, "Lampricide treatment levels at 1.5 times the MLC for sea lamprey may cause some mortality among adult mudpuppies. In addition, mudpuppies stressed from mating and spawning at certain times of the year may be more sensitive to the lampricides. We must note that these tests were conducted with adults and the results may not be the same for juveniles. In fact, the mortalities observed during previous lampricide treatments were mostly juveniles…" Indeed, there may be physiological and genetic differences between captive mudpuppies obtained from a bait wholesaler in Minnesota and wild mudpuppies in Vermont, let alone the environmental differences between controlled laboratory conditions and a large-scale field treatment.

Second, I strongly agree that "Due to the many variables that can contribute to mudpuppy population persistence and abundance, and that not every river and lampricide treatment are identical, it is agreed that post-treatment mudpuppy mortality survey data alone is not a reliable tool for assessing mudpuppy population impacts and stability." However, I hope that these and other similar statements within the application—emphasizing the difficulty of drawing conclusions about TFM treatment effects on non-target species via post-treatment mortality assessments alone—are not being presented as an argument to stop those assessments. There is clear utility in documenting the species, number, life stages, and sex ratios of nontarget mortalities. In particular, as stated in the application, most mudpuppies in Vermont have been observed during those post-treatment surveys. I strongly recommend conducting reach-wide assessments, from Peterson Dam to Lake Champlain, following each treatment, irrespective of how many non-target mortalities are observed during preliminary assessment of the five pre-defined stream sections outlined in Figure 5 of Appendix A of the approved permit application.

One of my regrets following the 2009 TFM treatment was not immediately collecting information on the sexes of adult mudpuppy mortalities that we collected during the post-treatment surveys. Those data would have been useful to determine if there were biased sex ratios among the dead adult mudpuppy sample collected following treatment. Given sampling bias and other confounding factors, we would not have been able to draw definitive conclusions about treatment effects on different sexes if the sample of mudpuppy mortalities had a skewed sex ratio. However, anecdotal observations from the mortality sample would provide another line of evidence about

whether the sexes experience different mortality rates during TFM applications. During our 2008–2010 study, we captured significantly fewer females during the second trapping season when compared with the first trapping season. We do not know the reason for this difference (and we discuss several possibilities for the observed change in sampled sex ratios between years in the discussion section of Chellman et al. 2017). However, one possibility is that female mudpuppies are more susceptible to TFM-induced mortality.

Our capture-mark-recapture (CMR) study from 2008–2010 was a good start in beginning to learn more about mudpuppy populations in this system. However, our study was brief, limited in geographic extent, and almost exclusively successful at targeting adults. Therefore, there is still much to learn about mudpuppy demographics in the Lamoille River. Additionally, the one year before and after study design (which, given the absence of any available untreated Vermont rivers known to support mudpuppies, lacked a control) provided very little information about the potential long-term effects of TFM treatments in the Lamoille River. In fact, the study was not intended to investigate the potential effects of TFM on mudpuppies. Our goal was to attempt developing more effective sampling methods and gain a baseline understanding of mudpuppy demographic parameters in the Lamoille River, including abundance.

Given the history of lamprey control in the Lake Champlain basin and approvals of previous treatment efforts, I understand that approval of this permit is likely a foregone conclusion, irrespective of feedback received during this public comment period. Therefore, once this permit application is approved, I strongly support long-term monitoring of mudpuppy populations in the Lamoille River. I agree that annual monitoring should be required—along with the funding necessary to pay wages for field staff, supplies, and administrative costs—through at least 2025. However, I strongly recommend annual mudpuppy population monitoring beyond the proposed end date of 2025. Assuming lampricide treatments will continue into the future, monitoring the Lamoille River mudpuppy population beyond the aftermath of the next treatment may provide more useful information on the effects of these treatment efforts on mudpuppies, helping bridge the gap in knowledge about the effects of TFM on mudpuppy populations. This study could potentially be more broadly applicable for informing similar treatment efforts throughout the Lake Champlain Basin and Great Lakes, where there are also concerns about the long-term effects of TFM on mudpuppy populations.

34. Response: See Response 1 and 3.