

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



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

For Aquatic Nuisance Control Permit Program Use Only

Application Number: 2015-07 Lake Dunmore

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 an application 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 Dunmore Fern Lake Association (Attn: James C. Foley, Jr.)

2a. Mailing Address: P.O. Box 14

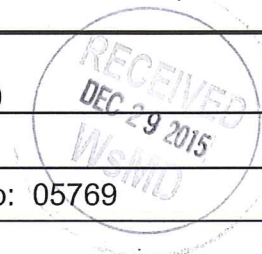
2b. Municipality: Salisbury

2c. State: VT

2d. Zip: 05769

3. Phone: 802-388-7933

4. Email: jfoleyjr@middlaw.com



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

1. Entity's Name: Aquatic Control Technology

2a. Mailing Address: 590 Lake Street

2b. Municipality: Shrewsbury

2c. State: MA

2d. Zip: 01545

3. Phone: 508-885-0101

4. Email: info@aquaticcontroltech.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: Lake Dunmore

2. Municipality: Leicester & Salisbury

3. Are there wetlands associated with the waterbody? Yes No ID: 5010

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: 6/1/2016	1b. Proposed end date (if known): 6/1/2021
2. Aquatic nuisance(s) to be controlled: Plant/Algae/Animal: Eurasian watermilfoil (<i>Myriophyllum spicatum</i>) Submit additional information as needed.	3. Pesticide(s) to be used ¹ : Trade Name: Renovate OTF & Renovate 3 EPA Registration #: 67690-42 & 62719-37-67690 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): 1.5 – 2.5 ppm 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. 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. LDFL Association, by: <u>Jawon Paul</u> its duly authorized agent Applicant/Applicator Signature: <u>Jawon Paul</u> Date: <u>12/26/15</u>	
G. 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: <u>Marc D Belland</u> President, ACT Date: <u>12/24/15</u>	
H. Application Fees 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, Main 2 Montpelier, VT 05620-3522 Direct all correspondence or questions to the Aquatic Nuisance Control Permit Program at: ANR.Shoreland@vermont.gov For additional information visit: www.watershedmanagement.vt.gov	

¹ The application fee for the aquatic pesticide Aquashade® and copper compounds used as algacides 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)

AQUATIC CONTROL TECHNOLOGY

December 16, 2015

Vermont Department of Environmental Conservation
Watershed Management Division
Aquatic Nuisance Control Program
1 National Life Drive, Main 2
Montpelier, VT 05620-3522



Re: Lake Dunmore 2016-2020 Application for use of Pesticides under an Aquatic Nuisance Control Permit

To Whom It May Concern:

Enclosed please find a signed copy of a permit application that was prepared on behalf of ~~the Town of Leicester~~ and the Lake Dunmore Fern Lake Association (LDFLA).

This application is requesting a five-year approval to initiate an area-selective herbicide treatment program with Renovate (triclopyr) herbicide for control of Eurasian watermilfoil at Lake Dunmore. Herbicide treatments will be used to supplement the existing Milfoil Control Program. Specific, annual requests for treatment will be submitted to DEC for final review and approval following an early season survey. Treatment requirements will likely vary from year to year, and will be dictated by the availability of funds, but no more than 100 acres would be treated during any single year. Requested changes from previous Renovate treatments performed in Vermont include increasing the maximum application rate for Renovate OTF to 2.0 - 2.5 ppm based on the volume of water being treated. Higher concentrations are needed to help overcome the effects of dilution in shoreline treatment areas with high edge to surface area ratios.

We trust that DEC will reference the attached materials and prior reports as necessary. LDFLA will provide a list of property owners that abut the lake and areas immediately downstream under separate cover.

Please do not hesitate to contact me directly should you have any questions or require additional information.

Sincerely,

A handwritten signature in black ink that reads "Marc D Belland".

President/ Aquatic Biologist

cc: Town of Leicester – LeicesterVT@comcast.net
Mr. James Foley, Jr., Lake Dunmore Fern Lake Association – jfoleyjr@middlaw.com

AQUATIC PESTICIDE PERMIT APPLICATION

LAKE DUNMORE

Salisbury & Leicester, Vermont

December 2015

Applicant:

Lake Dunmore Fern Lake Association
P.O. Box 14
Salisbury, VT 05769

Applicator:

Aquatic Control Technology.
21 West Main Street
Spencer, MA 01562

AQUATIC CONTROL TECHNOLOGY



AQUATIC PESTICIDE PERMIT APPLICATION

LAKE DUNMORE

Supplemental Information

- ◆ Attachment A – Product Labels & MSDS sheets
- ◆ Attachment B – Maps
- ◆ Attachment C – Detailed Project Description – Five-Year (2016-2020)
Integrated Aquatic Vegetation Management Plan
- ◆ Attachment D – Aquatic Vegetation Survey prepared by DFWI

ATTACHMENT A

PRODUCT LABELS & MSDS

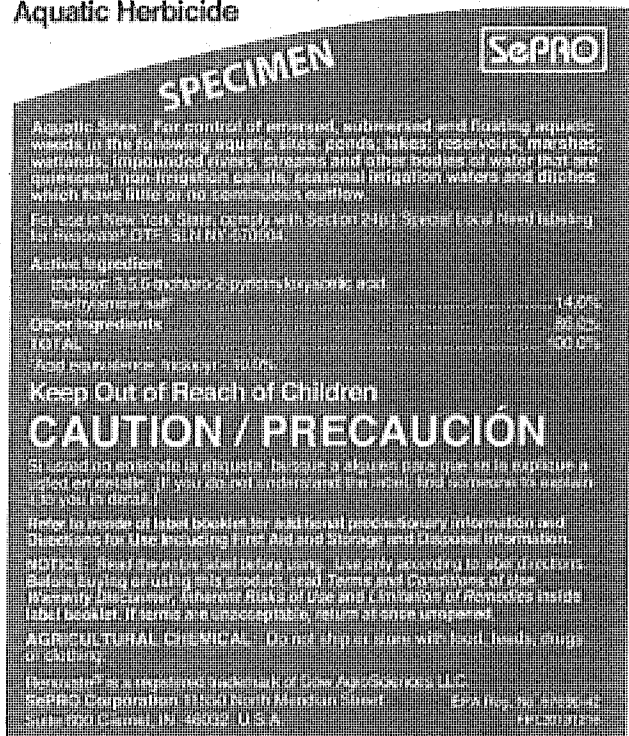
1. Renovate 3 (EPA Registration Number 62719-37-67690)
2. Renovate OTF (EPA Registration Number 67690-42)

(provided under separate cover)

Renovate[®] OTF

Aquatic Herbicide

GROUP 4 HERBICIDE



USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside, then wash thoroughly and put on clean clothing.

ENVIRONMENTAL HAZARDS

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. 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. Therefore, to minimize this hazard do not treat more than one-half (½) of the water area in a single operation and wait at least 10 days between treatments when susceptible plants are mature and have grown to the water's surface, or when the treatment would result in significant reductions in total plant biomass. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Waters having limited and less dense weed infestations may not require partial treatments.

SPECIALITY CHEMICAL: Do not ship or store with food, feeds, drugs or clothing.

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.

PRODUCT INFORMATION

When applying this product follow all applicable use directions, precautions and limitations.

For Aquatic and Wetland Sites:

Use Renovate[®] OTF herbicide for control of emersed, submersed and floating aquatic weeds in the following aquatic sites: ponds; lakes; reservoirs; marshes; wetlands; impounded rivers, streams and other bodies of water that are quiescent; non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow. Renovate[®] OTF is formulated on biodegradable granules that, when applied to water bodies, immediately deliver Renovate[®] OTF down to the critical area for controlling target weeds.

Obtain Required Permits: Consult with appropriate state or local pesticide and/or water authorities before applying this product in or around public waters. Permits and posting or treatment notification may be required by state or local public agencies.

Recreational Use of Water in Treatment Area: There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.

Livestock Use of Water from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

USE PRECAUTIONS AND RESTRICTIONS

- For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate[®] OTF, SLN NY-070004.
- **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.
- **Chemigation:** **Do not** apply this product through any type of irrigation system.
- **Do not** apply to tidal salt water bays or estuaries.
- **Do not** apply directly to un-impounded rivers or streams.
- **Do not** apply where runoff water may flow onto agricultural land as injury to crops may result.

APPLICATION TO WATERS USED FOR IRRIGATION

Irrigation Restrictions

- **Do not** use treated water for irrigating greenhouse or nursery plants unless triclopyr concentrations are confirmed to be less than 1 ppb as determined using FastEST[®] or other analytical techniques.
- **Do not** use water treated with Renovate[®] OTF for hydroponic farming unless triclopyr concentrations are confirmed to be less than 1 ppb as determined by FastEST[®] or other analytical techniques.
- **Do not** apply Renovate[®] OTF directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit dust to drift into these areas.
- This label describes both required and recommended uses of a chemical analysis for the active ingredient, triclopyr. SePRO

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

Causes moderate eye irritation. Avoid contact with eyes or clothing.

Keep Out of Reach of Children

CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID

If in eyes	<ul style="list-style-type: none"> • Hold eye 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 eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	<ul style="list-style-type: none"> • 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.
If swallowed	<ul style="list-style-type: none"> • Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything to an unconscious person.
If inhaled	<ul style="list-style-type: none"> • Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

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.

Corporation recommends the use of FastEST® analysis for the determination of the active ingredient concentration in water. Contact SePRO Corporation for the incorporation of this analysis in your treatment program. Other proven chemical analysis for the active ingredient may also be used. The FastEST® analysis is referenced in this label as the preferred method for the rapid determination of the concentration of the active ingredient in the water.

- **Non-Food Crop Irrigation:** There is no restriction on use of treated water to irrigate established grasses. If treated water is intended to be used to irrigate other non-crop areas not labeled for direct treatment with triclopyr (e.g., landscape ornamentals) or for other irrigation uses not described, consult with SePRO Corporation prior to commencing irrigation if triclopyr concentrations exceed 1.0 ppb.
- **Food Crop Irrigation:** Water treated with Renovate® OTF may not be used for crop or food-crop irrigation purposes for 120 days after application or until triclopyr concentrations are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less. These restrictions apply to all applications of Renovate® OTF where water could be used for irrigation of crops or food-crops, including:
 - o **Seasonal Irrigation Waters:** Renovate® OTF may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis.
 - o **Irrigation Canals/Ditches:** Those currently being used to transport irrigation water or that will be used for irrigation within 120 days following treatment

APPLICATIONS TO POTABLE WATER SOURCES

For applications of Renovate® OTF to control floating, emersed, and submersed weeds in sites that contain a functioning potable water intake for human consumption, see Table 1 to determine the minimum setback distances of the application from the functioning potable water intakes.

Area Treated (acres)	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
	Required Setback Distance (ft) from Potable Water Intake				
< 4	300	400	600	800	1,000
> 4 - 8	420	560	840	1,120	1,400
> 8 - 16	600	800	1,200	1,600	2,000
> 16 - 32	780	1,040	1,560	2,080	2,600
> 32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800 * ln (acres) - 160)/3.33	Setback (ft) = (800 * ln (acres) - 160)/2.50	Setback (ft) = (800 * ln (acres) - 160)/1.67	Setback (ft) = (800 * ln (acres) - 160)/1.25	Setback (ft) = (800 * ln (acres) - 160)

Note: ln = natural logarithm

Example Calculation 1: to apply 2.5 ppm Renovate® OTF to 50 acres:
 Setback in feet = (800 x ln (50 acres)) - 160
 = (800 x 3.912) - 160
 = 2,970 feet

Example Calculation 2: to apply 0.75 ppm Renovate® OTF to 50 acres:
 Setback in feet = (800 x ln (50 acres)) - 160
 3.33
 = (800 x 3.912) - 160
 3.33
 = 892 feet

NOTE: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes.

To apply Renovate® OTF around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis, or other appropriate means of analysis.

BEST MANAGEMENT PRACTICES FOR DRIFT MANAGEMENT

Equipment used in the application of Renovate® OTF should be carefully calibrated to ensure it is working properly and delivering a uniform distribution pattern. Make aerial application only when the wind velocity is 2 to 10 mph.

Applications may be made only when there is little or no hazard for volatility or dust drift, and when application can maintain Renovate® OTF placement in the intended area. Very small quantities of dust, which may not be visible, may seriously injure susceptible plants, and Renovate® OTF may be blown outside of the intended treatment area under extreme

conditions. Do not spread Renovate® OTF when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured.

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

Ground Application Equipment: To aid in reducing drift, Renovate® OTF may be applied when wind velocity is low (follow state regulations; see *Sensitive Area* under *Aerial Drift Reduction Advisory* below) or using a slurry injection or eductor system.

AERIAL DRIFT REDUCTION ADVISORY

This section is advisory in nature and does not supersede the mandatory label requirements.

Application Height: Applications should not be made 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 drift potential.

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 (e.g. higher wind).

Wind: Drift potential is lowest between wind speeds of 2 - 10 mph (follow state regulations). However, many factors, including equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential.

NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect drift.

Sensitive Areas: Renovate® OTF should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

AQUATIC WEEDS CONTROLLED BY RENOVATE® OTF

alligatorweed	milfoil species	white water lily (<i>Nymphaea</i> spp.)
American lotus	parrotfeather††	water primrose (<i>Ludwigia</i> spp.)
bladderwort	pickerelweed	watershield (<i>Brasenia</i> spp.)
Eurasian watermilfoil	pennywort	yellow water lily (<i>Nuphar</i> spp., spatterdock)
Flowering rush	smartweed	
hybrid milfoil (<i>Myriophyllum spicatum</i> x <i>sibiricum</i>)	water chestnut †, ††	

† Not for use in California

†† Retreatment may be needed to achieve desired level of control.

APPLICATION METHODS

Surface Application

Use a mechanical spreader such as a fertilizer spreader, blower or mechanical seeder, or similar equipment capable of uniformly applying Renovate® OTF. Before spreading any product, carefully calibrate the application equipment. When using boats and power equipment, you must determine the proper combination of (1) boat speed, (2) rate of delivery from the spreader, and (3) width of swath covered by the granules.

Use the following formula to calibrate the spreader's delivery in pounds of Renovate® OTF per minute:

$$\text{Pounds per Minute} = \frac{\text{miles per hour} \times \text{swath width (feet)} \times \text{pounds per acre}}{495}$$

Aerial Application (Helicopter Only)

Ensure uniform application. All equipment should be properly calibrated using blanks with similar physical characteristics to Renovate® OTF. To avoid streaked, uneven or overlapped application, use an appropriate tracking device (e.g. GPS). Refer to the *Aerial Drift Reduction Advisory* section of this label for additional precautions and instructions for aerial application.

Floating and Emersed Weeds

For control of water lily's (*Nymphaea* spp. and *Nuphar* spp.), watershield (*Brasenia* spp.), and other susceptible emersed and floating herbaceous weeds, apply 1.0 to 2.5 ppm a.e. triclopyr per acre. Apply when plants are actively growing.

Use higher rates in the rate range when plants are mature, when the weed mass is dense, in areas of greater water exchange, or for difficult to control species. Repeat as necessary to control regrowth, but do not exceed a total of 2.5 ppm a.e. triclopyr for the treatment area per annual growing season.

Submersed Weeds

For control of Eurasian watermilfoil (*Myriophyllum spicatum*) and other susceptible submersed weeds, select the rates of Renovate® OTF according to Table 2 to provide a triclopyr concentration of 0.50 to 2.5 ppm a.e. in treated water. Use of higher rates in the rate range is recommended in areas of greater water exchange. These areas may require a repeat application. Split treatments over relatively short periods of time (e.g., 1 to 4 days) may be effective in some areas (e.g. small sites or sites with higher dilution potential) to maintain adequate exposure with target plants. However, total application of Renovate® OTF must not exceed an application rate of 2.5 ppm a.e. triclopyr for the treatment area per annual growing season.

For optimal control, apply when Eurasian watermilfoil or other submersed weeds are actively growing.

Average Water Depth (ft)	0.5 ppm	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
	Pounds Renovate® OTF/Acre					
1	14	20	27	41	54	67
2	27	41	54	81	108	135
3	41	61	81	122	162	202
4	54	81	108	162	216	270

For applications greater in depth than 4 feet, when targeting difficult to control species, and/or in sites with high dilution potential, the following formula should be used to calculate applications rates should greater than 270 pounds of Renovate® OTF be needed to achieve desired weed control. NOTE: Do not exceed 2.5 ppm a.e. triclopyr for the treatment area per annual growing season.

Pounds of Renovate® OTF per Acre = average depth x target ppm x 27

Example Calculation:

6 foot average depth x 2.5 ppm x 27 = 405 pounds of Renovate® OTF per acre

For spot treatments or small treatment sites of ½ acre or less use Table 3 to determine the application rate depending on average water depth to achieve a concentration of 1.25 to 2.5 ppm a.e. Do not exceed 2.5 ppm a.e. triclopyr for the treatment area per annual growing season. Use higher rates in small treatment areas and in areas prone to higher dilution and for heavy weed infestation. Use the lower rates for spot treatment application of areas less prone to dilution and lighter weed infestations. For best results, split the total application rate into three equal applications 8 to 12 hours apart. Apply when water is calm.

Example: A 100 ft. x 40 ft. lakeshore swimming area with a 4 ft. average depth, heavily infested with Eurasian watermilfoil

- Step 1: Determine the area to be treated in square feet (ft²) by multiplying the length of the area by the width.
→ 100 ft. x 40 ft. = 4,000 ft²
- Step 2: Determine the amount of Renovate® OTF to be used by consulting Table 3, *Pounds of Renovate® OTF for Areas Less Than ½ Acre*.
→ According to Table 3, use 24.7 lbs. of Renovate® OTF total based on 4 foot average depth.
- Step 3: Apply Renovate® OTF uniformly over weeds in treatment site in three equal applications of 8.2 lbs. each, 8 - 12 hours apart.

Area (ft²)	3 foot average depth		4 foot average depth	
	1.25 ppm a.e.	2.5 ppm a.e.	1.25 ppm a.e.	2.5 ppm a.e.
500	1.2	2.3	1.5	3.0
1,000	2.3	4.6	3.1	6.1
4,000	9.3	18.6	12.4	24.7
10,000	23.2	46.5	31.0	61.9
20,000	46.5	93.0	62.0	123.9

For applications with an area or depth not included in the above chart, use the following formula to calculate the application rates.

Pounds of Renovate® OTF = area (ft²)/43,560 x average depth x target ppm x 27

Example Calculation:

8,250 ft²/43,560 x 4 foot average depth x 1.25 ppm x 27 = 25.6 pounds of Renovate® OTF

Small treatment application of Renovate® OTF is recommended with waterproof gloves or a hand spreader to uniformly distribute flakes on target weeds.

Wetland Sites

Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of emerged, floating or submersed aquatic weeds in wetland sites, follow use directions and application methods associated with the *Floating and Emerged Weeds* or *Submersed Weeds* sections on this label.

Use Precautions

Minimize unintentional application to open water when treating target vegetation in wetland sites.

If any content on this label is not understood, or you need further assistance, contact a SePRO Corporation Aquatic Specialist with questions specific to your application.

STORAGE AND DISPOSAL

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage: Store in original container only. Do not store near feed or foodstuffs. In case of spill, contain material and dispose as waste.

Pesticide Disposal: Wastes resulting from use of this product must be used according to label directions or disposed of at an approved waste disposal facility.

Nonrefillable Container Handling (non-rigid plastic bags, any size): Do not reuse or refill this container. Completely empty bag into application equipment. Offer for recycling if available. If recycling not available, then dispose of empty bag in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

TERMS AND CONDITIONS OF USE

If terms of the following *Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer, Inherent Risks of Use and Limitations of Remedies*.

WARRANTY DISCLAIMER

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation or the seller. To the extent consistent with applicable law, all such risks shall be assumed by buyer.

LIMITATION OF REMEDIES

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

- (1) Refund of purchase price paid by buyer or user for product bought, or
- (2) Replacement of amount of product used.

To the extent consistent with applicable law, SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. To the extent consistent with applicable law, in no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer*, *Inherent Risks of Use* and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or *Limitations of Remedies* in any manner.

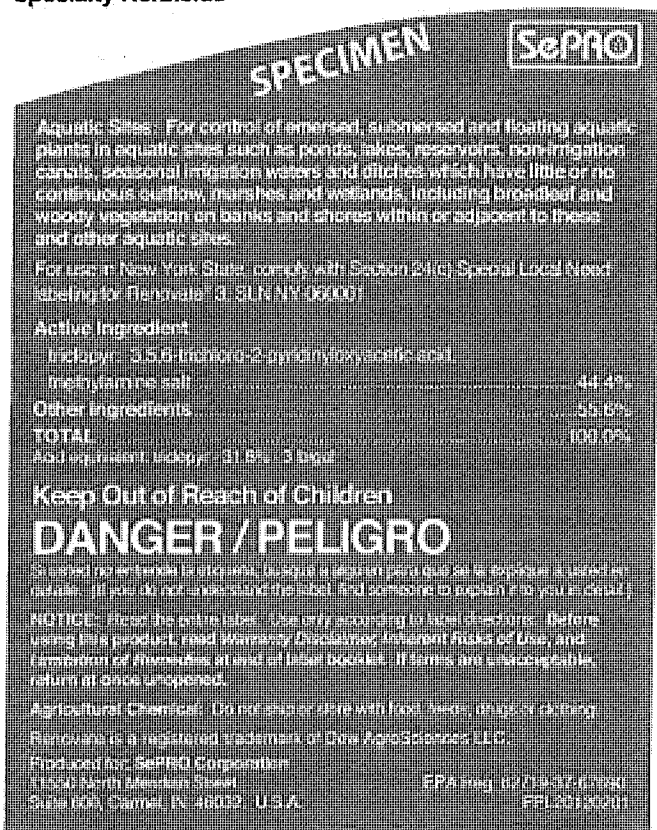
Renovate® is a registered trademark of Dow AgroSciences LLC.
©Copyright 2014 SePRO Corporation



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

Renovate[®] 3

Specialty Herbicide



PRECAUTIONARY STATEMENTS

Hazard to Humans and Domestic Animals

DANGER

Corrosive. Causes Irreversible Eye Damage. Harmful If Swallowed Or Absorbed Through Skin. Prolonged Or Frequently Repeated Skin Contact May Cause Allergic Reaction In Some Individuals. Do not get in eyes or on skin or clothing.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants;
- Shoes plus socks;
- Protective eyewear; and
- Chemical resistant gloves (≥ 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. 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, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS [40 CFR 170.240(d)(4-6)], 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 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.

Table of Contents

Page

Precautionary Statements.....	1
Hazard to Humans and Domestic Animals	1
Personal Protective Equipment (PPE).....	1
Engineering Controls	1
User Safety Recommendations	1
First Aid.....	1
Environmental Hazards	2
Physical or Chemical Hazards.....	2
Directions for Use	2
Agricultural Use Requirements.....	2
Non-Agricultural Use Requirements	2
Storage and Disposal	6
General Information for Aquatic and Wetland Sites	2
General Use Precautions and Restrictions.....	2
Grazing and Haying Restrictions	2
Avoiding Injurious Spray Drift.....	2
Spray Drift Management.....	3
Aerial Drift Reduction Advisory	3
Plants Controlled	3
Woody Plant Species.....	3
Annual and Perennial Broadleaf Weeds.....	4
Aquatic Weeds.....	4
Application Methods	4
Floating and Emerged Weeds	4
Submerged Weeds.....	4
Wetland Sites.....	5
Terrestrial Sites Associated with Wetland Areas.....	5
Terms and Conditions of Use.....	7
Warranty Disclaimer.....	7
Inherent Risks of Use.....	7
Limitation of Remedies	7

First Aid	
If in eyes:	<ul style="list-style-type: none"> • Hold eye 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 eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing:	<ul style="list-style-type: none"> • 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.
If swallowed:	<ul style="list-style-type: none"> • Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
<p>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.</p>	
<p>Note to Applicator: Allergic skin reaction is not expected from exposure to spray mixtures of Renovate 3 herbicide when used as directed.</p>	
<p>Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.</p>	

ENVIRONMENTAL HAZARDS

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

This chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

PHYSICAL OR CHEMICAL HAZARDS

Combustible. Do not use or store the product near heat or open flame.

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.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls;
- Shoes plus socks;
- Protective eyewear; and
- Chemical-resistant gloves (≥ 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber.

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for Agricultural Pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

GENERAL INFORMATION FOR AQUATIC AND WETLAND SITES

Use Renovate 3 herbicide for control of emerged, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, and ditches which have little or no continuous outflow, marshes and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

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.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate® 3, SLN NY-060001.

When applying this product in tank mix combination, follow all applicable use directions, precautions and limitations on each manufacturer's label.

Chemigation: Do not apply this product through any type of irrigation system.

Irrigation: Do not use treated water for irrigation for 120 days following application. As an alternative to waiting 120 days, treated water may be used for irrigation once the triclopyr level in the intake water is determined to be non-detectable by laboratory analysis (immunoassay). There is no restriction on use of water from the treatment area to irrigate established grasses.

Water treated with Renovate 3 may not be used for irrigation purposes for 120 days after application or until residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Seasonal Irrigation Waters: Renovate 3 may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis provided that there is a minimum of 120 days between applying Renovate 3 and the first use of treated water for irrigation purposes, or until residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Irrigation Canals/Ditches: Do not apply Renovate 3 to irrigation canals/ditches unless the 120-day restriction on irrigation water usage can be observed or residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Do not apply Renovate 3 directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit spray mists containing it to drift into them.

- Do not apply to salt water bays or estuaries.
- Do not apply directly to un-impounded rivers or streams.
- Do not apply on ditches or canals currently being used to transport irrigation water or that will be used for irrigation within 4 months following treatment. It is permissible to treat irrigation and non-irrigation ditch banks.
- Do not apply where runoff water may flow onto agricultural land as injury to crops may result.
- When making applications to control unwanted plants on banks or shorelines of moving water sites, minimize overspray to open water.
- The use of a mist blower is not recommended.

Grazing and Haying Restrictions

Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals:** Do not allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- Do not harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

Avoiding Injurious Spray Drift

Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants. Do not spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers or indicates a potential of hazardous spray drift, do not spray.

Aerial Application: For aerial application near susceptible crops, apply through a Microfoil® or Thru-Valve boom®, or use a drift control additive labeled for aquatic use. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free mixtures containing thickening agents labeled for use in aquatics or applications made with the Microfoil or Thru-Valve boom. Keep spray pressures low enough to provide coarse spray droplets. Spray boom should be no longer than 3/4 of the rotor length. Do not use a thickening

agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by SePRO Corporation is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than as advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than SePRO Corporation, in selecting and determining how to use its equipment.

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 determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

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

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should 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 recommended 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 airstream produces larger droplets than other orientations and is the recommended practice. 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: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made 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. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. Note: 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: Applications should not occur 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.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Renovate 3 should be used in thickened (high viscosity) spray mixtures using a labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low (follow state regulations). In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine-droplet spray.

High Volume Leaf-Stem Treatment: To minimize spray drift, do not use pressure exceeding 50 psi at the spray nozzle and keep sprays no higher than brush tops. A labeled thickening agent may be used to reduce drift.

Plants Controlled

Woody Plant Species

alder	choke cherry
arrowwood	cottonwood
ash	crataegus (hawthorn)
aspen	locust
bear clover (bearmat)	maleuca (seedlings)
beech	maples
birch	mulberry
blackberry	oaks
blackgum	poison ivy
Brazilian pepper	poison oak
casara	poplar
ceanothus	salt-bush (<i>Baccharis</i> spp.)
cherry	sweetgum
Chinese tallow	waxmyrtle
chinquapin	willow

Annual and Perennial Broadleaf Weeds

burdock smart weed
 Canada thistle tansy ragwort
 curly dock tropical sodaapple
 elephant ear vetch
 plantain wild lettuce

Aquatic Weeds

alligatorweed Pennywort
 American lotus phragmites
 American frogbit pickerelweed
 aquatic sodaapple purple loosestrife
 Eurasian watermilfoil waterhyacinth
 milfoil species waterlily
 nuphar (spatterdock) watershield
 parrotfeather water primrose

*Retreatment may be needed to achieve desired level of control.

APPLICATION METHODS

FLOATING AND EMERGED WEEDS

For control of waterhyacinth, alligatorweed (see specific directions below), and other susceptible emerged and floating herbaceous weeds and woody plants, apply 1 1/2 to 6 lb ae of triclopyr (2 to 8 quarts of Renovate 3) per acre as a foliar application using surface or aerial equipment. Use higher rates in the rate range when plants are mature, when the weed mass is dense, or for difficult to control species. Repeat as necessary to control regrowth and plants missed in the previous operation, but do not exceed a total of 6 lb ae of triclopyr (8 quarts of Renovate 3) per acre per annual growing season.

Use a non-ionic surfactant in the spray mixture to improve control. Follow all directions and use precautions on the aquatic surfactant label. Apply when plants are actively growing.

Surface Application

Use a spray boom, handgun or other similar suitable equipment mounted on a boat or vehicle. Thorough wetting of foliage is essential for maximum effectiveness. Use 20 to 200 gallons per acre of spray mixture. Special precautions such as the use of low spray pressure, large droplet producing nozzles or addition of a labeled thickening agent may minimize spray drift in areas near sensitive crops.

Aerial Application (Helicopter Only)

Apply with a helicopter using a Microfoil or Thru-Valve boom, or a drift control additive in the spray solution. Apply in a minimum of 10 gallons of total spray mix per acre. Do not apply when weather conditions favor drift to sensitive areas. See label section on aerial application directions and precautions.

Waterhyacinth (Eichhornia crassipes)

Apply Renovate 3 at 1 1/2 to 6 lb ae of triclopyr (2 to 8 quarts of Renovate 3) per acre to control waterhyacinth. Apply when plants are actively growing. Use the higher rate in the rate range when the weed mass is dense. It is important to thoroughly wet all foliage with the spray mixture. Use a non-ionic surfactant in the spray mixture. A repeat treatment may be needed to control regrowth or plants missed in the previous treatment.

Alligatorweed (Alternanthera philoxeroides)

Apply Renovate 3 at 2 to 6 lb ae of triclopyr (3 to 8 quarts of Renovate 3) per acre to control alligatorweed. It is important to thoroughly wet all foliage with the spray mixture. For best results, add an approved non-ionic aquatic surfactant to the spray mixture. Alligatorweed growing outside the margins of a body of water can be controlled with this treatment. However, alligatorweed growing in water will only be partially controlled. Top growth above the water will be controlled, but the plant will likely regrow from tissue below the water surface.

Precautions for Potable Water Intakes – Lakes, Reservoirs, Ponds:

For applications of Renovate 3 to control floating and emerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Renovate 3 Application Rate				
Area Treated (acres)	2 qt/acre	4 qt/acre	6 qt/acre	8 qt/acre
	Setback Distance (ft)			
<4	0	200	400	500
>4 - 8	0	200	700	900
>8 - 16	0	200	700	1,000
>16	0	200	900	1,300

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Renovate 3 around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

SUBMERGED WEEDS

For control of Eurasian watermilfoil (*Myriophyllum spicatum*) and other susceptible submerged weeds in ponds, lakes, reservoirs, and in non-irrigation canals or ditches that have little or no continuous outflow, apply Renovate 3 as either a surface or subsurface application. Rates should be selected according to the rate chart below to provide a triclopyr concentration of 0.75 to 2.5 ppm ae in treated water. Use higher rates in the rate range in areas of greater water exchange. These areas may require a repeat application. However, total application of Renovate 3 must not exceed an application rate of 2.5 ppm of triclopyr for the treatment area per annual growing season.

Apply in spring or early summer when Eurasian watermilfoil or other submerged weeds are actively growing.

Areas near susceptible crops or other desirable broadleaf plants may be treated by subsurface injection applied by boat to avoid spray drift.

Subsurface Application

Apply desired amount of Renovate 3 per acre directly into the water through boat-mounted distribution systems. When treating target plants that are 6 feet below the surface of the water, trailing hoses should be used along with an aquatic approved sinking agent (except California).

Surface Application

Apply the desired amount of Renovate 3 as either a concentrate or a spray mixture in water. However, use a minimum spray volume of 5 gallons per acre. Do not apply when weather conditions favor drift to sensitive areas.

Average water depth (feet) x 0.905 x target concentration (ppm) = gallons of Renovate 3 per surface acre treated.

Example: to achieve a 2 ppm concentration of triclopyr in water averaging 4 feet deep

4 x 0.905 x 2 ppm = 7.2 gallons of Renovate 3 per surface acre treated.

Concentration of Triclopyr Acid in Water (ppm ae)					
Water Depth (ft)	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
	Gallons of Renovate 3 per Surface Acre at Specified Depth				
1	0.7	0.9	1.4	1.8	2.3
2	1.4	1.8	2.7	3.6	4.6
3	2.1	2.7	4.1	5.4	6.8
4	2.7	3.6	5.4	7.2	9.1
5	3.4	4.5	6.8	9.0	11.3
6	4.1	5.4	8.1	10.9	13.6
7	4.8	6.3	9.5	12.7	15.8
8	5.5	7.2	10.9	14.5	18.1
9	6.1	8.1	12.2	16.3	20.4
10	6.8	9.0	13.6	18.1	22.6
15	10.2	13.6	20.4	27.2	33.9
20	13.6	18.1	27.2	36.2	45.3

Precautions for Potable Water Intakes – Lakes, Reservoirs, Ponds:
For applications of Renovate 3 to control submerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see the chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Concentration of Triclopyr Acid in Water (ppm ae)					
Area Treated (acres)	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
	Required Setback Distance (ft) from Potable Water Intake				
<4	300	400	600	800	1,000
>4 - 8	420	560	840	1,120	1,400
>8 - 16	600	800	1,200	1,600	2,000
>16 - 32	780	1,040	1,560	2,080	2,600
>32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = $(800 \times \ln(\text{acres}) - 160) / 3.33$	Setback (ft) = $(800 \times \ln(\text{acres}) - 160) / 2.50$	Setback (ft) = $(800 \times \ln(\text{acres}) - 160) / 1.67$	Setback (ft) = $(800 \times \ln(\text{acres}) - 160) / 1.25$	Setback (ft) = $(800 \times \ln(\text{acres}) - 160)$

Example Calculation 1: to apply 2.5 ppm Renovate 3 to 50 acres:

$$\begin{aligned} \text{Setback in feet} &= (800 \times \ln(50 \text{ acres}) - 160) \\ &= (800 \times 3.912) - 160 \\ &= 2,970 \text{ feet} \end{aligned}$$

Example Calculation 2: to apply 0.75 ppm Renovate 3 to 50 acres:

$$\begin{aligned} \text{Setback in feet} &= \frac{(800 \times \ln(50 \text{ acres}) - 160)}{3.33} \\ &= \frac{(800 \times 3.912) - 160}{3.33} \\ &= 892 \text{ feet} \end{aligned}$$

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Renovate 3 around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

WETLAND SITES

Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of woody plants and broadleaf weeds in these sites, follow use directions and application methods on this label for terrestrial sites associated with wetland areas.

Use Precautions: Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water. Note: Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife can be controlled with foliar applications of Renovate 3. For broadcast applications, use a minimum of 4 1/2 to 6 lb ae of triclopyr (6 to 8 quarts of Renovate 3) per acre. Apply Renovate 3 when purple loosestrife is at the bud to mid-flowering stage of growth. Follow-up applications for control of regrowth should be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If using a backpack sprayer, a spray mixture containing 1% to 1.5% Renovate 3 or 5 to 7.6 fl oz of Renovate 3 per 4 gallons of water should be used. All purple loosestrife plants should be thoroughly wetted.

Phragmites (*Phragmites australis*)

Phragmites can be selectively controlled with foliar applications of Renovate 3. For broadcast applications, a minimum of 2 1/4 lb ae of triclopyr (3 quarts of Renovate 3) per acre should be used. For optimum control, apply Renovate 3 when phragmites is in the early stage of growth, 1/2 to 3 feet in height, prior to seed head development. Follow-up applications for control of regrowth may be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If a backpack sprayer is used, a spray mixture containing 1% to 1.5% of Renovate 3 or 5 to 7.6 fl oz of Renovate 3 per 4 gallons of water should be used. All phragmites foliage should be thoroughly wetted.

Aerial application by helicopter may be needed when treating restoration sites that are inaccessible, remote, difficult to traverse, isolated, or otherwise unsuited to ground application, or in circumstances where invasive exotic weeds dominate native plant populations over extensive areas and efforts to restore native plant diversity are being conducted. By air, apply in a minimum spray volume of 30 gallons per acre using Thru-Valve or Microfoil boom only.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

TERRESTRIAL SITES ASSOCIATED WITH WETLAND AREAS

- Apply no more than 2 lb ae of triclopyr (2/3 gallon of Renovate 3) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting is allowed.
- On forestry sites, Renovate 3 may be used at rates up to 6 lb ae of triclopyr (2 gallons of Renovate 3) per acre per year.

Use Renovate 3 at rates of 3/4 to 6 lb ae of triclopyr (1/4 to 2 gallons of Renovate 3) per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. Use only water suitable for spraying. Use a labeled non-ionic surfactant for all foliar applications. When using surfactants, follow the use directions and precautions listed on the surfactant manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre. The order of addition to the spray tank is water, spray thickening agent (if used), additional herbicide (if used), and Renovate 3. A labeled aquatic surfactant should be added to the spray tank last or as recommended on the product label. If combined with emulsifiable concentrate herbicides, moderate continuous adequate agitation is required.

Before using any recommended tank mixtures, read the directions and all use precautions on both labels.

For best results, apply when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, maples, or oaks are prevalent and during applications made in late summer when the plants are mature and during drought conditions, use the higher rates of Renovate 3.

When using Renovate 3 in combination with a 2,4-D herbicide approved for aquatic use, such as DMA 4 IVM, generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, re-sprouting may occur the year following treatment.

High Volume Foliage Treatment

For control of woody plants, use Renovate 3 at the rate of 3 to 6 lb ae of triclopyr (1 to 2 gallons of Renovate 3) per 100 gallons of spray solution, or Renovate 3 at 3/4 to 3 lb ae of triclopyr (1 to 4 quarts of Renovate 3) may be tank mixed with 1/4 to 1/2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, diluted to make 100 gallons of spray solution. Apply at a volume of 100 to 400 gallons of total spray per acre depending upon size and density of woody plants. Coverage should be thorough to wet all leaves, stems, and root collars. (See *General Use Precautions and Restrictions*.) Do not exceed the maximum allowable use rate of 6 lb ae of triclopyr (2 gallons of Renovate 3) per acre per growing season.

Low Volume Foliage Treatment

To control susceptible woody plants, apply up to 15 lb ae of triclopyr (5 gallons of Renovate 3) in 10 to 100 gallons of finished spray. The spray concentration of Renovate 3 and total spray volume per acre may be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see *General Use Precautions and Restrictions*). For best results, a labeled aquatic surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Cut Surface Treatments (Woody Plants)

Individual plant treatments such as basal bark and cut surface applications may be used on any use site listed on this label at a maximum use rate of 2.67 gallons of Renovate 3 (8 lb ae of triclopyr) per acre. These types of applications are made directly to ungrazed parts of plants and, therefore, are not restricted by the grazing maximum rate of 2/3 of a gallon of Renovate 3 (2 lb ae of triclopyr) per acre.

To control unwanted trees and other listed woody plants, apply Renovate 3, either undiluted or diluted in a 1 to 1 ratio with water as directed below.

With Tree Injector Method

Apply by injecting 1/2 milliliter of undiluted Renovate 3 or 1 milliliter of the diluted solution through the bark at intervals of 3 to 4 inches between centers of the injector wound. The injections should completely surround the tree at any convenient height. **Note: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is injected directly into plants.**

With Hack and Squirt Method

Make cuts at a convenient height around the tree trunk with a hatchet or similar equipment so that the cuts overlap slightly and make a continuous circle around the trunk. Spray 1/2 milliliter of undiluted Renovate 3 or 1 milliliter of the diluted solution into each cut.

With Frill or Girdle Method

Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with undiluted or diluted solution.

Both of the above methods may be used successfully at any season except during periods of heavy sap flow of certain species - for example, maples.

Stump Treatment

Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Renovate 3. The cambium area next to the bark is the most vital area to wet.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal. Open dumping is prohibited.

Pesticide Storage: Store above 28°F or agitate before use.

Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

Nonrefillable containers 5 gallons or less:

Container Handling: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse 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 1/4 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. **Pressure rinse as follows:** Empty the remaining contents into application equipment or a 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.

Nonrefillable containers 5 gallons or larger:

Container Handling: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 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 a 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.

Refillable containers 5 gallons or larger:

Container Handling: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water. Agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

TERMS AND CONDITIONS OF USE

If terms of the following *Warranty Disclaimer*, *Inherent Risks of Use*, and *Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer*, *Inherent Risks of Use* and *Limitations of Remedies*.

WARRANTY DISCLAIMER

SePRO Corporation warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation or the seller. All such risks shall be assumed by buyer.

LIMITATION OF REMEDIES

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

- (1) Refund of purchase price paid by buyer or user for product bought, or
- (2) Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such loss or damage in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer*, *Inherent Risks of Use*, and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or this *Limitation of Remedies* in any manner.

EPA Stamped Notification: 06/13/2008

© Copyright 2012 SePRO Corporation

® Renovate is a registered trademark of Dow AgroSciences LLC

SAFETY DATA SHEET



Renovate[®] OTF Aquatic Herbicide

Section 1. Identification

GHS product identifier : Renovate[®] OTF Aquatic Herbicide

Other means of identification : Not available.

EPA Registration No. : 67690-42

Relevant identified uses of the substance or mixture

Aquatic herbicide.

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

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A

GHS label elements

Hazard pictograms : Exclamation mark

Signal word : Warning

Hazard statements : Causes serious eye irritation.

Precautionary statements

Prevention : Wear eye or face protection. Wash hands thoroughly after handling.

Response : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Not applicable.

Disposal : Not applicable.

Hazards not otherwise classified : None known.





Section 3. Composition/information on ingredients

Substance/mixture : Mixture
Other means of identification : Not available.

CAS number/other identifiers

CAS number : Not applicable.

Ingredient name	%	CAS number
Proprietary ingredient 1	60 - 70	-
Triclopyr Acetic Acid, Triethylamine Salt	14	57213-69-1
Proprietary ingredient 2	0.1 - 0.9	-

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

- Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 20 minutes. Get medical attention.
- Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Skin contact** : Flush contaminated skin with plenty of water. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- Ingestion** : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Irritating to mouth, throat and stomach.



Section 4. First aid measures

Over-exposure signs/symptoms

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

Specific hazards arising from the chemical : No specific fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
halogenated compounds

Special protective actions for fire-fighters : No special measures are required.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Section 6. Accidental release measures

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

None.

Appropriate engineering controls : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Section 8. Exposure controls/personal protection

Skin protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

- Physical state** : Solid. [Granular solid.]
- Color** : Creamy grayish-tan.
- Odor** : Ammoniacal.
- Odor threshold** : Not available.
- pH** : 7.8 [Conc. (% w/w): 1%]
- Melting point** : Not available.
- Boiling point** : Not available.
- Flash point** : Not applicable.
- Burning time** : Not available.
- Burning rate** : Not available.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : Not available.
- Vapor density** : Not available.
- Relative density** : 0.7
- Solubility** : Not available.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- SADT** : Not available.
- Viscosity** : Not available.

Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : No specific data.
- Incompatible materials** : Reactive or incompatible with the following materials: None known.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Renovate® OTF Aquatic Herbicide	LC50 Inhalation Vapor	Rat	>2 mg/L	4 hours
	LD50 Dermal	Rat	>5000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Renovate® OTF Aquatic Herbicide	Eyes - Moderate irritant	Rat	-	-	-
	Skin - Non Irritant	Rat	-	-	-

Sensitization

Product/ingredient name	Route of exposure	Species	Result
Renovate® OTF Aquatic Herbicide	skin	Rat	Not sensitizing

Mutagenicity

There is no data available.

Carcinogenicity

There is no data available.

Reproductive toxicity

There is no data available.

Teratogenicity

There is no data available.

Specific target organ toxicity (single exposure)

There is no data available.

Specific target organ toxicity (repeated exposure)

There is no data available.

Aspiration hazard

There is no data available.

Section 11. Toxicological information

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

- Eye contact** : Causes serious eye irritation.
- Inhalation** : Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:
pain or irritation
watering
redness
- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : No known significant effects or critical hazards.
- Ingestion** : No known significant effects or critical hazards.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

- Potential immediate effects** : No known significant effects or critical hazards.
- Potential delayed effects** : No known significant effects or critical hazards.

Long term exposure

- Potential immediate effects** : No known significant effects or critical hazards.
- Potential delayed effects** : No known significant effects or critical hazards.

Potential chronic health effects

- General** : No known significant effects or critical hazards.
- Carcinogenicity** : No known significant effects or critical hazards.
- Mutagenicity** : No known significant effects or critical hazards.
- Teratogenicity** : No known significant effects or critical hazards.
- Developmental effects** : No known significant effects or critical hazards.
- Fertility effects** : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

There is no data available.

**Section 12. Ecological information****Toxicity**

Product/ingredient name	Result	Species	Exposure
Triclopyr Acetic Acid, Triethylamine Salt	Acute EC50 15.3 mg/L Fresh water	Algae - Navicula pelliculosa	4 days
	Acute EC50 775 mg/L Fresh water Acute LC50 120 mg/L Fresh water Chronic NOEC 80.7 mg/L Chronic NOEC 104 mg/L	Daphnia - Daphnia magna Fish - Pimephales promelas Daphnia - Daphnia magna Fish - Pimephales promelas	48 hours 96 hours 21 days 28 days
Proprietary ingredient 2	Acute EC50 4400+ ppb Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 >10 mg/L Fresh water	Crustaceans - Ceriodaphnia dubia	48 hours
	Acute LC50 167 ppb Fresh water	Fish - Oncorhynchus mykiss	96 hours

Persistence and degradability

There is no data available.

Bioaccumulative potential

There is no data available.

Mobility in soilSoil/water partition coefficient (K_{oc}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling empty containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	Not regulated.	Not regulated.	Not regulated.
UN proper shipping name	-	-	-
Transport hazard class(es)	-	-	-
Packing group	-	-	-



**Section 14. Transport information**

Environmental hazards	No.	No.	No.
Additional information	-	-	-

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according : Not available.
to Annex II of MARPOL
73/78 and the IBC Code

Section 15. Regulatory information

U.S. Federal regulations : TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): Not determined.

Clean Air Act Section 112 : Not listed
(b) Hazardous Air
Pollutants (HAPs)

Clean Air Act Section 602 : Not listed
Class I Substances

Clean Air Act Section 602 : Not listed
Class II Substances

DEA List I Chemicals : Not listed
(Precursor Chemicals)

DEA List II Chemicals : Not listed
(Essential Chemicals)

SARA 302/304**Composition/information on ingredients**

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Triclopyr Acetic Acid, Triethylamine Salt Proprietary ingredient 2	14 0.1 - 0.9	Yes. No.	No. No.	Yes. No.	Yes. Yes.	No. No.

SARA 313

**Section 15. Regulatory information**

	Product name	CAS number	%
Form R - Reporting requirements	Triclopyr Acetic Acid, Triethylamine Salt	57213-69-1	14
Supplier notification	Triclopyr Acetic Acid, Triethylamine Salt	57213-69-1	14

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

- Massachusetts** : The following components are listed: Proprietary ingredient 1
New York : None of the components are listed.
New Jersey : The following components are listed: Proprietary ingredient 1; Triclopyr Acetic Acid, Triethylamine Salt
Pennsylvania : The following components are listed: Proprietary ingredient 1
California Prop. 65

No products were found.

International regulations

- International lists** : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): Not determined.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): Not determined.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Section 16. Other information**Hazardous Material Information System (U.S.A.)**

Health : 1 * Flammability : 0 Physical hazards : 0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Health : 1 Flammability : 0 Instability : 0

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.



Section 16. Other information

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of issue mm/dd/yyyy : 07/15/2015
Date of previous issue : 04/15/2013
Version : 4
Revised Section(s) : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16.
Prepared by : KMK Regulatory Services Inc.
Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

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.



Conforms to HazCom 2012/United States

SDS

Renovate® 3

SAFETY DATA SHEET



Renovate® 3

Herbicide

Section 1. Identification

GHS product identifier : Renovate® 3 Herbicide

Recommended use of the chemical and restrictions on use Identified uses : Herbicide

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 hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Flammable liquids - Category 3
Eye irritation - Category 2A
Specific target organ toxicity - single exposure - Category 3

Label elements
Hazard pictograms



Signal word: **WARNING!**



SDS

Renovate® 3

Hazards

Flammable liquid and vapor.
Causes serious eye irritation.
May cause respiratory irritation.

Precautionary statements

Prevention

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting/ equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
Wash skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/ eye protection/ face protection.

Response

IF ON SKIN (or hair):

Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.

IF INHALED:

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.

IF IN EYES:

Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/ attention.

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage

Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.

Disposal

Dispose of contents/ container to an approved waste disposal plant.

Other hazards

No data available

Section 3. Composition/information on ingredients

This product is a mixture.

Component	CASRN	Concentration
Triclopyr Triethylamine Salt	57213-69	44.4%
Triethylamine	121-44-8	3.0%
Alkylphenol alkoxylate	69029-39-6	1.0%
Balance	Not Available	47.2%

Section 4. First aid measures

Description of first aid measures

General advice:

First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). 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.



SDS

Renovate® 3

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. Suitable emergency eye wash facility should be immediately available.

Ingestion:

Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Never give anything by mouth to an unconscious person.

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: To extinguish combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Straight or direct water streams may not be effective to extinguish 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:

Under fire conditions some components of this product may decompose. The smoke may contain unidentified toxic and/or irritating compounds. Combustion products may include and are not limited to: Nitrogen oxides. Hydrogen chloride. Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards:

This material will not burn until the water has evaporated. Residue can burn. May produce flash fire. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. If exposed to fire from another source and water is evaporated, exposure to high temperatures may cause toxic fumes.

Advice for firefighters

Fire Fighting Procedures:

Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Eliminate ignition sources. To extinguish



SDS

Renovate® 3

combustible residues of this product use water fog, carbon dioxide, dry chemical or foam. 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. Keep personnel out of low areas. No smoking in area. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. 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: 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. Keep away from heat, sparks and flame. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Electrically ground and bond all equipment. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Do not swallow. Wash thoroughly after handling. Use with adequate ventilation. No smoking, open flames or sources of ignition in handling and storage area. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Use of non-sparking or explosion -proof equipment may be necessary, depending upon the type of operation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers.

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. Minimize sources of ignition, such as static build-up, heat, spark or flame.

**Section 8. Exposure controls/personal protection**

Control parameters

Exposure limits are listed below, if they exist.

Component	Regulation	Type of listing	Value/Notation
Triclopyr Triethylamine Salt	Dow IHG	TWA	2 mg/m ³
	Dow IHG	TWA	SKIN, DSEN, BEI
Triethylamine	ACGIH	TWA	0.5 ppm
	ACGIH	STEL	1 ppm
	ACGIH	TWA	Absorbed via skin
	ACGIH	STEL	Absorbed via skin
	OSHA Z-1	TWA	100 mg/m ³ 25 ppm
Ethanol	ACGIH	TWA	1,000 ppm
	ACGIH	STEL	1,000 ppm
	OSHA Z-1	TWA	1,900 mg/m ³ 1,000 ppm
Alkylphenol alkoxyate	Dow IHG	TWA	2 mg/m ³

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 chemical goggles.

Skin protection

Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). 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: Wear clean, body-covering clothing.

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	Pink
Odor	Ammoniacal
Odor Threshold	No test data available
pH	9.5 10% pH Electrode
Melting point/range	Not applicable
Freezing point	No test data available
Boiling point (760 mmHg)	No test data available
Flash point	Closed cup > 43 °C (>109 °F) <i>Setaflash Closed Cup ASTM D3828</i>
Evaporation Rate (Butyl Acetate =1)	No test data available
Flammability (solid, gas)	Not data available
Lower explosion limit	No test data available
Upper lower explosion limit	No test data available
Vapor pressure	Not applicable
Relative Vapor Density (air = 1)	Not applicable
Relative Density (water = 1)	1.1385 at 20 °C (68 °F) <i>Digital Density Meter (Oscillating Coil)</i>
Water solubility	Soluble
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Dynamic Viscosity	12.5 mPa.s at 25 °C (77 °F)
Kinematic Viscosity	No test data available
Explosive properties	No <i>Thermal</i>
Oxidizing properties	No
Liquid Density	1.1385 g/cm ³ at 20 °C (68 °F) <i>Digital density meter</i>
Molecular weight	No data available
Surface tension	38.5 mN/m at 20 °C (68 °F) <i>EC Method A5</i>

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

Section 10. Stability and reactivity

Reactivity:	No data available
Chemical stability:	Thermally stable at recommended temperatures and pressures.
Possibility of hazardous reactions:	Polymerization will not occur.
Conditions to avoid:	Active ingredient decomposes at elevated temperatures.
Incompatible materials:	Avoid contact with: Oxidizers
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: Hydrogen chloride, Nitrogen oxides.

Section 11. Toxicological information



SDS

Renovate® 3

Toxicological information on this product or its components appear in this section when such data is available.

Acute toxicity

Acute oral toxicity Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.
As product: LD50, Rat, female, 4100 mg/kg

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

Acute inhalation toxicity No adverse effects are anticipated from single exposure to mist. Excessive exposure may cause irritation to upper respiratory tract (nose and throat).
As product: LC50, Rat, male and female, 4 Hour, Mist, > 5.4 mg/1
Maximum attainable concentration.
No deaths occurred at this concentration.

Skin corrosion/irritation Brief contact is essentially nonirritating to skin.

**Serious eye damage/
eye irritation** May cause moderate eye irritation.
May cause moderate corneal injury.

Sensitization Did not demonstrate the potential for contact allergy in mice.
For respiratory sensitization: No relevant data found.

**Specific Target Organ
Systemic Toxicity
(Single Exposure)** May cause respiratory irritation.

**Specific Target Organ
Systemic Toxicity
(Repeated Exposure)** For the active ingredient(s): In animals, effects have been reported on the following organs:
Kidney.
For the minor component(s): In animals, effects have been reported on the following organs:
Kidney.
Liver.

Carcinogenicity Ethanol when not consumed in an alcoholic beverage is not classifiable as a human carcinogen. For similar active ingredient(s). Triclopyr. Did not cause cancer in laboratory animals.

Teratogenicity For the active ingredient(s): Has been toxic to the fetus in laboratory animals at doses toxic to the mother. Did not cause birth defects in laboratory animals.
For the minor component(s): Has caused birth defects in lab animals at high doses. EDTA and its sodium salts have been reported to cause birth defects in laboratory animals only at exaggerated doses that were toxic to the mother. These effects are likely associated with zinc deficiency due to chelation.

Reproductive toxicity For similar active ingredient(s). Triclopyr. In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals.

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.



Section 12. Ecological information

Ecotoxicological information on this product or its components appear in this section when such data is available.

Toxicity

Acute toxicity to fish

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 > 100 mg/L in the most sensitive species tested).

LC50, *Oncorhynchus mykiss* (rainbow trout), 96 Hour, 400 mg/L

LC50, *Lepomis macrochirus* (Bluegill sunfish), semi-static test, 96 Hour, > 100 mg/L

Acute toxicity to aquatic invertebrates

EC50, eastern oyster (*Crassostrea virginica*), static test, 48 Hour, 56 - 87 mg/L

LC50, *Daphnia magna* (Water flea), static test, 48 Hour, > 1,000 mg/L

Acute toxicity to algae/aquatic plants

ErC50, *Pseudokirchneriella subcapitata* (green algae), 72hr Growth rate inhibition, 107 mg/L

ErC50, blue-green alga *Anabaena flos-aquae*, 72 Hour, Growth inhibition, > 100 mg/L

EC50, *Lemna gibba*, 7 d, Growth inhibition, > 100 mg/L

Persistence and degradability

Triclopyr Triethylamine Salt

Biodegradability:

For similar active ingredient(s). Triclopyr. Biodegradation under aerobic static laboratory conditions is high (BOD20 or BOD28/ThOD > 40%).

For similar active ingredient(s). Triclopyr. Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Triethylamine

Biodegradability:

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).

10-day Window: Pass

Biodegradation:

96%

Exposure time:

21 d

Method:

OECD Test Guideline 301 A or Equivalent

10-day Window: Not applicable

Biodegradation:

25-34%

Exposure time:

28 d

Method:

OECD Test Guideline 302C or Equivalent

Theoretical Oxygen

Demand:

3.49 mg/mg

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitizer: OH radicals

Atmospheric half-life: 0.116 d

Method: Estimated.



SDS

Renovate® 3

Ethylenediamine tetraacetic acid

Biodegradability:	Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability). 10-day Window: Not applicable
Biodegradation:	37%
Exposure time:	14 d
Method:	OECD Test Guideline 3028 or Equivalent 10-day Window: Fail
Biodegradation:	0%
Exposure time:	30 d
Method:	OECD Test Guideline 3010 or Equivalent
Theoretical Oxygen Demand:	1.37 mg/mg
Photodegradation	Test Type: Half-life (indirect photolysis) Sensitizer: OH radicals Atmospheric half-life: 2.12 Hour Method: Estimated.

Ethanol

Biodegradability:	Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. 10-day Window: Pass
Biodegradation:	> 70%
Exposure time:	5 d
Method:	OECD Test Guideline 3010 or Equivalent
Theoretical Oxygen Demand:	2.08 mg/mg
Photodegradation	Test Type: Half-life (indirect photolysis) Sensitizer: OH radicals Atmospheric half-life: 2.99 d Method: Estimated.

Alkylphenol alkoxyate

Biodegradability:	Biodegradation under aerobic laboratory conditions is below detectable limits (80020 or 80028/ThOD < 2.5%).
Theoretical Oxygen Demand:	2.35 mg/mg
Chemical Oxygen Demand:	1.78 mg/mg

Balance

Biodegradability: No relevant data found.

Bioaccumulative potential

Bioaccumulation: No data available for this product.

Mobility in soil

Triclopyr Triethylamine Salt For similar active ingredient(s).
Potential for mobility in soil is very high (Koc between 0 and 50).



Triethylamine

SDS

Renovate® 3

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient(Koc): 11 - 146 Estimated.

Ethylenediamine tetra
acetic acid

Potential for mobility in soil is high (Koc between 50 and 150).
Partition coefficient(Koc): 98

Ethanol

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient(Koc): 1.0 Estimated.

Alkylphenol alkoxyate

No data available.

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

Proper shipping name Combustible liquid, n.o.s. (Triethylamine, Ethanol)
UN Number NA 1993
Class CBL
Packing Group III

Classification for SEA transport (IMO-IMDG):

Proper shipping name FLAMMABLE LIQUID, N.O.S. (Triethylamine, Ethanol)
UN number UN 1993
Class 3
Packing group III
Marine pollutant No
Transport in bulk Consult IMO regulations before transporting ocean bulk
according to Annex I or II
of MARPOL 73/78 and the
IBC or IGC Code

Classification for AIR transport (IATA/JCAO):

Proper shipping name Flammable liquid, n.o.s.(Triethylamine, Ethanol)
UN number UN 1993
Class 3
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



SDS

Renovate® 3

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 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

- Fire Hazard
- Acute Health Hazard
- Chronic Health Hazard

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

Components	CASRN
Triethylamine	121-44-8
Triclopyr Triethylamine Salt	57213-69-1

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 cancer.

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.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

The following product components are cited in the Pennsylvania Hazardous Substance List and/or the Pennsylvania Environmental Substance List, and are present at levels which require reporting.

Components	CASRN
Triethylamine	121-44-8
Ethylenediamine tetraacetic acid	60-00-4
Ethanol	64-1 7-5



Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

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.

Federal Insecticide, Fungicide and Rodenticide Act

EPA Registration Number: 62719-37-67690

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals. Following is the hazard information as required on the pesticide label:

DANGER

Corrosive

Causes irreversible eye damage

Harmful if swallowed or absorbed through skin

Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

Section 16. Other information

**Hazard Rating System
NFPA**

Health: 2 Fire: 2 Reactivity: 0

Legend

- Absorbed via skin Absorbed via skin
- ACGIH USA. ACGIH Threshold Limit Values (TLV)
- DOW IHG Dow Industrial Hygiene Guideline
- OSHA Z-1 USA. Occupational Exposure Limits (OSHA) – Table Z-1 Limits for Air Contaminants
- SKIN, SDEN, BEI Absorbed via Skin, Skin Sensitizer, Biological Exposure Indice
- STEL Short-term exposure limit
- TWA 8-hour, time-weighted average

History

Date of issue mm/dd/yyyy: 08/11/2015

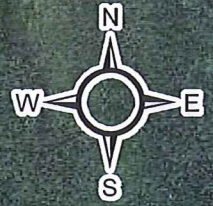
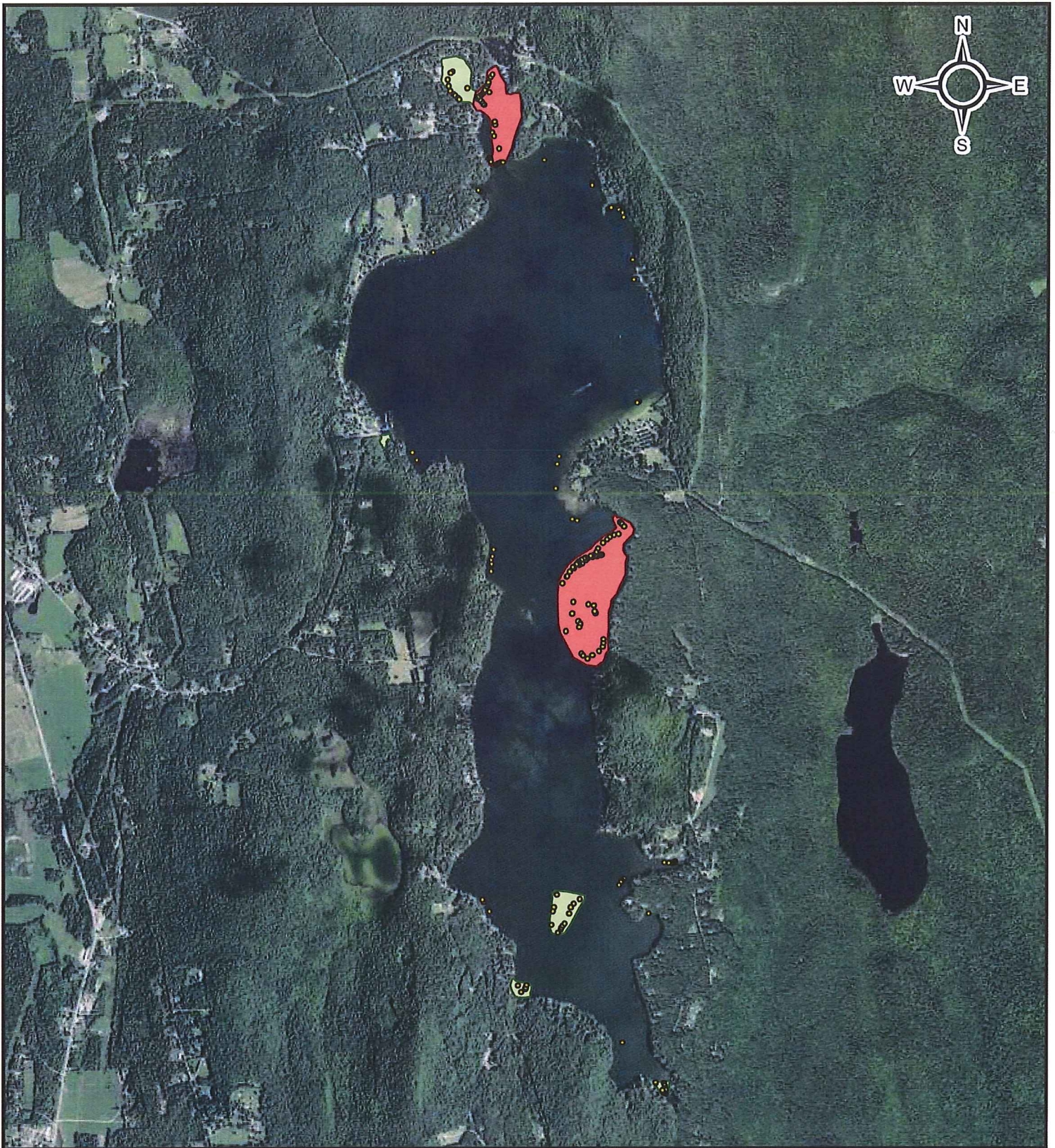
Notice to reader

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.

ATTACHMENT B

MAPS

- ◆ **Figure 1: Potential Herbicide Treatment Areas for 2016 - Preliminary**
- ◆ **Figure 2: Littoral Area – Possible Extent of Eurasian Watermilfoil Infestation**
- ◆ **Figure 3: Site Locus**



Lake Dunmore
 Leicester/Salisbury, Vermont
 Potential Herbicide
 Treatment Areas

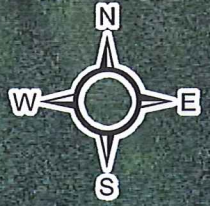
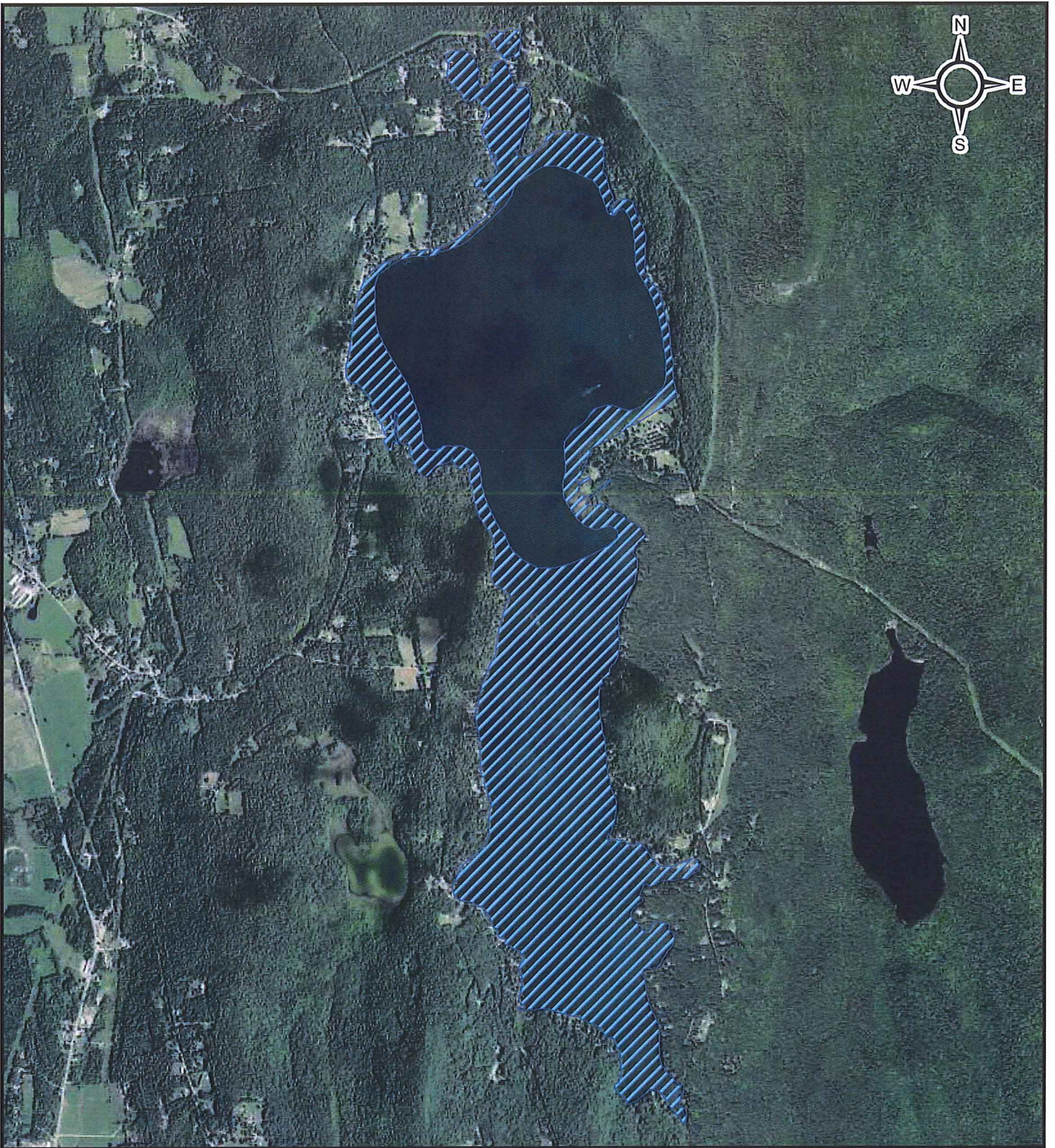
FIGURE:	SURVEY DATE:	MAP DATE:
1	08/03/15	9/30/15

Legend:

- Recorded Milfoil Growth (08/03/15)
- Primary Treatment Areas
- Possible Secondary Areas

0 500 1,000 2,000 3,000 4,000 5,000
 Feet


AQUATIC CONTROL TECHNOLOGY
 11 JOHN ROAD
 SUTTON, MASSACHUSETTS 01590
 PHONE: (508) 865-1000
 FAX: (508) 865-1220
 WEB: WWW.AQUATICCONTROLTECH.COM



Lake Dunmore
 Leicester/Salisbury, Vermont
 Littoral Area

FIGURE:	SURVEY DATE:	MAP DATE:
2		10/02/15

Legend:

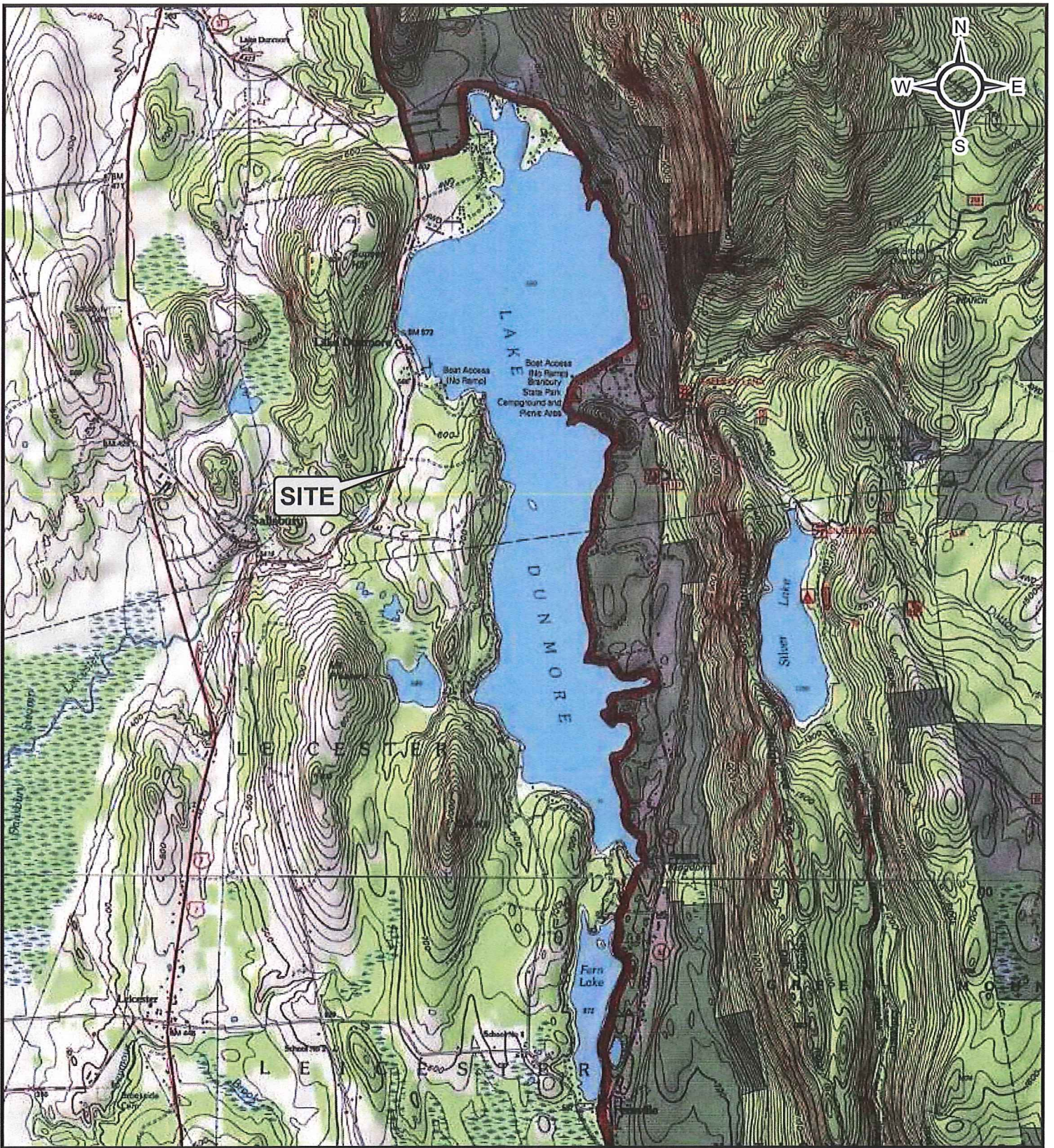
 Potential area for milfoil infestation; depth less than 20' (605 ac)
 (Source: VT Dept. of Water Resources Aug '72)

0 500 1,000 2,000 3,000 4,000 Feet

AQUATIC CONTROL TECHNOLOGY

11 JOHN ROAD
 SUTTON, MASSACHUSETTS 01590
 PHONE: (508) 865-1000
 FAX: (508) 865-1220
 WEB: WWW.AQUATICCONTROLTECH.COM





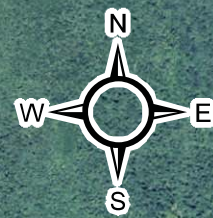
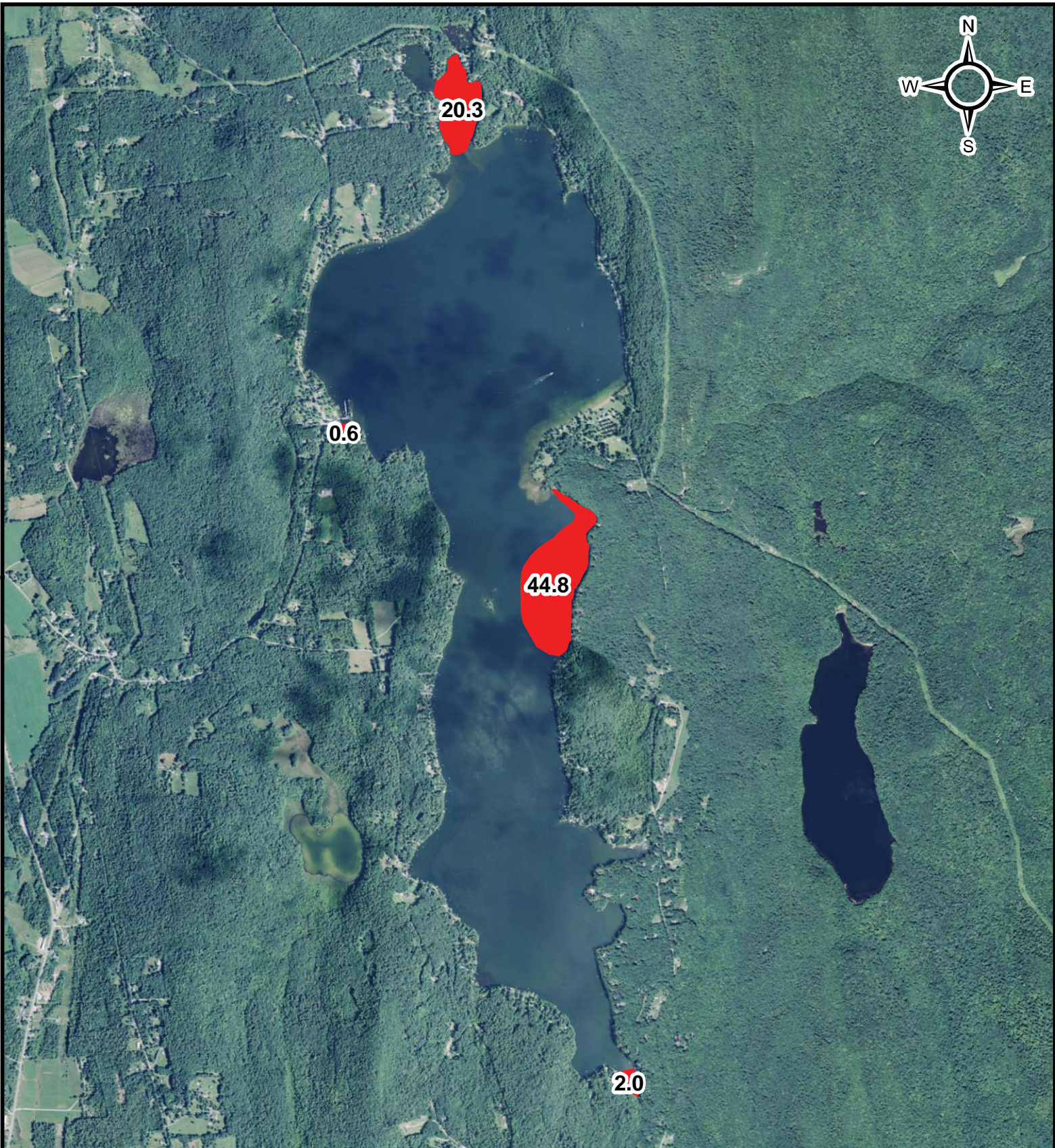
Lake Dunmore
 Leicester/Salisbury, Vermont
 Site Locus

FIGURE:	SURVEY DATE:	MAP DATE:
3	-	12/16/15

Legend:

AQUATIC CONTROL TECHNOLOGY

11 JOHN ROAD
 SUTTON, MASSACHUSETTS 01590
 PHONE: (508) 865-1000
 FAX: (508) 865-1220
 WEB: WWW.AQUATICCONTROLTECH.COM



Lake Dunmore

Leicester/Salisbury, Vermont

2016 Herbicide
Treatment Areas

Legend:

 Treatment Areas (67.7 ac)

SOLITUDE
LAKE MANAGEMENT

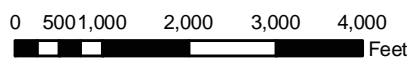


FIGURE:	SURVEY DATE:	MAP DATE:
1	05/25/16	06/1/06

ATTACHMENT C

DETAILED PROJECT DESCRIPTION

- **Five-Year (2016-2020) Integrated Aquatic Vegetation Management Plan**

INTRODUCTION

Lake Dunmore is a 985-acre lake located in Salisbury and Leicester, Vermont. Presence of the invasive aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*) was first confirmed in the lake in 1988. Volunteer control efforts were initiated immediately, but after a second infestation was discovered at the north end of the lake in 1994 a more comprehensive, paid management program began. Eurasian watermilfoil control efforts have continued and grown to a current budget that exceeds \$300,000 annually. The program was initially developed and it continues to be coordinated and overseen by the Lake Dunmore Fern Lake Association (LDFLA). Funding is provided by LDFLA, along with contributions from the Towns of Salisbury and Leicester and the Vermont Aquatic Nuisance Control Grant in Aid program. Program elements include a Greeter Program at the State Boat Launch and an extensive diver hand-pulling and suction-harvesting program. More than 20 people were employed for these efforts during the 2015 season, along with significant volunteer contributions.

Eurasian watermilfoil (EWM) control efforts at Lake Dunmore have expanded as the EWM distribution and density has increased over the years. In 2013, an estimated 3600 bushels of EWM were removed from the lake. This number expanded to 5500 bushels in 2014. Seeing the accelerated EWM growth and expansion in recent years, prompted LDFLA to evaluate alternate management strategies. Based on the positive recent experiences of other Vermont lakes, LDFLA decided to consider the use of aquatic herbicides as part of an integrated management effort. Darrin Fresh Water Institute (DFWI) was hired to conduct comprehensive aquatic plant surveys during the summers of 2014 and 2015. Aquatic Control Technology (ACT) was also contracted to survey the lake in the summer of 2015 to make specific recommendations for the use of aquatic herbicides at Lake Dunmore.

The following document outlines a Five-Year Integrated Management Plan that targets control of EWM through the use of area-selective aquatic herbicide treatments and the continued use of diver hand-pulling, suction-harvesting and bottom barrier installations. LDFLA is requesting issuance of a 5-year maintenance permit for area-selective spot-treatments with Renovate herbicide, subject to annual approval of the specific treatment areas by DEC.

EXISTING CONDITIONS

EWM is widely distributed in Lake Dunmore at varying densities. DFWI found EWM at 18% of the 196 sample points that were surveyed in 2014. The greatest concentrations of EWM were found at the north end, in the “spine” area located on eastern side near the center of lake and in smaller patches found in the southern end. A similar distribution of EWM was documented by ACT during their August 2015 survey. Approximately 80 acres of EWM beds were identified throughout the lake (Figure 1).

DFWI identified 5 meters as the maximum depth of colonization of EWM in Lake Dunmore. Based on available bathymetry data, approximately 60% of Lake Dunmore, or 600 acres of the lake’s 985-acre total surface area, are capable of supporting EWM growth. Reported average and maximum water depths are 28 feet and 105 feet, respectively, but the deep hole is found in the lake’s large northern basin. The entire southern end of the lake is shallow enough to support EWM, although growth remains scattered and localized. This is undoubtedly due to the efforts of LDFLA, which should not go unrecognized; without the annual management program employed over the past two decades, a much greater percentage of Lake Dunmore would currently be infested with nuisance EWM growth.

Fortunately, Lake Dunmore also supports a diverse and robust population of native aquatic plants. DFWI documented 30 aquatic plant species in 2014. Four of these species, *Chara/Nitella*, *Elodea canadensis*, *Najas flexilis* and *Potamogeton robbinsii*, were present at more than 25% of the sample point locations and had greater distribution than EWM. Maintaining dense native plant growth in Lake Dunmore will be paramount to achieving long-term EWM control.

OBJECTIVES/GOALS

Principal objectives of the five-year integrated management plan being proposed for Lake Dunmore 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 the systemic-acting Renovate (triclopyr) herbicide, suction harvesting and hand-harvesting, and limited use of benthic barriers – 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 Dunmore.

RENOVATE (TRICLOPYR) HERBICIDE TREATMENT PLAN

Results of the Renovate (triclopyr) herbicide treatments performed at several other Vermont lakes over since 2006 have demonstrated that triclopyr can provide effective and highly-selective EWM control, even when used for partial-lake or shoreline treatments. Selectivity of triclopyr for EWM has been documented following triclopyr treatments at Lake St. Catherine, Lake Morey, Lake Fairlee, Lake Hortonia, Burr Pond and at Indian Brook Reservoir.

The proposed Renovate herbicide treatment program is seeking approval to treat areas of Lake Dunmore where EWM cover is too abundant to be cost-effectively managed using suction harvesting or hand-pulling. Both Renovate 3 (liquid) and Renovate (OTF) will be considered for use depending on the location and configuration of the targeted treatment areas. An estimated 60% of the Lake Dunmore system is capable of supporting EWM growth. Treatments would occur within the areas shown on Figure 2, but the amount of acreage treated is not expected to exceed more than 100 acres (approximately 10% of the lake's total surface area) during any single year, and the actual amount treated each may be significantly less. LDFLA and their lake consultant will prepare and submit a proposed treatment map to DEC each year following an early season survey in May. Once the treatment areas are finalized, LDFLA will complete the required pre-treatment notifications.

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

August/September	Comprehensive Late Season Survey
November	Submission of Annual Report that identifies preliminary plans for upcoming year
December	Project review and meeting with DEC
May	Early season survey to develop Final Treatment Map; Submit map and specific treatment plans to DEC for review and approval; Perform required pre-treatment notification
Late-May/June	Schedule and perform herbicide treatment; post-treatment monitoring
July-September	Surveys/inspections

Flexibility on the treatment schedule is also requested to allow for late summer (post Labor Day) spot-treatments in years 1-5 of the program, if warranted. Studies have shown that Eurasian watermilfoil is a cool water perennial species and it undergoes a period of active growth in the late summer when auxin-mimic systemic herbicides like triclopyr can be used effectively. Favorable results have been achieved in other New England states in recent years following late summer (September) treatments of both variable milfoil (*Myriophyllum heterophyllum*) and Eurasian watermilfoil.

Based on the recent treatment experiences with triclopyr herbicide at the other Vermont lakes the following protocols are recommended for triclopyr treatments in Lake Dunmore:

1. Formulation – Utilize Renovate 3 (liquid) and Renovate OTF (granular) formulations of triclopyr herbicide. The granular formulation has proven to be effective for steeply sloped areas, smaller EWM beds and in areas where there is potential for excessive dilution from untreated water. The granular carrier takes the herbicide to the lake bottom where it is released. The liquid formulation could be used in larger beds and cove areas that will not be subject to as much dilution and in areas where access for application of the granular formulation would be challenging.
2. Application – Plan to utilize a split-application approach where appropriate to increase the herbicide concentration-exposure-time. Approximately 70% of the herbicide will be sequentially applied to all areas being treated; then the remaining herbicide is applied to the same areas in the same sequence several hours later.
3. Timing – Delay treatment until there is enough active EWM growth to maximize herbicide uptake. Additional EWM biomass is expected to provide more stem/leaf surface area for herbicide uptake and may help limit dilution caused by water movement. EWM plants should be filling two-thirds to three-quarters of the water column. Treatments will likely be scheduled between late May and late June. Optional late summer (post Labor Day) spot-treatments may be considered in some cases.
4. Rate – The application rate (dose) will be determined by the size and configuration of the treatment area and the formulation of Renovate being applied. Where practical, the application rate will be consistent with rates used at other Vermont lakes in recent years. This usually

involves targeting 2.0 – 2.5 ppm of triclopyr in the bottom four feet of the water column with Renovate OTF granular (216 - 270 lbs/acre). Renovate 3 liquid applications have generally targeted whole water column applications of 0.75 – 1.5 ppm. However, approval is being requested for treatment using the maximum application rate of 2.5 ppm as listed on the product labels, to facilitate effective treatment of narrow, shoreline beds of EWM and small (<5 contiguous acres) treatment areas. The concentration and formulation to be applied would be specified in a specific treatment plan that would be submitted to DEC with the proposed treatment map following the early season survey.

Herbicide	Renovate 3 Liquid formulation EPA Reg. No.: 62719-37-67690 <u>Active Ingredient:</u> triclopyr (3,5,6-trchloro-2-pyridinyloxyacetic acid, triethylamine salt) 44.4%	Renovate OTF Granular formulation EPA Reg. No.: 67690-42 <u>Active Ingredient:</u> triclopyr (3,5,6-trchloro-2-pyridinyloxyacetic acid, triethylamine salt) 14.0%
Application Rate	0.75 – 1.5 ppm Amount to be applied would be calculated based on the targeted water volume being treated; Lower rates would be used for treatment of entire coves or large contiguous areas.	2.0 – 2.5 ppm Rate calculation based on bottom 4 feet of the water column or more as conditions warrant.
Treatment Timing	Between late May and late June Delay treatment until there is more active milfoil growth to improve herbicide uptake. Additional milfoil biomass is expected to provide more surface area for herbicide uptake and may help limit dilution caused by water movement. Possible late season (post Labor Day) applications if warranted	Between late May and late June Delay treatment until there is more active milfoil growth to improve herbicide uptake. Additional milfoil biomass is expected to provide more surface area for herbicide uptake and may help limit dilution caused by water movement. Possible late season (post Labor Day) applications if warranted
Method of Application	The concentrated liquid formulation will be injected subsurface through weighted hoses using a boat-mounted pumping system. GPS systems with WAAS or differential accuracy will be used to provide real-time navigation and to insure that the herbicide is evenly applied throughout the designated treatment area. Split-applications may be performed in some instances to help increase the herbicide concentration-exposure-time. This would be accomplished by applying 50-70% of the total dose initially and then following with the remaining product several hours later.	The solid (granular) formulation will be evenly applied using the eductor/boom spray system or calibrated cyclone spreader. GPS systems with WAAS or differential accuracy will be used to provide real-time navigation and to insure that the herbicide is evenly applied throughout the designated treatment area. Split-applications may be performed in some instances to help increase the herbicide concentration-exposure-time. This would be accomplished by applying 50-70% of the total dose initially and then following with the remaining product several hours later.

IMPACTS TO NATIVE PLANT COMMUNITY

Significant adverse impacts to the native plant community are not expected from the proposed Renovate herbicide treatments to Lake Dunmore. Treatment programs at other Vermont lakes in recent years have not shown significant impacts to native plant populations. In recent permit decisions, DEC has summarized potential impacts and have determined that the data is either too variable, inconclusive or that the plant frequency of occurrence values have been so low that trends are not detectable. Even though some native species are listed as being susceptible on the Renovate labels (e.g. bladderwort, watershield, white water lily, spatterdock), no change trends have been noted in these species. Overall, other Vermont lakes that have been treated with Renovate have remained diverse and in many cases the native plant diversity and abundance has remained the same or even increased.

LAKE DUNMORE 2014 Survey Data from DFWI

Macrophyte species	Common name	FOC	Trend LSC ¹	Trend Morey ²
<i>Brasenia schreberi</i>	Watershield	1.0 %	nc	
<i>Chara/Nitella</i>	Muskgrass	26.5%	v	v
<i>Ceratophyllum demersum</i>	Coontail	0.5%	v	nc
<i>Eleocharis acicularis</i>	Spikerush	0.5%		
<i>Elodea canadensis</i>	Waterweed	33.7%	+	v
<i>Isoetes echinospora</i>	Quillwort	1.5%		
<i>Megalodonta beckii</i>	White water crowfoot	1.5%		v
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	18.4%	-	-
<i>Myriophyllum tenellum</i>	Leafless milfoil	2.6%		
<i>Najas flexilis</i>	Water naiad	27.6%	v	-
<i>Nuphar variegata</i>	Yellow water lily	0.5%		
<i>Nymphaea odorata</i>	White water lily	1.5%	nc	
<i>Potamogeton amplifolius</i>	Broad-leaf pondweed	10.2%	+	nc
<i>Potamogeton epihydrus</i>	Ribbon-leaf pondweed	0.5%	nc	
<i>Potamogeton pusillus</i>	Narrow-leaf pondweed	3.1%	+	
<i>Potamogeton praelongus</i>	White-stem pondweed	0.5%		v
<i>Potamogeton gramineus</i>	Variable pondweed	4.6%	-	-
<i>Potamogeton illinoensis</i>	Illinois pondweed	12.2%	+	+
<i>Potamogeton robbinsii</i>	Robbins pondweed	30.1%	v	+
<i>Potamogeton sp</i>	Pondweed	2.6%		
<i>Sagittaria graminea</i>	Slender arrowhead	2.6%		
<i>Sparganium sp.</i>	Burred	1.5%		
<i>Utricularia gibba</i>	Humped bladderwort	1.0%		
<i>Utricularia sp.</i>	bladderwort	0.5%		
<i>Utricularia vulgaris</i>	Giant bladderwort	1.5%	nc	
<i>Vallisneria americana</i>	Wild celery	18.9%	v	v
<i>Zosterella dubia</i>	Water stargrass	6.1%	+	

- Species and Frequency of Occurrence (FOD) data from DFWI 2014 survey
- ¹Trend data following herbicide treatments for Lake St. Catherine from Permit #2009-CO2(HB) [Abbreviations in the "Trend" column; no change (nc); increasing (+); decreasing (-); variable (v). Note that the trend designation is subjective.
- ²Trend data following herbicide treatments for Lake Morey from Permit #2012-CO1(HB) [Abbreviations in the "Trend" column; no change (nc); increasing (+); decreasing (-); variable (v). Note that the trend designation is subjective.

Only Humped Bladderwort (*Utricularia gibba*) is found on Vermont's rare plant list. This species has been found in the Lake St. Catherine system, Lake Fairlee, Burr Pond and Lake Hortonia and the evidence has not shown significant changes in the populations following large-scale triclopyr treatments.

WATER USE RESTRICTIONS AND NOTIFICATION

Water Use Restrictions – The water use restrictions listed on the current Renovate 3 and Renovate OTF labels no longer prohibits the use of treated water to irrigate established grasses. Irrigation of other non-food crop areas (e.g. landscape ornamentals) may now be permitted even if triclopyr concentrations exceed 1.0 ppb after consultation with SePRO Corporation. Use of the current water use restrictions in the permit conditions is requested.

Written Notification – LDFLA will provide written plans of treatment in mailed document, which will be provided to all property owners. Information to be included in the newsletter will be provided in the permit.

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. LDFLA will work closely with DEC to develop posters/signs that will be most effective for this purpose. The LDFLA newsletter will highlight that the signs will be the source of information for the specific treatment areas and water use restrictions.

NON-CHEMICAL CONTROL PROGRAM

LDFLA remains committed to continuing with non-chemical controls as part of this integrated milfoil management program. Techniques that will be used include:

- Suction harvesting
- SCUBA Diver hand-pulling
- Snorkel hand-pulling (volunteer)
- Benthic Barrier Matting
- Weevils
- Volunteer monitoring
- Boat launch inspections – Greeter Program
- Education – outreach with member communications & volunteer training

Use of herbicides are intended to supplement LDFLA's current milfoil management program that involves extensive diver suction-harvesting and hand-pulling. 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 will be to reduce the distribution and density of EWM so that herbicide use can be minimized.

LDFLA also remains committed to initiating and supporting responsible and practical watershed management protection measures.

Project cost estimates for the Five-Year Milfoil Management Program being proposed at Lake Dunmore is provided in the following table. Please note these are estimates and are subject to the availability of funds.

LAKE DUNMORE – FIVE-YEAR MILFOIL MANAGEMENT PROGRAM BUDGET ESTIMATES

		Lake Dunmore/Fern Lake Association				
		Five Year Milfoil Management Program Budget & Funding Estimates				
Estimated Program Costs	2016	2017	2018	2019	2020	Comments
Renovate Herbicide Treatment Program						
Treatment - Dunmore	\$ 77,350	\$ -	\$ 25,000	\$ -	\$ 77,350	Based on Renovate OTF (Granular)
Treatment - Fern	\$ 11,340	\$ -	\$ 3,000	\$ -	\$ 11,340	Frequency depends on initial results
Permitting	\$ 2,500	\$ -	\$ -	\$ -	\$ -	5 yr permits in 2016
Notifications	\$ 2,500	\$ -	\$ 2,500	\$ -	\$ 2,500	ATC estimates
Pre-treat & post-treat surveys	\$ 2,500	\$ -	\$ 2,500	\$ -	\$ 2,500	ATC estimates
Monitoring - Residue Testing	\$ 3,450	\$ -	\$ 3,450	\$ -	\$ 3,450	ATC estimates
Total Herbicide Program	\$ 99,640	\$ -	\$ 36,450	\$ -	\$ 97,140	
Non-Chemical Control Program						
Milfoil Removal Salaries	\$ 84,200	\$ 85,884	\$ 69,300	\$ 87,602	\$ 70,686	2% increase annually
Greeter Salaries	\$ 13,000	\$ 13,260	\$ 13,525	\$ 13,796	\$ 14,072	2% increase annually
Milfoil Removal Fringe Benefits	\$ 12,630	\$ 12,883	\$ 10,395	\$ 13,140	\$ 10,603	2% increase annually
Greeter Fringe Benefits	\$ 1,950	\$ 1,989	\$ 2,029	\$ 2,069	\$ 2,111	2% increase annually
Travel	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	Held flat
Equipment	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	Held flat
Supplies	\$ 7,350	\$ 7,350	\$ 7,350	\$ 7,350	\$ 7,350	Held flat
Contractual Services	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	Held flat
Insurance	\$ 10,500	\$ 10,920	\$ 11,357	\$ 11,811	\$ 12,284	4% increase annually
Misc Other	\$ 500	\$ 510	\$ 520	\$ 531	\$ 541	2% increase annually
Total Non-Chemical Program	\$ 147,130	\$ 149,796	\$ 131,476	\$ 153,299	\$ 134,646	
Total Cash Needs	\$ 246,770	\$ 149,796	\$ 167,926	\$ 153,299	\$ 231,786	
In-Kind Services (boat storage, cabin rental)	\$ 14,100	\$ 14,382	\$ 14,670	\$ 14,963	\$ 15,262	2% increase annually
In-Kind Personnel Services	\$ 36,000	\$ 36,720	\$ 37,454	\$ 38,203	\$ 38,968	2% increase annually
Total Program Costs	\$ 296,870	\$ 200,898	\$ 220,050	\$ 206,465	\$ 286,016	
Program Funding Sources						
Dues and Fund Raising Events	\$ 15,000	\$ 15,000	\$ 15,000	\$ 20,000	\$ 20,000	Dues increase in 2019
LCBP Greeter Grant	\$ 14,000	\$ 14,000	\$ 14,000	\$ 14,000	\$ 14,000	Held flat
Leicester & Salisbury Support Total	\$ 38,000	\$ 38,000	\$ 38,000	\$ 38,000	\$ 42,000	Hoped for increase in 2020
Income from Association Endowment	\$ 25,000	\$ 30,000	\$ 35,000	\$ 40,000	\$ 45,000	Grows as Endowment increases
State Aquatic Invasive Species Grant-In-Aid	\$ 154,770	\$ 52,796	\$ 65,926	\$ 41,299	\$ 110,786	See attached for explanation
Total Cash Funding Required	\$ 246,770	\$ 149,796	\$ 167,926	\$ 153,299	\$ 231,786	

Dues & Fund Raising Events: This source is used to cover the basic operating expenses of the Association not directly related to Invasive Species Control. It ranges between \$30,000 & \$35,000 annually, covers accounting, audit, some office supplies, and support of other small programs and contributes \$15,000 to \$20,000 annually to the Invasive Species Control project.

LCBP Greeter Grant: From the Lake Champlain Basin Program to support expanded Greeter coverage at the lakes access areas.

Support from the Towns of Leicester and Salisbury, VT: This support has increased 8 fold over the past ten years and demonstrates good understanding and working relationships between the association and towns.

Income from Endowment: The Association has conducted a substantial capital campaign in the last 3 years with the intent of raising \$1,250,000 in endowed funds leading to annual earnings of \$50,000 to be applied to lake preservation and invasive species control annually. The annual endowment earnings are planned to grow from \$25,000 in 2016 to \$50,000 by 2021. Some limited additions are also being made to Association Reserves to assist with unanticipated costs and operating budget shortfalls.

State Aquatic Invasive Species Grant-in-Aid: This is the amount needed to close the expected annual operating budget gap. Depending on the support from the state some adjustments to program and/or draw from Reserves may be used to meet program expenses.

ATTACHMENT D

AQUATIC VEGETATION SURVEY OF LAKE DUNMORE AND FERN LAKE

- 2014 Survey Report prepared by Darrin Fresh Water Institute (DFWI)
- 2015 Survey Report prepared by DFWI

(provided under separate cover)



Lake George, New York
Adirondack Field Station at Bolton Landing

Aquatic Vegetation of Lake Dunmore and Fern Lake, Salisbury, Vermont

Prepared By

Lawrence Eichler
Research Scientist

&

Charles Boylen
Associate Director

Darrin Fresh Water Institute
5060 Lakeshore Drive
Bolton Landing, NY 12814
(518) 644-3541 (voice) (518) 644-3640 (fax)
eichll@rpi.edu

September 10, 2014
DFWI Technical Report 2014-6

TABLE OF CONTENTS

Background	.....	1
Methods	.....	1
Survey Sites	.....	1
Species List and Herbarium Specimens	.....	2
Point Intercept Survey	.....	3
Results and Discussion		
Lake Dunmore Survey	.....	4
Fern Lake Survey	.....	9
Summary	.....	13
References	.....	16
Acknowledgements	.....	16
Appendix A. Lake Dunmore aquatic plant distribution maps	.....	A-1
Appendix B. Fern Lake aquatic plant distribution maps	.....	B-1

List of Tables

	Page
Table 1 Species list for Lake Dunmore and Fern Lake, August 2014.....	4
Table 2 Lake Dunmore percent frequency of occurrence data.	6
Table 3 Lake Dunmore species richness comparison.	8
Table 4 Fern Lake percent frequency of occurrence data.	10
Table 5 Fern Lake species richness comparison.	11

List of Figures

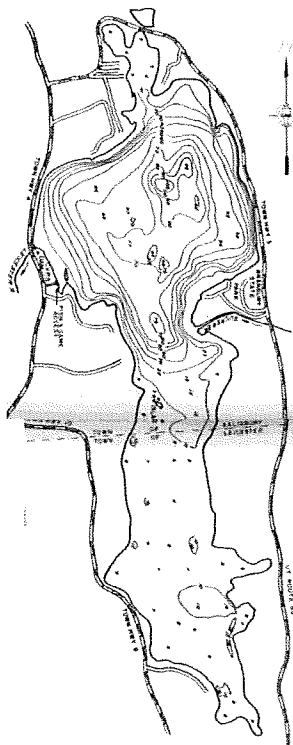
		Page
Figure 1	Eurasian watermilfoil harvest in Lake Dunmore and Fern Lake	2
Figure 2	Map of Lake Dunmore with point intercept survey locations	2
Figure 3	Map of Fern Lake with point intercept survey locations	3
Figure 4	Depth distribution of Lake Dunmore sampling points in 1 meter depth classes	5
Figure 5	Lake Dunmore frequency of occurrence summaries for sampling points of all water depths	7
Figure 6	Lake Dunmore frequency of occurrence summaries for sampling points less than 5 meters water depth	7
Figure 7	Lake Dunmore species richness for native species in open-lake surveys	8
Figure 8	Depth distribution of Fern Lake sampling points in 1 meter depth classes.	9
Figure 9	Fern Lake frequency of occurrence summaries for sampling points of all water depths	10
Figure 10	Fern Lake frequency of occurrence summaries for sampling points within the littoral zone (<5 m water depth)	11
Figure 11	Fern Lake species richness for native species	12
Figure 12	Distribution of Eurasian watermilfoil in Lake Dunmore	13
Figure 13	Distribution of Eurasian watermilfoil in Fern Lake.....	14

Background.

At the request of Mr. Allen Wilson of the Lake Dunmore Fern Lake Association, quantitative aquatic plant surveys were undertaken for Lake Dunmore and Fern Lake, Vermont. The survey consisted of frequency of occurrence and relative abundance data for all aquatic plant species present in points distributed throughout both lakes. The Point-Intercept Rake Toss method presently used by the US Army Corps of Engineers and others was employed. The assessment ultimately will include the distribution and density of existing aquatic plant communities, the extent of exotic species infestation and a review of ongoing management efforts to control Eurasian watermilfoil (*Myriophyllum spicatum*).

Methods

Survey Sites



Lake Dunmore. Lake Dunmore is located in Addison County, in the towns of Salisbury and Leicester. The lake has a surface area of approximately 985 acres. Lake Dunmore has a single outlet with a control structure to maintain lake level. Average water depth is reported to be 28 ft, with a maximum depth of 105 ft (VTDEC 2014). Secchi disk transparency is reported to be 20 ft (6.2 m; VT DEC 2013). Eurasian watermilfoil (*Myriophyllum spicatum*) populations were first confirmed in 1988 (LDFLA 2014). A barrier was installed to contain fragments and Eurasian watermilfoil was removed by volunteers. Within a few years, a second infestation was discovered at the north end of the lake and in 1994 the current management program was initiated. Hand harvesting by skin and SCUBA divers has been the basis of the program for most years with use of diver operated suction harvesting in recent years. While there is a general sense that management efforts are controlling Eurasian watermilfoil, the level of effort to achieve control has continued to expand. By 2013, over 3600 bushels of Eurasian watermilfoil were being harvested by 2 suction harvesting teams with consideration of adding teams in the future (Figure 1).

Fern Lake. Fern Lake is a 69 acre waterbody located in the town of Leicester, Vermont. Eurasian watermilfoil was first detected in Fern Lake in 1996, when a single milfoil plant was found and removed (VTDEC 2011). Eurasian watermilfoil was detected again in 2003, when 36 plants were removed. Since that time the population of Eurasian watermilfoil has expanded substantially. Harvesting has occurred in Fern Lake every year since 2003 with diver operated suction harvesting employed since 2010. In 2013, the aquatic weevil population of Fern Lake was augmented as an additional control measure (Ritter 2013). In addition to weevil augmentation, hand and suction harvesting removed a total of 1800 bushels of Eurasian watermilfoil in 2013 (Figure 1).

Figure 1. Eurasian watermilfoil harvest from Lake Dunmore and Fern Lake.

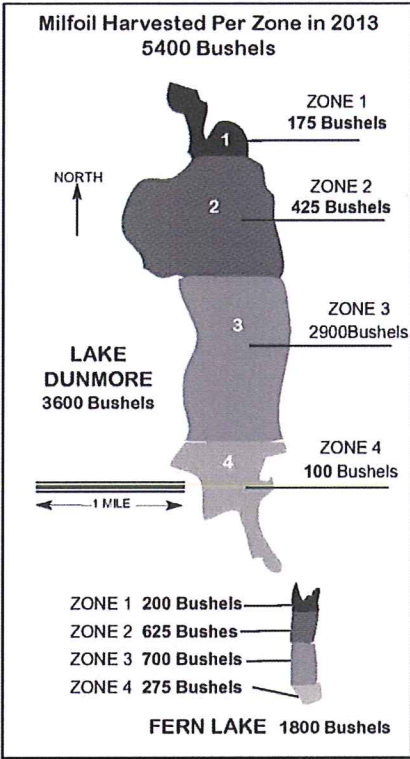


Figure 2. Map of Lake Dunmore with point intercept survey locations for 2014.

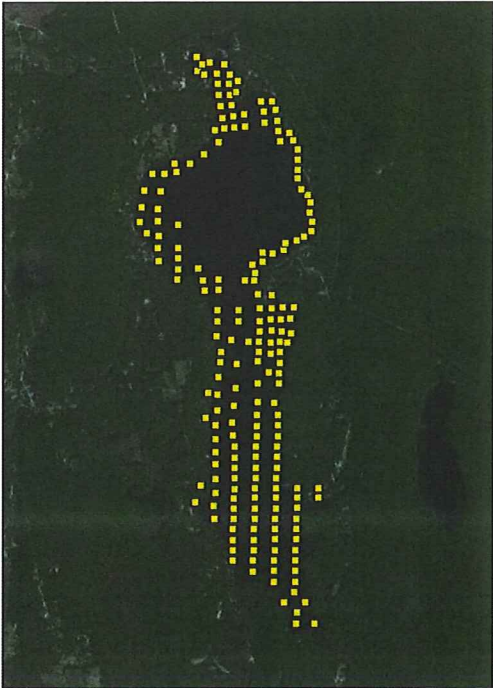


Figure 3. Map of Fern Lake with point intercept survey locations for 2014.



Species List and Herbarium Specimens. As the lakes were surveyed, the occurrence of each aquatic plant species observed in the lake was recorded and adequate herbarium specimens were collected. The herbarium specimens were returned to the Darrin Fresh Water Institute, where they were pressed, dried, and mounted (Hellquist 1993). A number of species which were collected as reference specimens for each lake were not found in line intercept or wetland transect surveys.

Point Intercept Surveys. The frequency and diversity of aquatic plant species were evaluated using a point intercept method (Madsen 1999). At each grid point intersection, all species located at that point were recorded, as well as water depth. Species were located by a visual inspection of the point and by deploying a rake to the bottom, and examining the plants retrieved. A total of 60 points were selected for Fern Lake (Figure 3), and 196 points were surveyed for Lake Dunmore (Figure 2), based on a 100 m grid. A global positioning system (GPS) was used to navigate to each point for the survey observation. Point intercept plant frequencies were surveyed on August 7 and 8, 2014 at a time of maximum aquatic plant abundance.

Results and Discussion

Lake Dunmore Survey Results

In August of 2014, the aquatic plant community of Lake Dunmore included twenty submersed species, four floating-leaved species and six emergent species (Table 1). This number of species greatly exceeds the 15 species typically reported for moderately productive lakes in our region and indicates good water quality and a variety of habitat types. Eurasian watermilfoil (*Myriophyllum spicatum*) was the only exotic species reported for Lake Dunmore. Species richness was quite high, with a number of species occurring in more than 5% of survey points (Table 2). Waterweed (*Elodea canadensis*) was the most common plant (34% of survey points). Eurasian watermilfoil (*Myriophyllum spicatum*) was present in 18% of survey points. A number of native species were also commonly observed. A complete list of species observed for Lake Dunmore and Fern Lake is provided in Table 1. One of the species present in Lake Dunmore, Humped Bladderwort (*Utricularia gibba*) is found on Vermont's rare plant list (VT DEC 2012).

Table 1. Species lists for Lake Dunmore and Fern Lake.

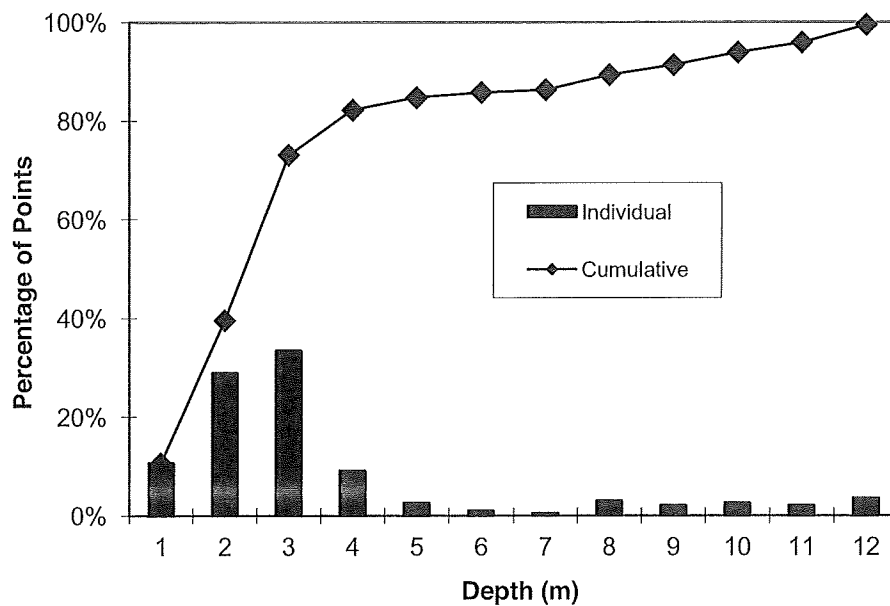
Species	Common Name	Lake Dunmore	Fern Lake
<i>Brasenia schreberi</i> J.F. Gmel	watershield	x	
<i>Ceratophyllum demersum</i> L.	coontail	x	
<i>Chara/Nitella</i> sp.	muskgrass, chara	x	x
<i>Eleocharis acicularis</i> (L.) Roemer & Schultes	needle spike-rush	x	x
<i>Elodea canadensis</i> Michx.	waterweed	x	x
<i>Fontinalis</i> sp.	moss	x	
<i>Isoetes echinospora</i> Dur.	quillwort	x	
<i>Megalodonta beckii</i> Torr.	white water crowsfoot	x	
<i>Myriophyllum tenellum</i> L.	leafless watermilfoil	x	
<i>Myriophyllum spicatum</i> L.	Eurasian watermilfoil	x	x
<i>Najas flexilis</i> (Willd.) Rostk. & Schmidt.	bushy pondweed	x	x
<i>Nuphar variegata</i> Engelm. ex Durand	yellow pondlily	x	x
<i>Nymphaea odorata</i> Ait.	white pondlily	x	x
<i>Nymphoides cordatum</i> (Ell.) Fern.	floating heart	x	
<i>Pontederia cordata</i> L.	pickerelweed	x	x
<i>Potamogeton amplifolius</i> Tuckerm.	largeleaf pondweed	x	
<i>Potamogeton epihydrus</i> Raf.	ribbon-leaf pondweed	x	
<i>Potamogeton gramineus</i> L.	variable-leaf pondweed	x	
<i>Potamogeton illinoensis</i> Morong	Illinois pondweed	x	x
<i>Potamogeton praelongus</i> Wulf.	White-stem pondweed	x	x
<i>Potamogeton pusillus</i> L.	Narrow-leaf pondweed	x	x

Species	Common Name	Lake Dunmore	Fern Lake
<i>Potamogeton robbinsii</i> Oakes	Robbins pondweed	x	
<i>Potamogeton spirillus</i> Tuckerm.	pondweed		x
<i>Sagittaria graminea</i> Michx.	arrowhead	x	x
<i>Scirpus sp.</i>	rush	x	
<i>Sparganium sp.</i>	burreed	x	
<i>Typha</i>	cattail	x	x
<i>Utricularia gibba</i> Hayne	humped bladderwort	x	
<i>Utricularia vulgaris</i> L.	giant bladderwort	x	
<i>Vallisneria americana</i> L.	wild celery	x	
<i>Zosterella dubia</i> (Jacq.) Small	water stargrass	x	x

Maximum Depth of Colonization

Maximum depth of rooted aquatic plant growth was similar for the two lakes, with the littoral zone extending to a depth of approximately 5.0 meters. Specimens of *Chara* sp. were observed in a single sample from 7 m depth. The extensive shallow areas at the south end of Lake Dunmore are responsible for the predominance of sample points in water depths less than 5 meters.

Figure 4. Depth Distribution of Lake Dunmore Sampling Points in 1 meter depth classes.



Species Lists

Maps of the distribution of aquatic plant species for Lake Dunmore are included in Appendix A. Frequency of occurrence results are presented in Table 2. Waterweed (*Elodea canadensis*) was the most common plant (34% of survey points). Eurasian watermilfoil (*Myriophyllum spicatum*) was present in 18% of survey points. Common native species for Lake Dunmore included *Potamogeton robbinsii* (30% of survey points), *Najas flexilis* (28%), *Chara/Nitella* (27%), *Vallisneria americana* (19%), *Potamogeton illinoensis* (12%) *Potamogeton amplifolius* (10%), and *Zosterella dubia* (6%).

Table 2. Lake Dunmore percent frequency of occurrence data.

Species	Common Name	Lake Dunmore
<i>Brasenia schreberi</i>	watershield	1.0%
<i>Chara/Nitella</i>	Muskgrass	26.5%
<i>Ceratophyllum demersum</i>	Coontail	0.5%
<i>Eleocharis acicularis</i>	Spikerush	0.5%
<i>Elodea canadensis</i>	Waterweed	33.7%
<i>Isoetes echinospora</i>	Quillwort	1.5%
<i>Megalodonta beckii</i>	White water crowsfoot	1.5%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	18.4%
<i>Myriophyllum tenellum</i>	Leafless milfoil	2.6%
<i>Najas flexilis</i>	Water naiad	27.6%
<i>Nuphar variegata</i>	Yellow water lily	0.5%
<i>Nymphaea odorata</i>	White water lily	1.5%
<i>Potamogeton amplifolius</i>	Broad-leaf pondweed	10.2%
<i>Potamogeton epihydrus</i>	Ribbon-leaf pondweed	0.5%
<i>Potamogeton pusillus</i>	Narrow-leaf pondweed	3.1%
<i>Potamogeton praelongus</i>	White-stem pondweed	0.5%
<i>Potamogeton gramineus</i>	Variable pondweed	4.6%
<i>Potamogeton illinoensis</i>	Illinois pondweed	12.2%
<i>Potamogeton robbinsii</i>	Robbins pondweed	30.1%
<i>Potamogeton sp 1</i>	Pondweed	2.6%
<i>Sagittaria graminea</i>	Slender arrowhead	2.6%
<i>Sparganium sp.</i>	Burred	1.5%
<i>Utricularia gibba</i>	Humped bladderwort	1.0%
<i>Utricularia sp. 1</i>	bladderwort	0.5%
<i>Utricularia vulgaris</i>	Giant bladderwort	1.5%
<i>Vallisneria americana</i>	Wild celery	18.9%
<i>Zosterella dubia</i>	Water stargrass	6.1%

Seventy-three percent of whole lake sampling points were vegetated by at least one native plant species (Figure 5), 83% of survey points with depths less than 5 m (Figure 6) and 78% of survey points with depths less than 2 meters depth yielded native aquatic plants. Eurasian watermilfoil was present in 18% of whole lake survey points, and 30% of survey points less than 5 m water depth, representing the littoral zone or zone of aquatic plant growth.

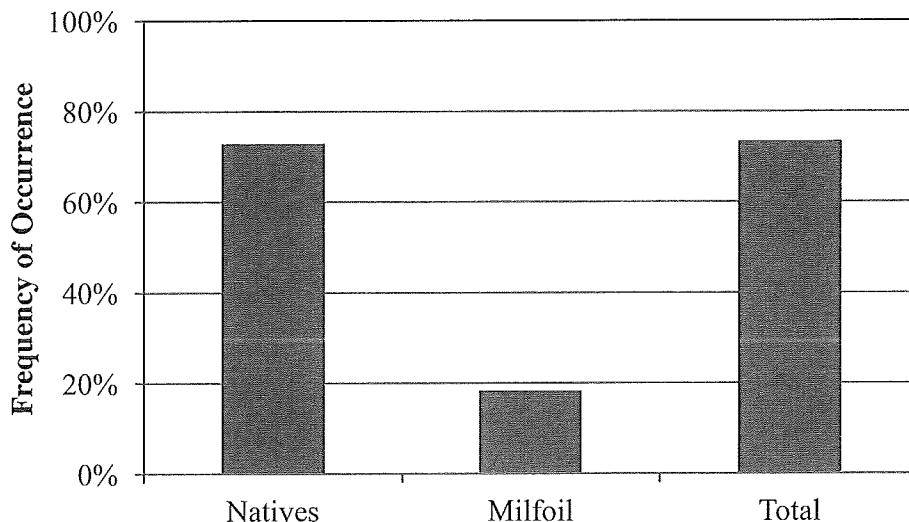


Figure 5. Lake Dunmore frequency of occurrence summaries.

For survey points within the littoral zone, water depth less than 5 m (Figure 5), results similar to whole lake surveys are reported. The expected relationship of greater frequency of occurrence of aquatic plants with shallower water depth is consistent with that reported by other regional studies. Littoral zone frequency of occurrence values (Figure 6) were dominated by native species and similar to nearby lakes (Getsinger et al. 2002).

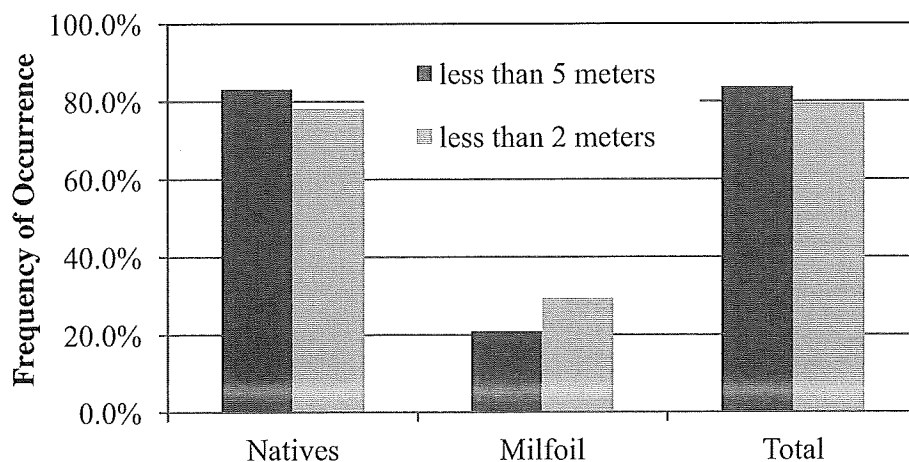


Figure 6. Lake Dunmore frequency of occurrence summaries for sampling points less than 5 and 2 meters water depth.

Species richness results are presented in Table 3 and Figure 6. Whole lake native species richness was 1.93 species per sample point. Species richness in this range is comparable to other nearby lakes (Eichler et al. 2013).

Table 3. Lake Dunmore species richness comparison.

Plant Grouping	Depth Class	Summary Statistic	2014
Native plant species	Whole Lake (all depths)	Mean	1.93
		N	196
		Std. Error	0.12
	Points with depths <5m	Mean	2.23
		N	167
		Std. Error	0.13
	Points with depths <2m	Mean	2.31
		N	78
		Std. Error	0.23
All plant species	Whole Lake (all depths)	Mean	2.12
		N	196
		Std. Error	0.14
	Points with depths <5m	Mean	3.11
		N	167
		Std. Error	0.15
	Points with depths <2m	Mean	2.60
		N	78
		Std. Error	0.25

For survey points exclusively within the littoral zone (depths less than 5 meters), native species richness was 2.31 species per survey point (Figure 6). As expected, species richness in the littoral zone and its shallow fringe was higher than whole lake species richness.

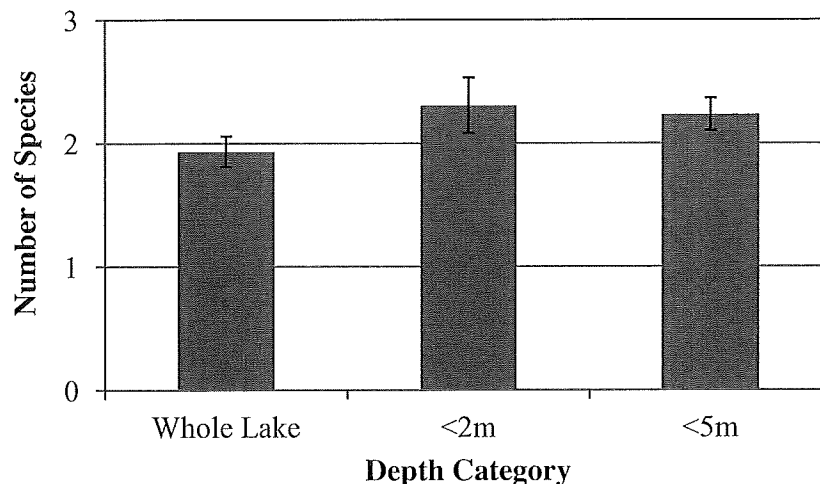


Figure 7. Lake Dunmore species richness for native species. Error bars are standard error of the mean.

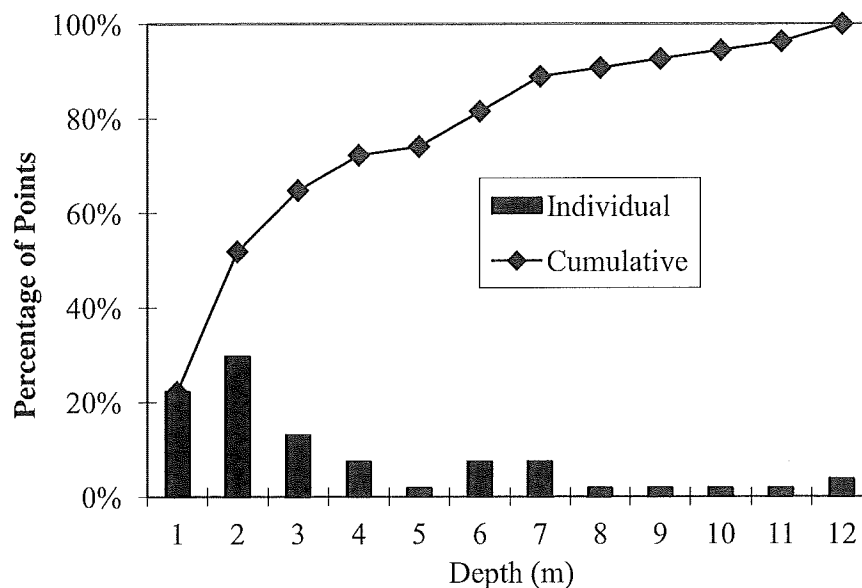
Fern Lake Survey Results

In August of 2014, the aquatic plant community of Fern Lake included nine submersed species, two floating-leaved species and three emergent species. None of the species reported for Fern Lake were on Vermont's rare plant list. With the exception of Eurasian watermilfoil, all other species were native to our region (Table 1). Species richness was quite high, with a large number of species occurring in more than 5% of survey points (Table 5). For Fern Lake, Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 48% of survey points. A number of native species were also commonly observed.

Maximum Depth of Colonization

Maximum depth of rooted aquatic plant growth for Fern Lake was similar to that reported for Lake Dunmore, with the littoral zone extending to a maximum depth of 5 m. A total of 74% of survey points were within the littoral zone. In Fern Lake, viable plant specimens were collected in water depths greater than 5 m, however only for a single point with a depth of 6 m.

Figure 8. Depth Distribution of Fern Lake Sampling Points in 1-meter depth classes.



Species Lists

Maps of the distribution of aquatic plant species for Fern Lake are included in Appendix B. Frequency of occurrence results are presented in Table 4. Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 48% of survey points. Common native species for Fern Lake included *Najas flexilis* (46% of survey points), *Potamogeton illinoensis* (37%), *Chara/Nitella* (17%), *Zosterella dubia* (13%), *Sagittaria graminea* (11%), *Potamogeton*

pusillus (9%), *Potamogeton praelongus* (7%) and *Eleocharis acicularis* (7%).

Table 4. Fern Lake percent frequency of occurrence data.

Species	Common Name	Fern Lake
<i>Chara/Nitella</i>	Muskgrass	16.7%
<i>Eleocharis acicularis</i>	Spikerush	7.4%
<i>Elodea canadensis</i>	Waterweed	1.9%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	48.1%
<i>Najas flexilis</i>	Water naiad	46.3%
<i>Nuphar variegata</i>	Yellow water lily	1.9%
<i>Nymphaea odorata</i>	White water lily	7.4%
<i>Potamogeton pusillus</i>	Narrow-leaf pondweed	9.3%
<i>Potamogeton praelongus</i>	White-stem pondweed	7.4%
<i>Potamogeton illinoensis</i>	Illinois pondweed	37.0%
<i>Potamogeton spirillus</i>	pondweed	3.7%
<i>Sagittaria graminea</i>	Slender arrowhead	11.1%
<i>Zosterella dubia</i>	Water stargrass	13.0%

In 2014, seventy-six percent of whole lake sampling points were vegetated by at least one native plant species (Figure 9), 93% of survey points with depths less than 5 meters (Figure 10) and 96% of survey points less than 2 meters depth yielded native aquatic plants. Eurasian watermilfoil was present in 48% of whole lake survey points, 63% of survey points less than 5 meters water depth and 67% of survey points less than 2 meters water depth.

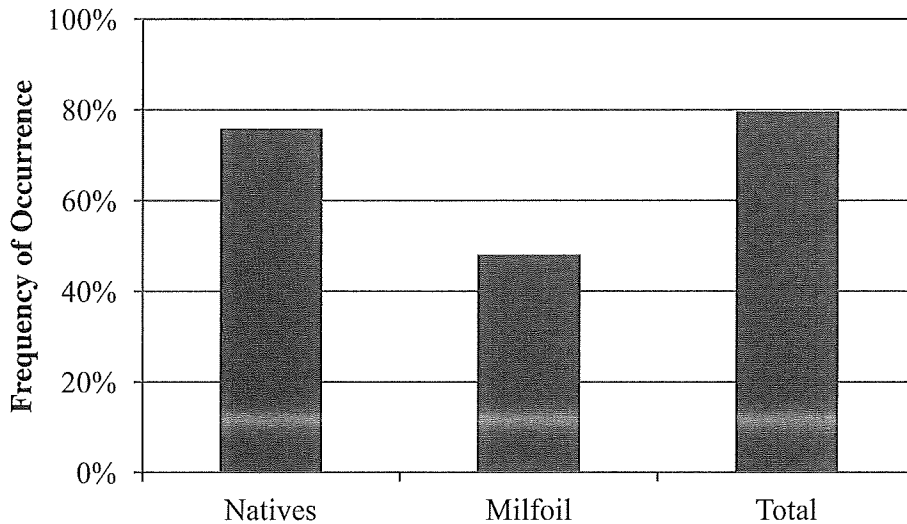


Figure 9. Fern Lake frequency of occurrence summaries.

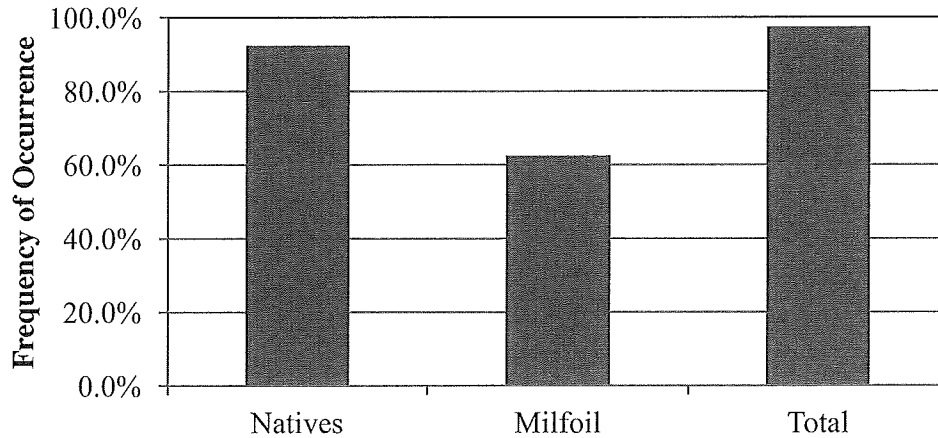
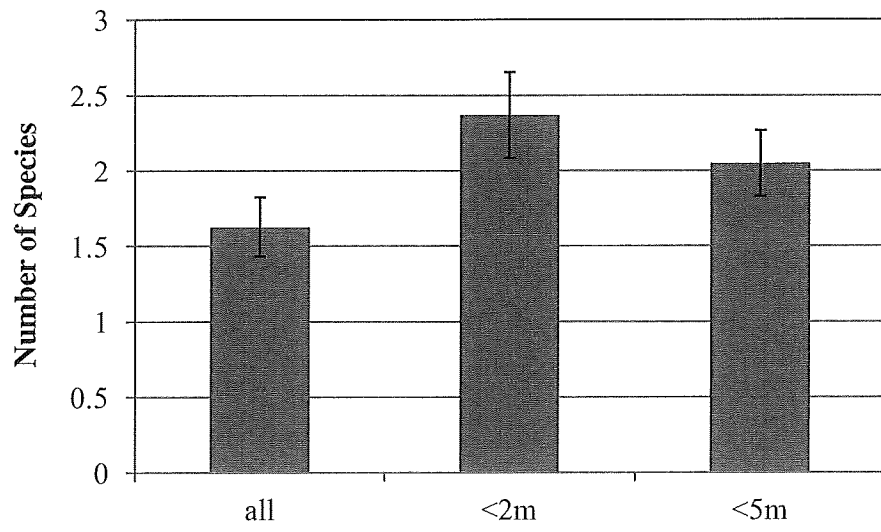


Figure 10. Fern Lake frequency of occurrence summaries for sampling points within the littoral zone (<5 m water depth).

Species richness results for Fern Lake are presented in Table 6. Whole lake native plant species richness was 1.63 species per survey point (Figure 11). Species richness in this range is comparable to other regional lakes (Eichler et al. 2013), but slightly lower than Lake Dunmore, perhaps due to the smaller size and limited habitat complexity of Fern Lake..

Table 5. Fern Lake species richness comparison.

Plant Grouping	Depth Class	Summary Statistic	2014
Native plant species	Whole Lake (all depths)	Mean	1.63
		N	60
		Std. Error	0.20
	Points with depths <5m	Mean	2.37
		N	40
		Std. Error	0.28
	Points with depths <2m	Mean	2.05
		N	27
		Std. Error	0.22
All plant species	Whole Lake (all depths)	Mean	2.11
		N	60
		Std. Error	0.24
	Points with depths <5m	Mean	3.04
		N	40
		Std. Error	0.32
	Points with depths <2m	Mean	2.68
		N	27
		Std. Error	0.25



**Figure 11. Fern Lake species richness for native species.
Error bars are standard error of the mean.**

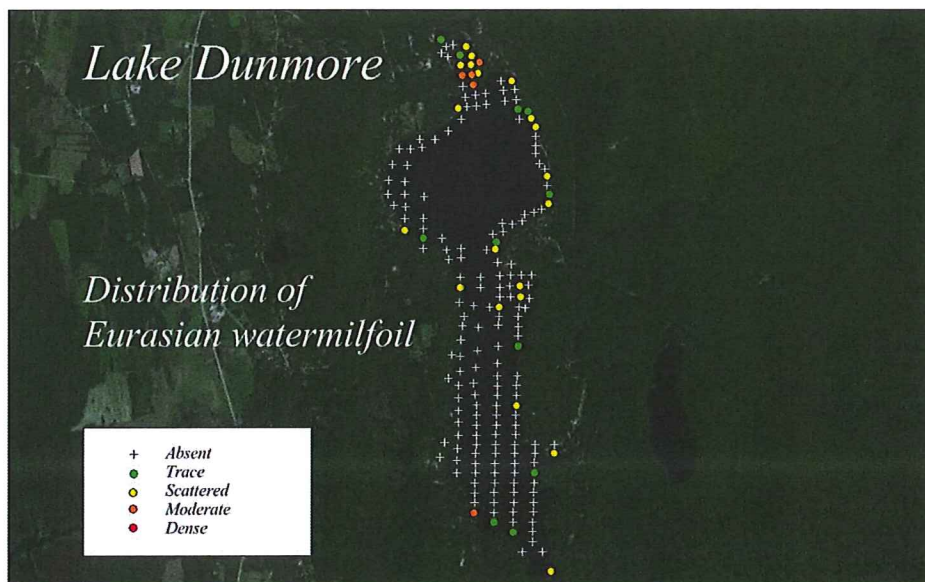
Summary

Quantitative aquatic plant surveys were undertaken for Lake Dunmore and Fern Lake, Vermont, in August of 2014. Surveys were conducted to obtain post-treatment data for hand and suction harvesting efforts to control Eurasian watermilfoil. The frequency and distribution of aquatic plant species in each waterbody were evaluated using a point intercept method based on a differential global positioning system of grid points.

Eurasian watermilfoil (*Myriophyllum spicatum*) populations were first confirmed in Lake Dunmore in 1988 and in 1994 the current management program was initiated. Eurasian watermilfoil was first detected in Fern Lake in 1996, with annual management efforts since 2003. Hand harvesting by skin and SCUBA divers has been the basis of the program for most years with use of diver operated suction harvesting in recent years. While there is a general sense that management efforts are controlling Eurasian watermilfoil, the level of effort required to achieve control has continued to expand. By 2013, over 3600 bushels of Eurasian watermilfoil were being harvested from Lake Dunmore by 2 suction harvesting teams. In 2013, the aquatic weevil population of Fern Lake was augmented as an additional control measure. In addition to weevil augmentation, hand and suction harvesting removed a total of 1800 bushels of Eurasian watermilfoil.

The aquatic plant community of Lake Dunmore included twenty submersed species, four floating-leaved species and six emergent species. This number of species greatly exceeds the 15 species typically reported for moderately productive lakes in our region and indicates good water quality and a variety of habitat types. One of the species present in Lake Dunmore, Humped Bladderwort (*Utricularia gibba*) is found on Vermont's rare plant list (VT DEC 2012). *Myriophyllum spicatum* was the only exotic species reported for Lake Dunmore. Species

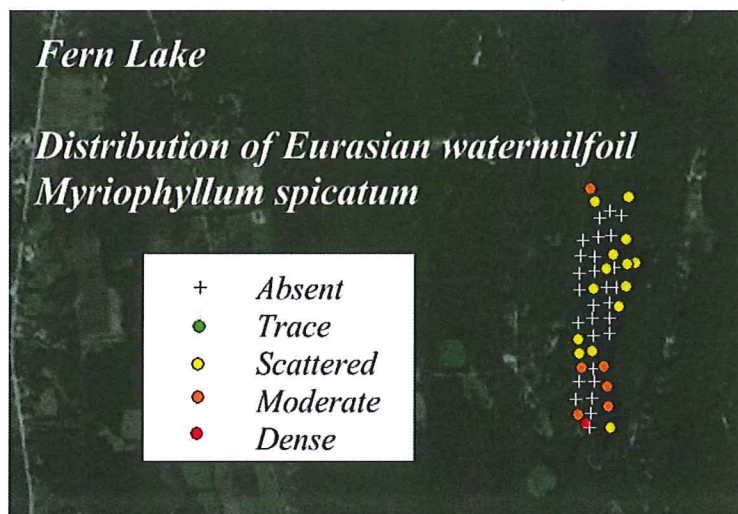
Figure 12. Distribution of Eurasian watermilfoil in Lake Dunmore.



richness was quite high, with a number of species occurring in more than 5% of survey points. Seventy-three percent of whole lake sampling points were vegetated by at least one native plant species. Native species richness in the littoral zone was 2.23 species per sample, and in the average range for regional lakes. Common native species for Lake Dunmore included Waterweed (*Elodea canadensis*, 34% of survey points), Robbins Pondweed (*Potamogeton robbinsii*, 30%), Bushy Pondweed (*Najas flexilis*, 28%), Muskgrass (*Chara/Nitella*, 27%), Wild Celery (*Vallisneria americana*, 19%), Illinois Pondweed (*Potamogeton illinoensis*, 12%), Broad-leaf Pondweed (*Potamogeton amplifolius*, 10%), and Water Stargrass (*Zosterella dubia*, 6%). Eurasian watermilfoil was present in 18% of whole lake survey points (Figure 12), and 30% of survey points less than 5 m water depth, representing the littoral zone or zone of aquatic plant growth.

For Fern Lake, the aquatic plant community included nine submersed species, two floating-leaved species and three emergent species. None of the species reported for Fern Lake were on Vermont’s rare plant list. With the exception of Eurasian watermilfoil, all other species were native to our region. Species richness was quite high, with a large number of species occurring in more than 5% of survey points. For Fern Lake, Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 48% of survey points (Figure 13). A number of native species were also commonly observed. Common native species for Fern Lake included Bushy Pondweed (*Najas flexilis*, 46% of survey points), Illinois Pondweed (*Potamogeton illinoensis*, 37%), Muskgrass (*Chara/Nitella*, 17%), Water stargrass (*Zosterella dubia*, 13%), Arrowhead (*Sagittaria graminea*, 11%), Narrow-leaf Pondweed (*Potamogeton pusillus*, 9%), White-stem Pondweed (*Potamogeton praelongus*, 7%) and Spike-rush (*Eleocharis acicularis*, 7%).

Figure 13. Distribution of Eurasian watermilfoil in Fern Lake.



Eurasian watermilfoil in both Lake Dunmore and Fern Lake was present as low to moderate density growth in August of 2014, while the native plant populations appear robust and similar to other regional lakes. It is likely that the current management effort is slowing the spread of

Eurasian watermilfoil, however the amount of Eurasian watermilfoil harvested continues to increase on an annual basis (LDFLA 2013). For Lake Dunmore, a more aggressive effort appears necessary for the north cove. For Fern Lake, Eurasian watermilfoil dominated the aquatic plant population. Management via suction harvesting was ongoing at the time of the survey with additional reductions in the level of Eurasian watermilfoil likely. The area adjacent to the boat launch supported a dense population of flowering Eurasian watermilfoil which should be a focus of future efforts. The current survey provides baseline data for analysis of the effectiveness of existing management efforts for Eurasian watermilfoil control and its impact on non-target species.

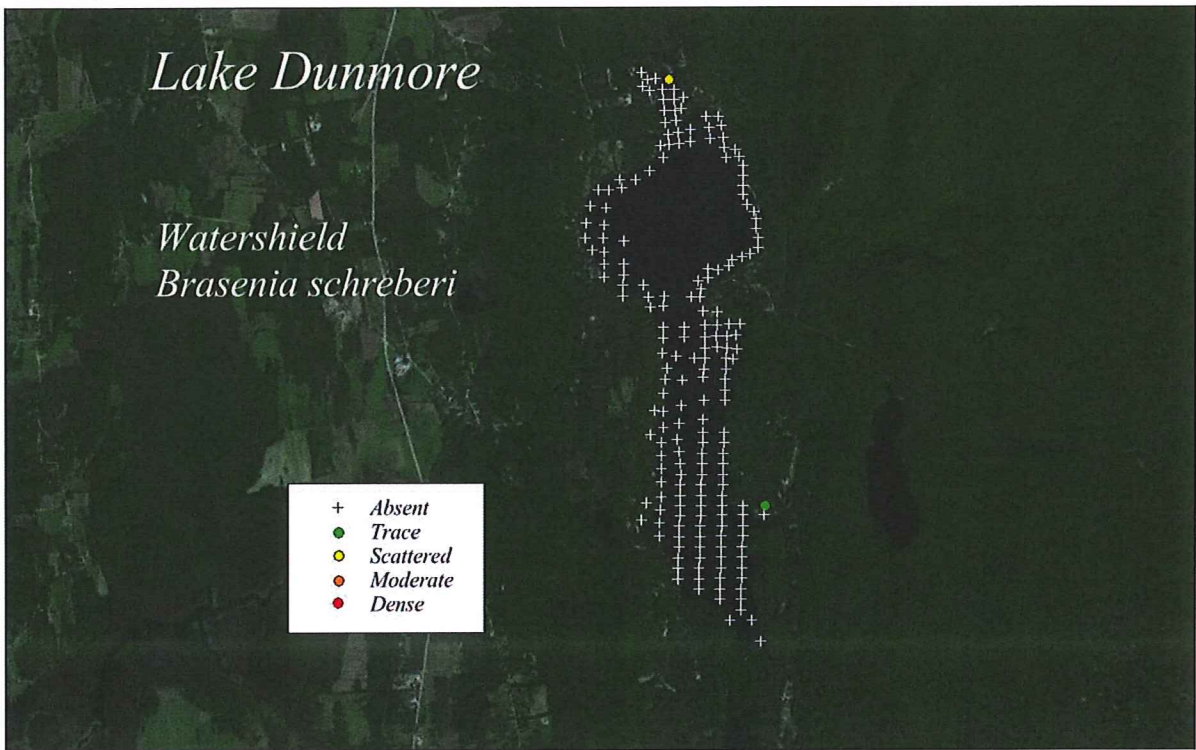
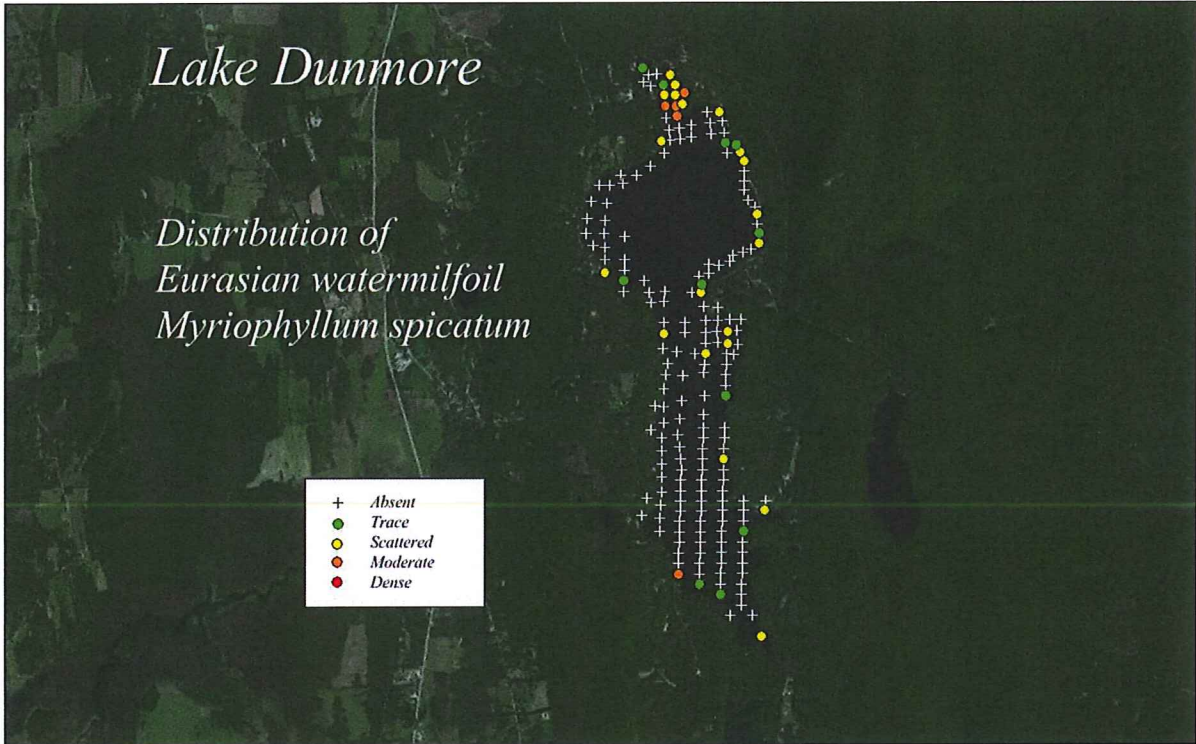
References

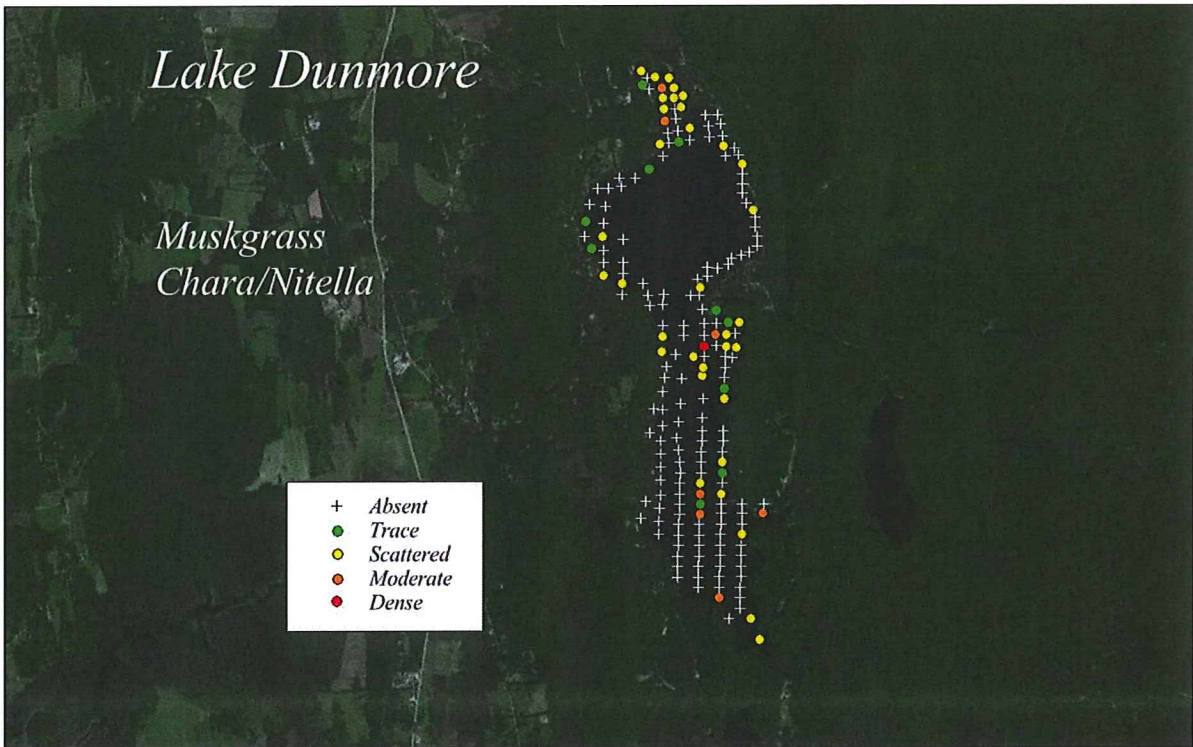
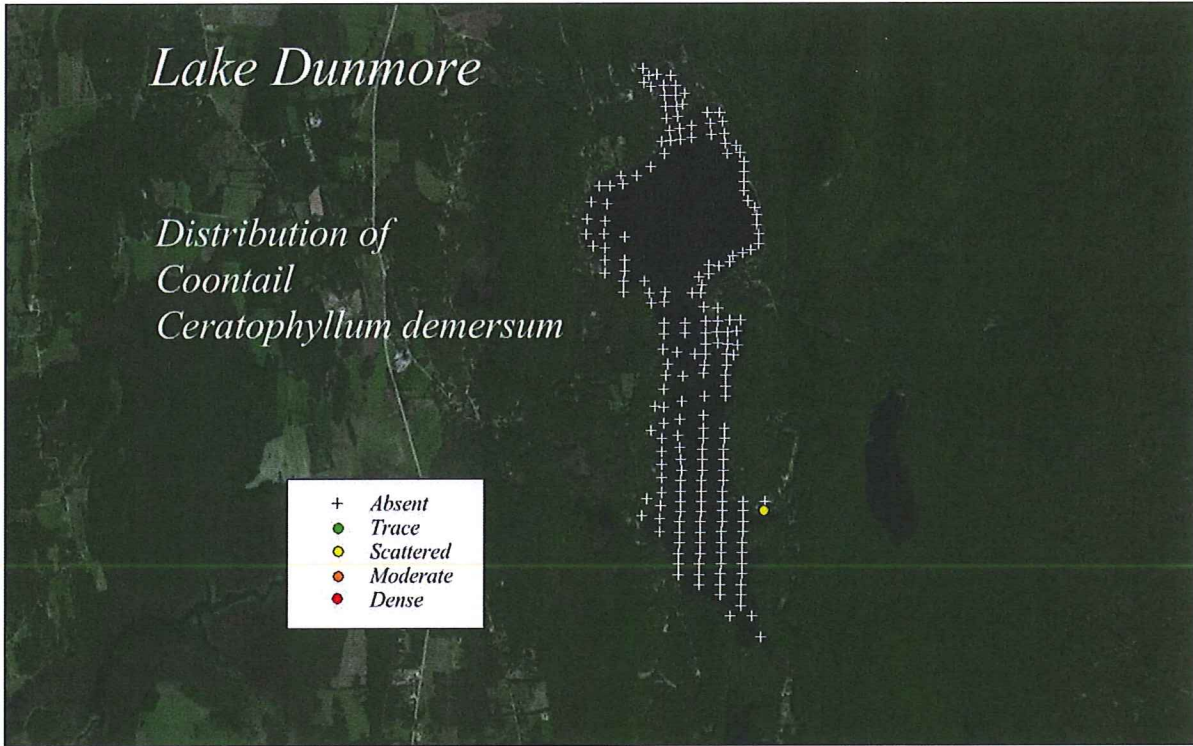
- Crow, G.E. and C.B. Hellquist. 2000. Aquatic and wetland plants of northeastern North America. 2 Volumes. University of Wisconsin Press, Madison, WI.
- Eichler, L.W. and C.W. Boylen. 2013. Aquatic vegetation of Burr Pond and Lake Hortonia, Vermont. Prepared for the Vermont DEC & the Lake Hortonia & Burr Pond Property Owners Association. Darrin Fresh Water Institute, Bolton Landing, NY. November 2005
- Getsinger et al., K.D., R.M. Stewart, J.D. Madsen, A.S. Way, C.S. Owens, H.A. Crosson, and A.J. Burns. 2002. Use of Whole-Lake Fluridone Treatments to Selectively Control Eurasian Watermilfoil in Burr Pond and Lake Hortonia, VT. US Army Corps of Engineers, Engineer Research and Development Ctr., Aquatic Plant Control Res. Program. ERDC/EL TR-02-39.
- Hellquist, C.B. 1993. Taxonomic considerations in aquatic vegetation assessments. *Lake and Reserv. Manage.* 7:175-183.
- LDFLA. 2013. Lake Dunmore Fern Lake Association Milfoil Annual Report 2013. www.ldfla.com.
- Madsen, J.D. 1999. Point intercept and line intercept methods for aquatic plant management. US Army Engineer Waterways Experiment Station Aquatic Plant Control Research Program Technical Note CC-02, Vicksburg, MS.
- Madsen, J.D., L.W. Eichler, and C.W. Boylen. 1988. Vegetative spread of Eurasian watermilfoil in Lake George, New York. *J. Aquat. Plant Manage.* 26, 47-50.
- Madsen J.D., J.W. Sutherland, J.A. Bloomfield, L.W. Eichler and C.W. Boylen. 1991. Decline of native vegetation under a canopy of Eurasian watermilfoil. *J. of Aquatic Plant Manage.* 29:94-99.
- VT DEC. 2010. Vermont Department of Environmental Conservation – Lay Monitoring Program. www.anr.state.vt.us/dec/waterq/cfm/lakerep/lakerep_details.cfm
- VT DEC. 2012. Rare and Uncommon Native Vascular Plants of Vermont. Vermont Natural Heritage Inventory. Vermont Fish & Wildlife Department. 21 November 2012
- Rare and Uncommon Native Plants of Vermont.
www.vtfishandwildlife.com/.../List_of_Rare_and_Uncommon_Native_Plants_of_Vermont.pdf

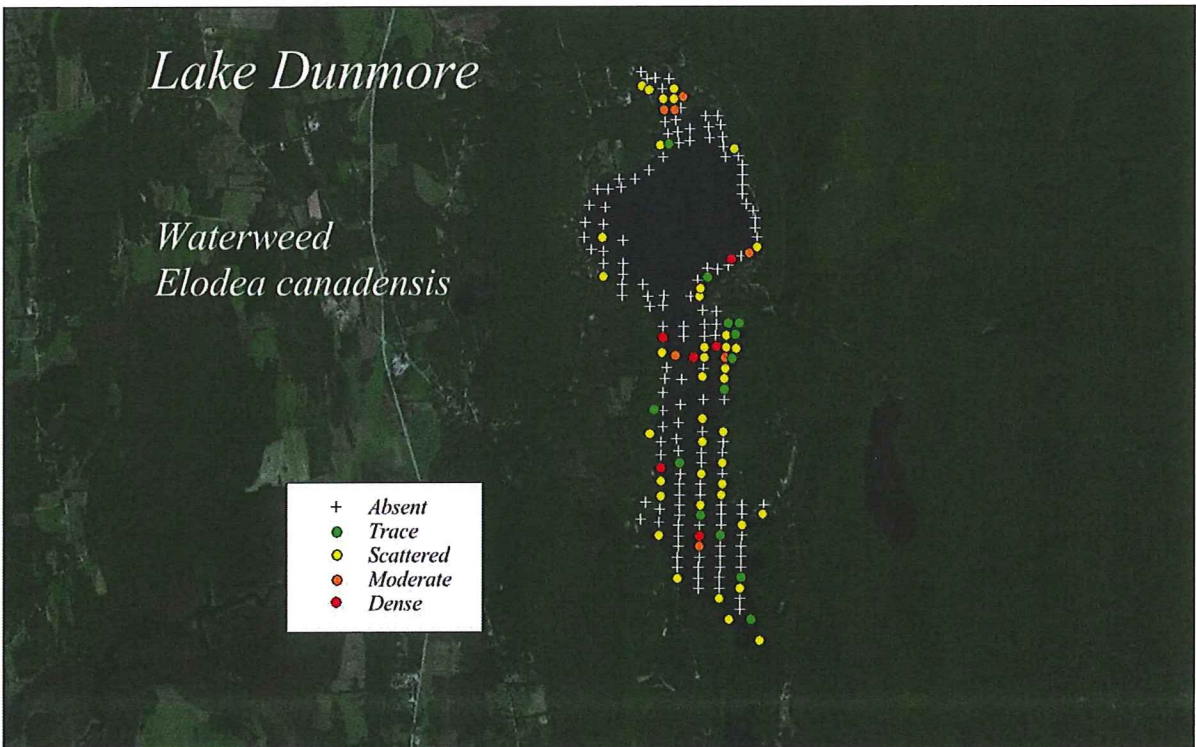
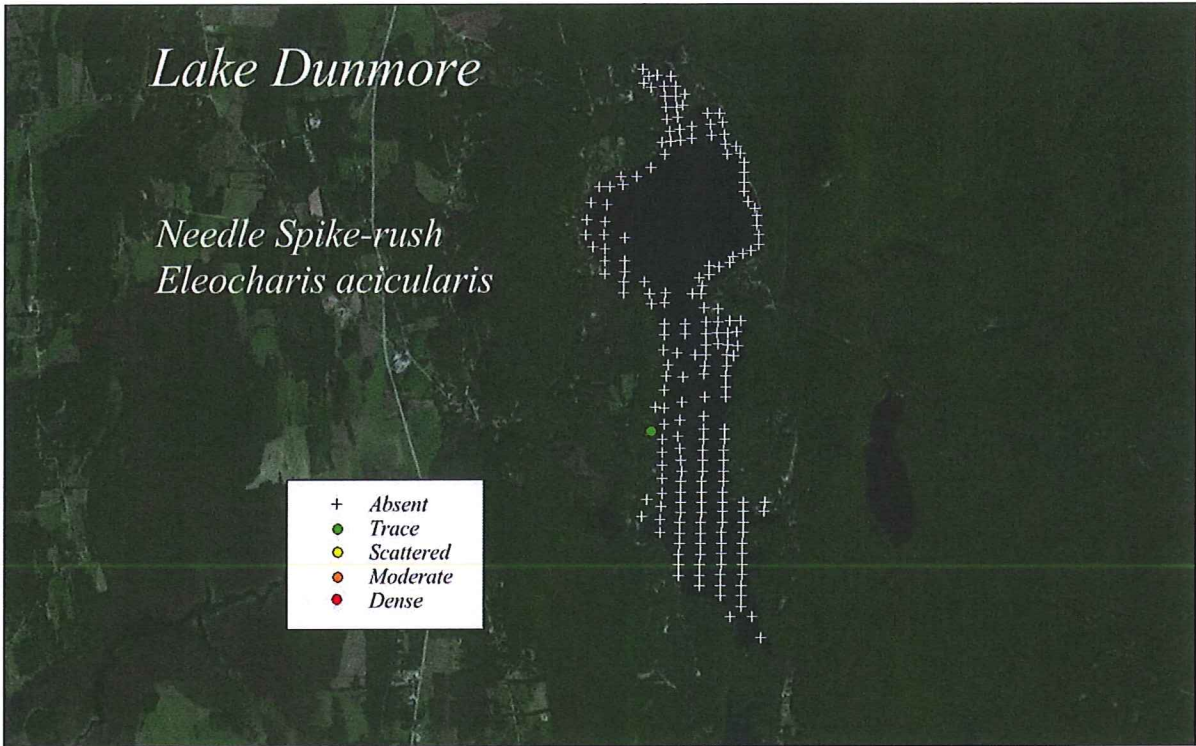
Acknowledgements

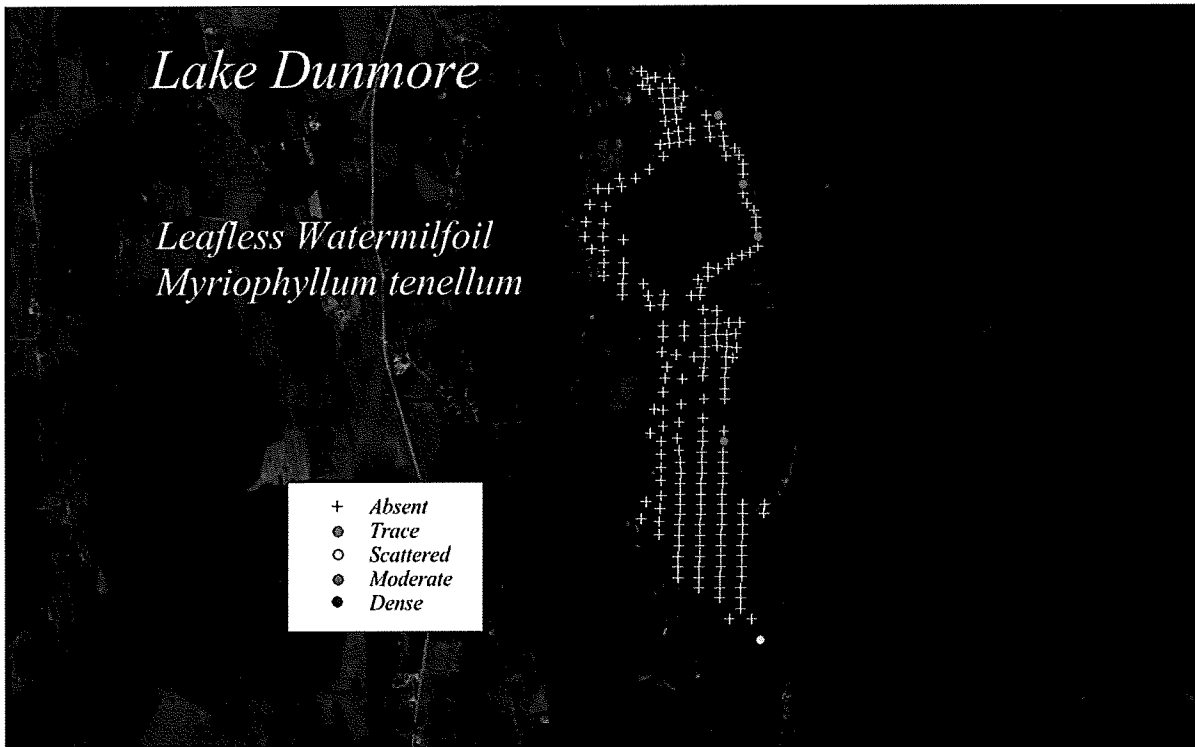
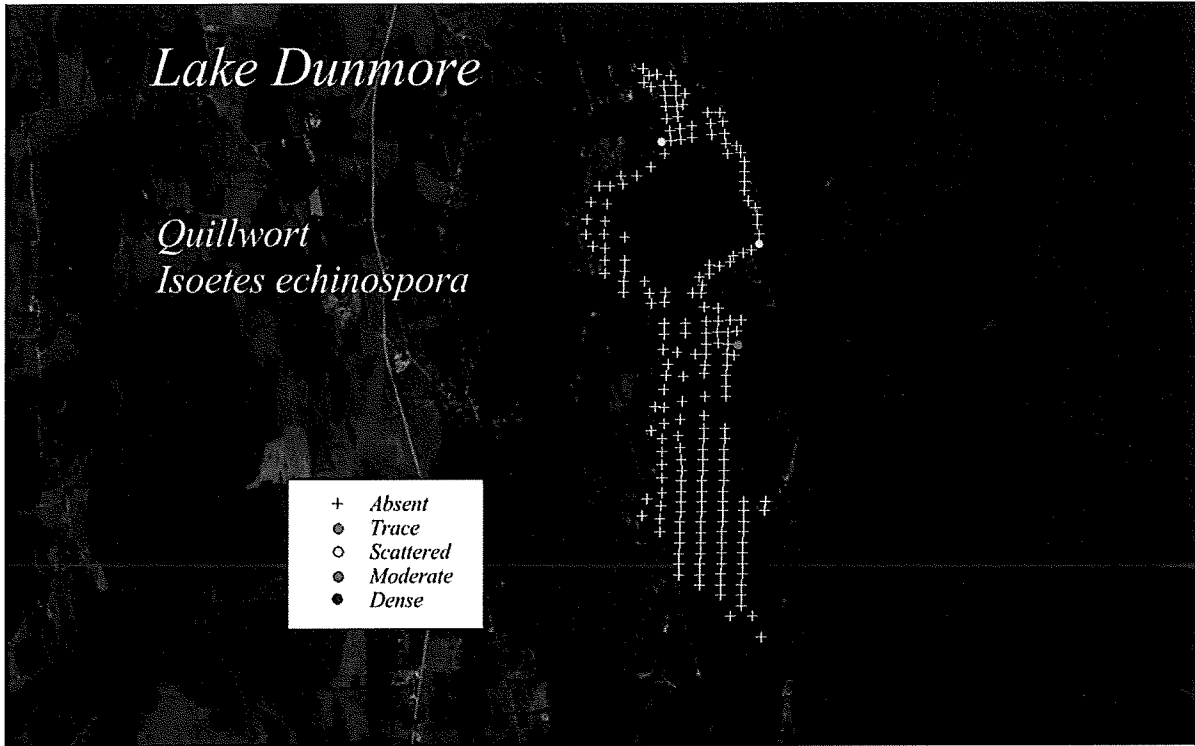
The authors would like to acknowledge Mr. Allen Wilson of the Lake Dunmore Fern Lake Property Owners Association for his assistance in coordinating the current survey project.

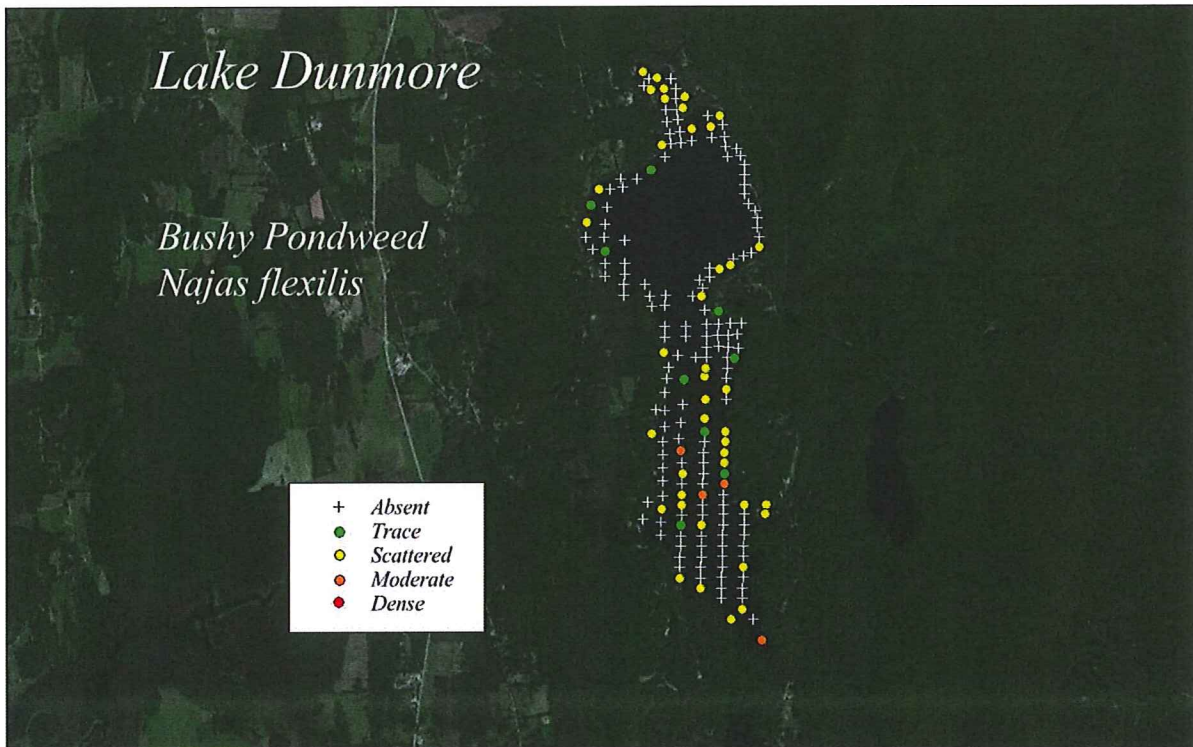
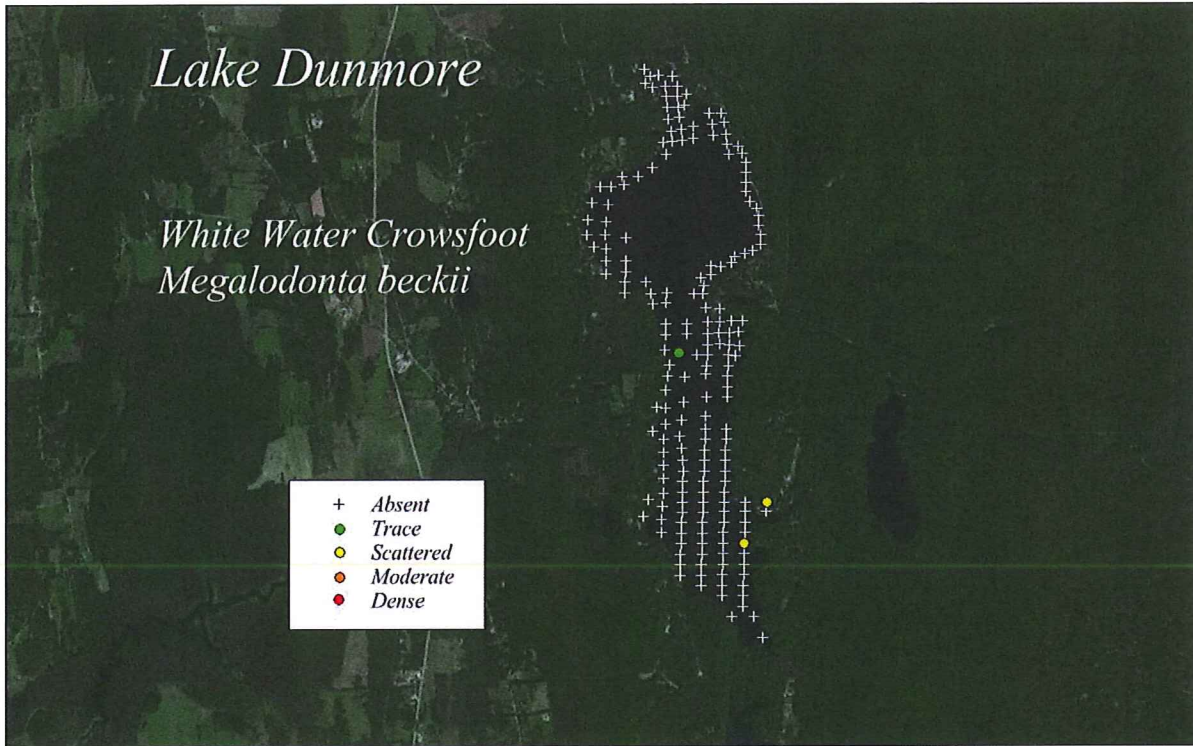
Appendix A
Lake Dunmore Aquatic Plant Distribution Maps

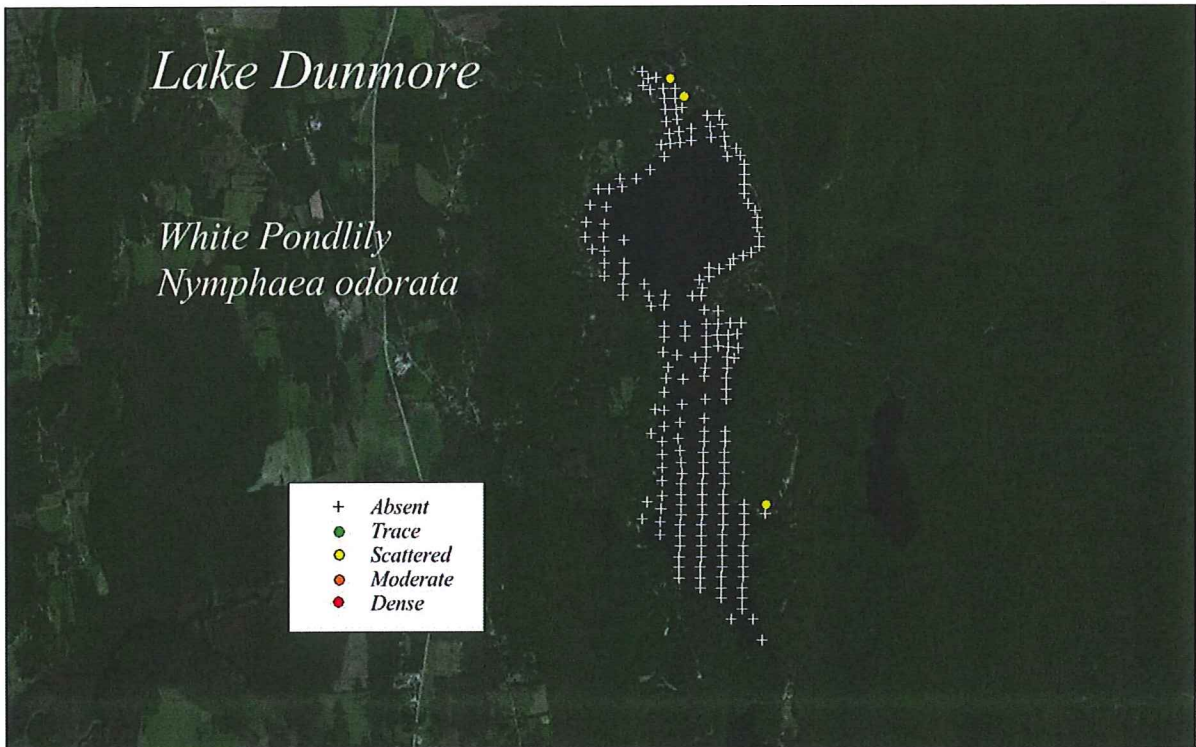
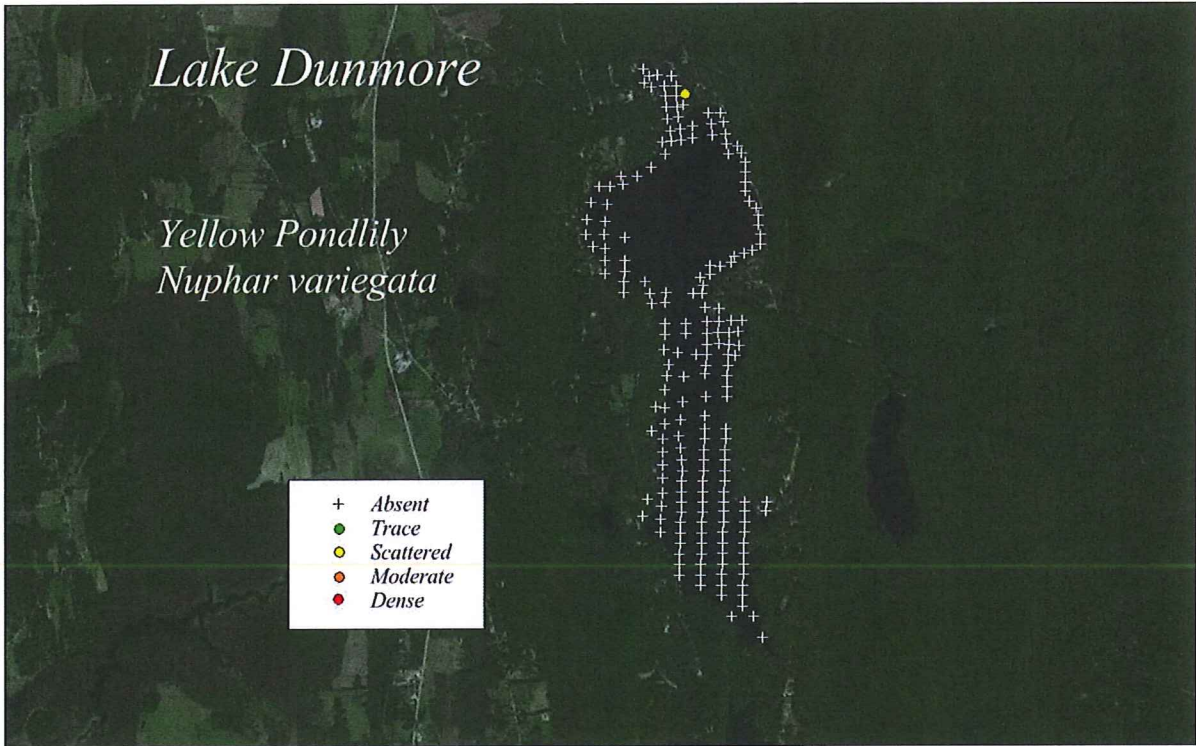


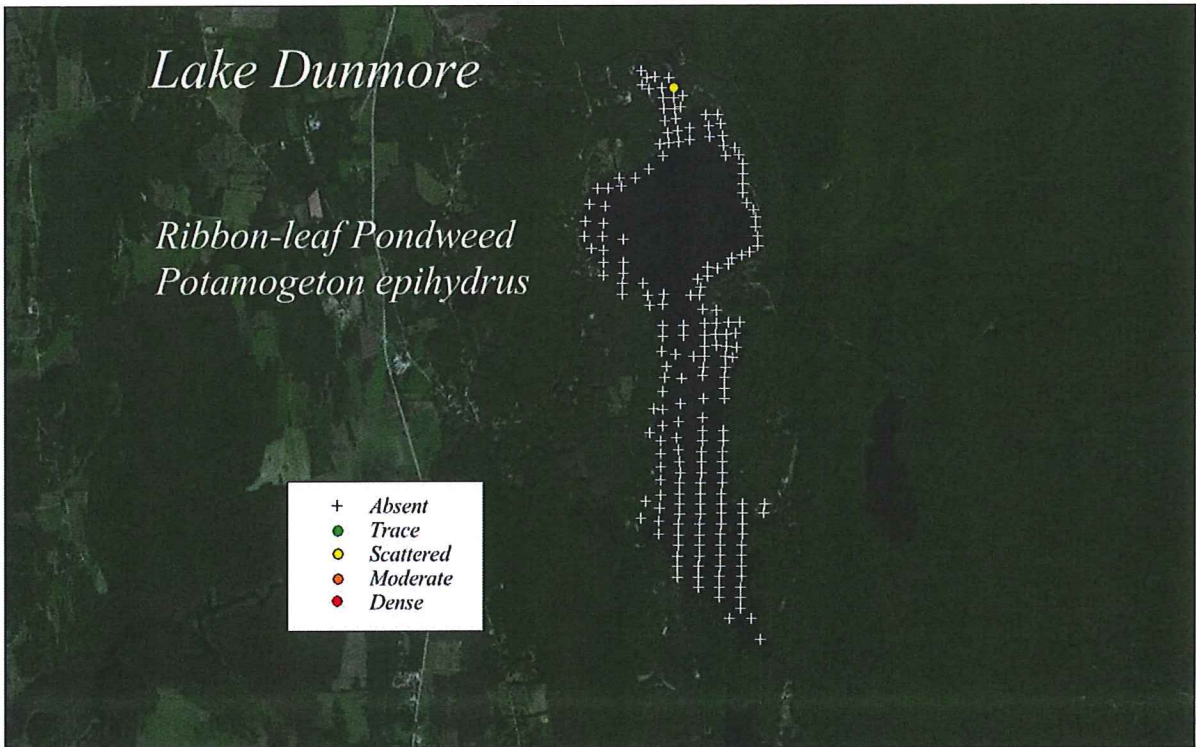
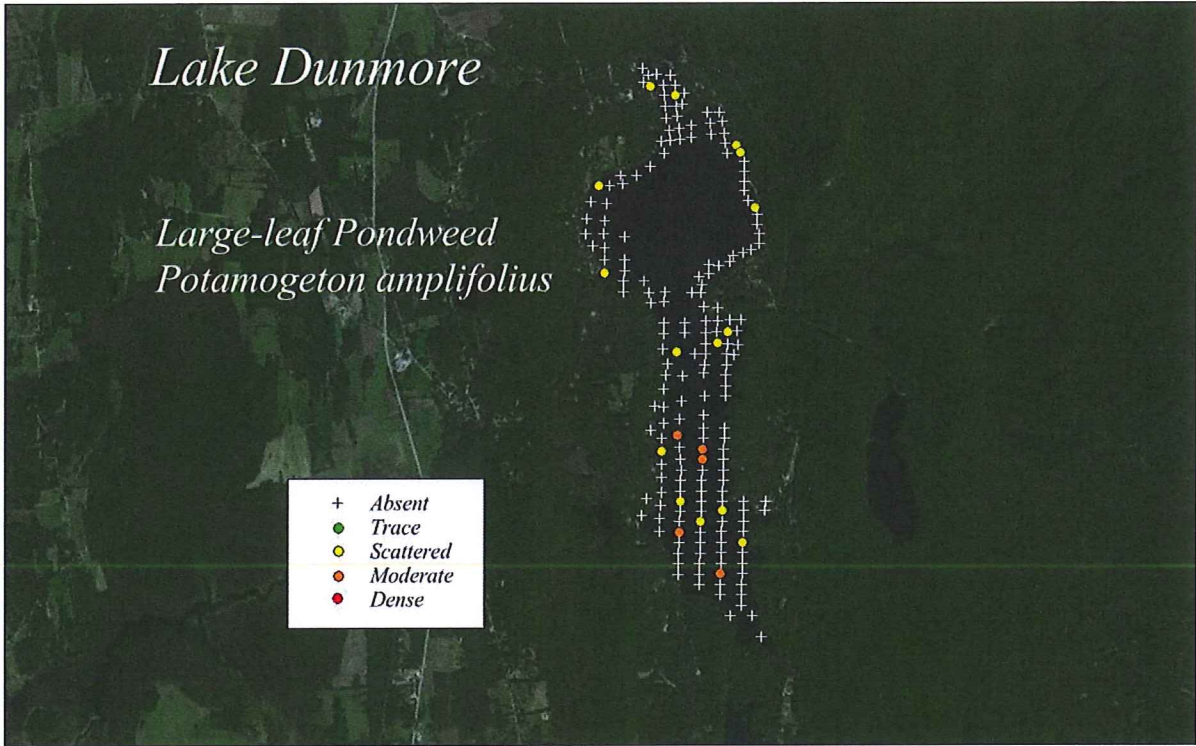


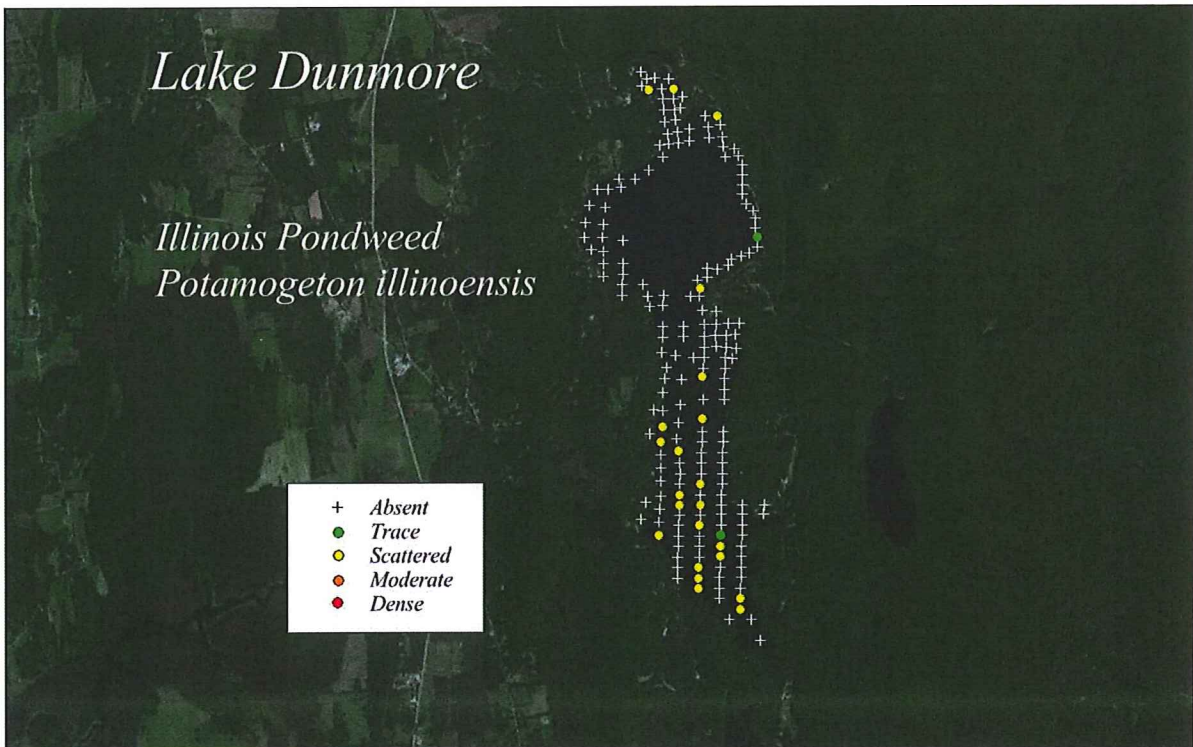
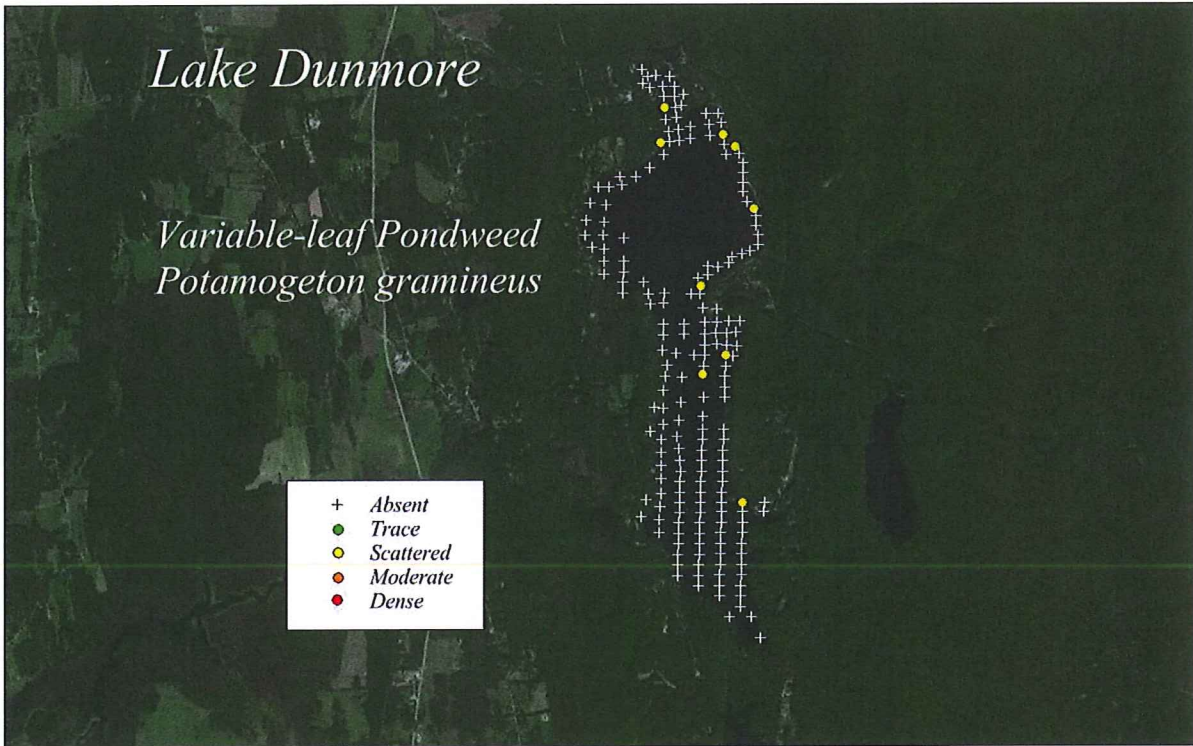


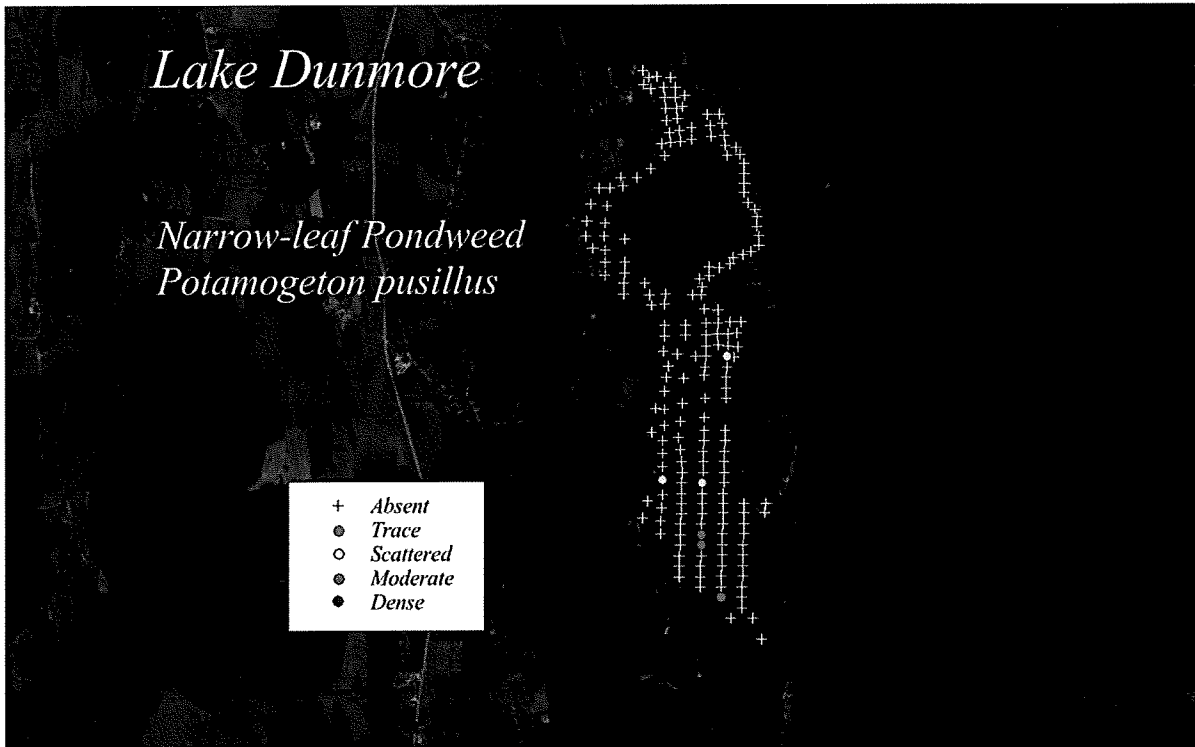
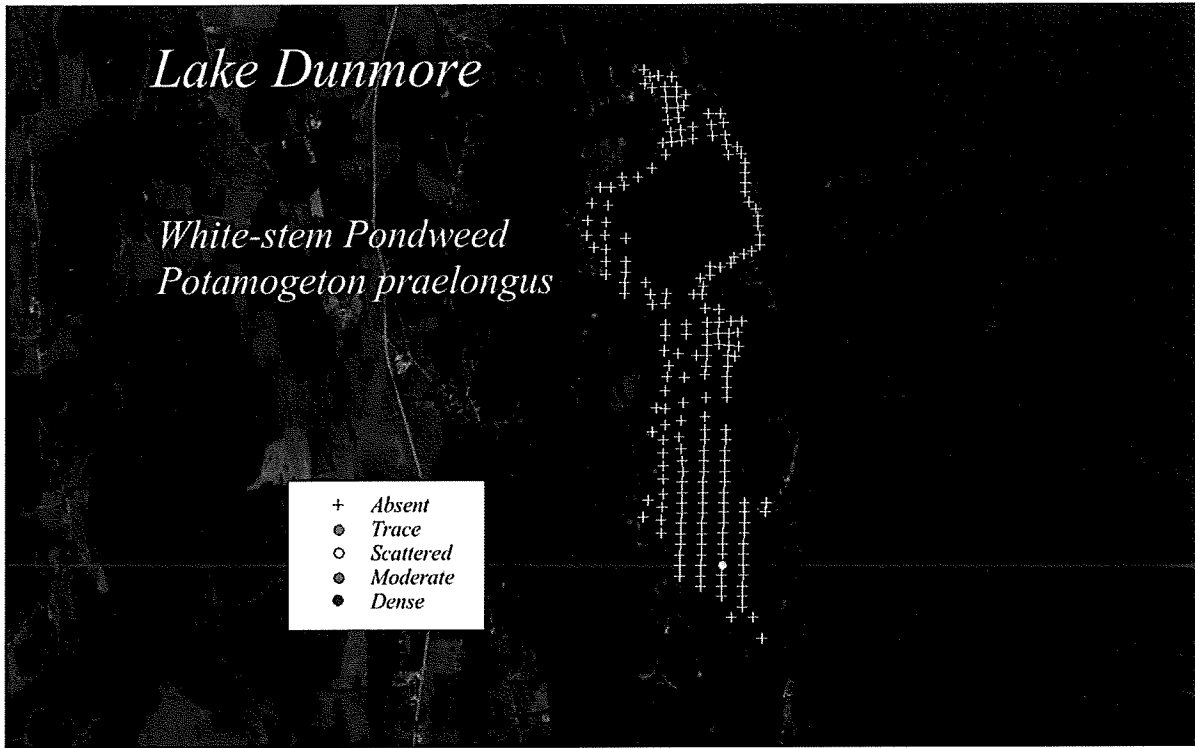


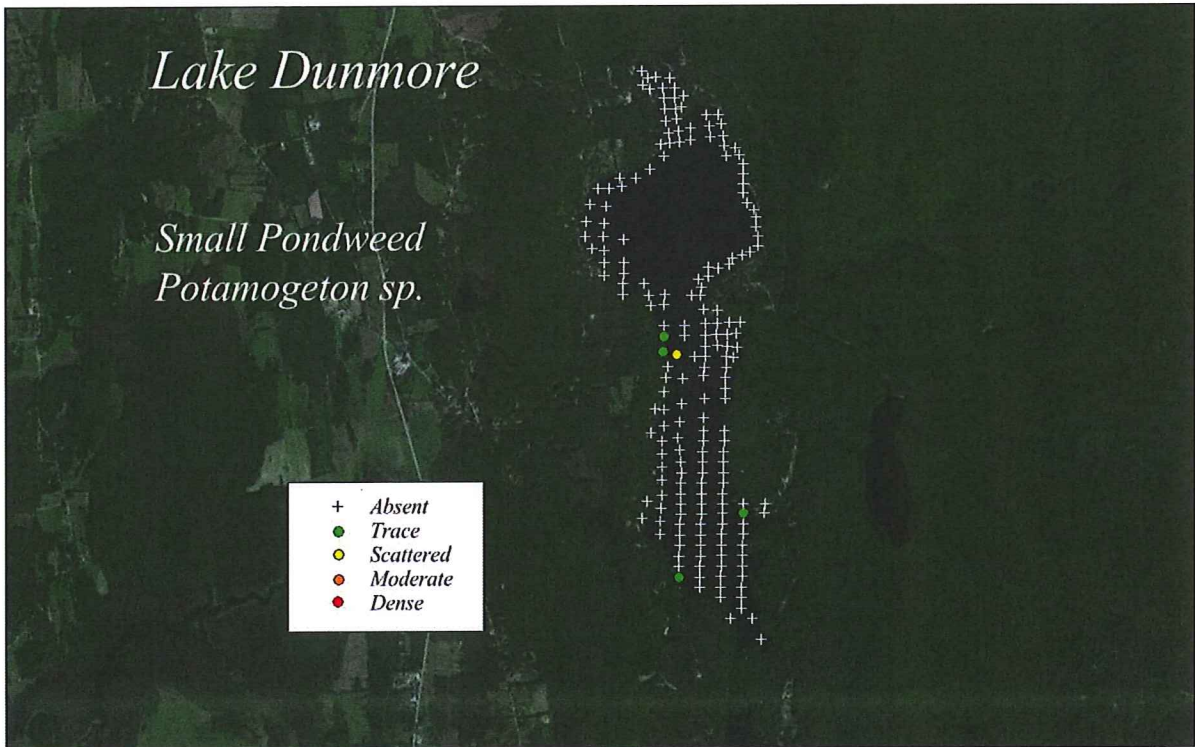
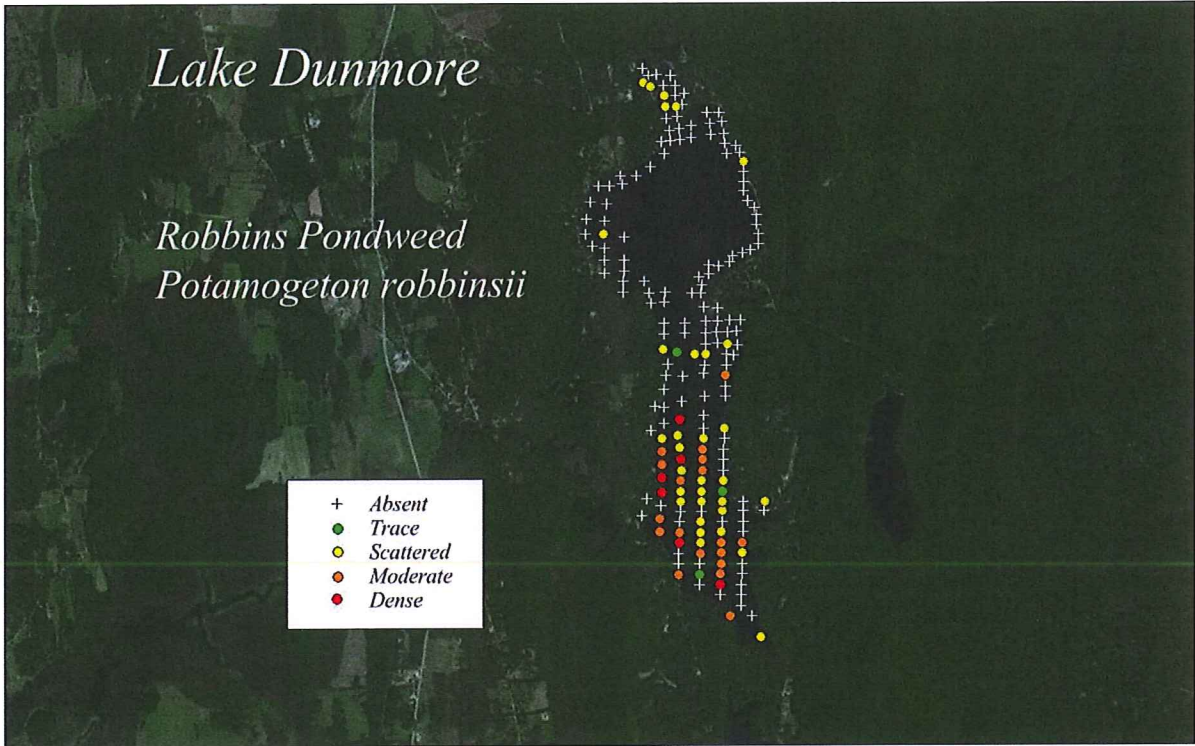


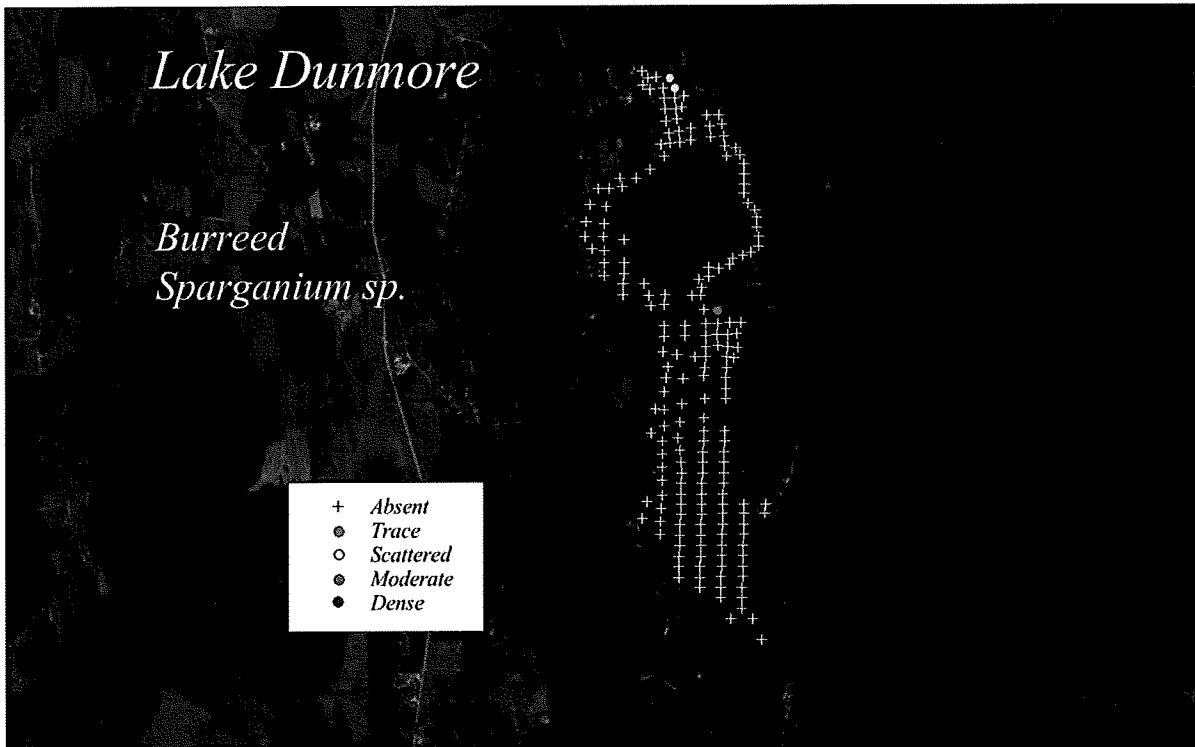
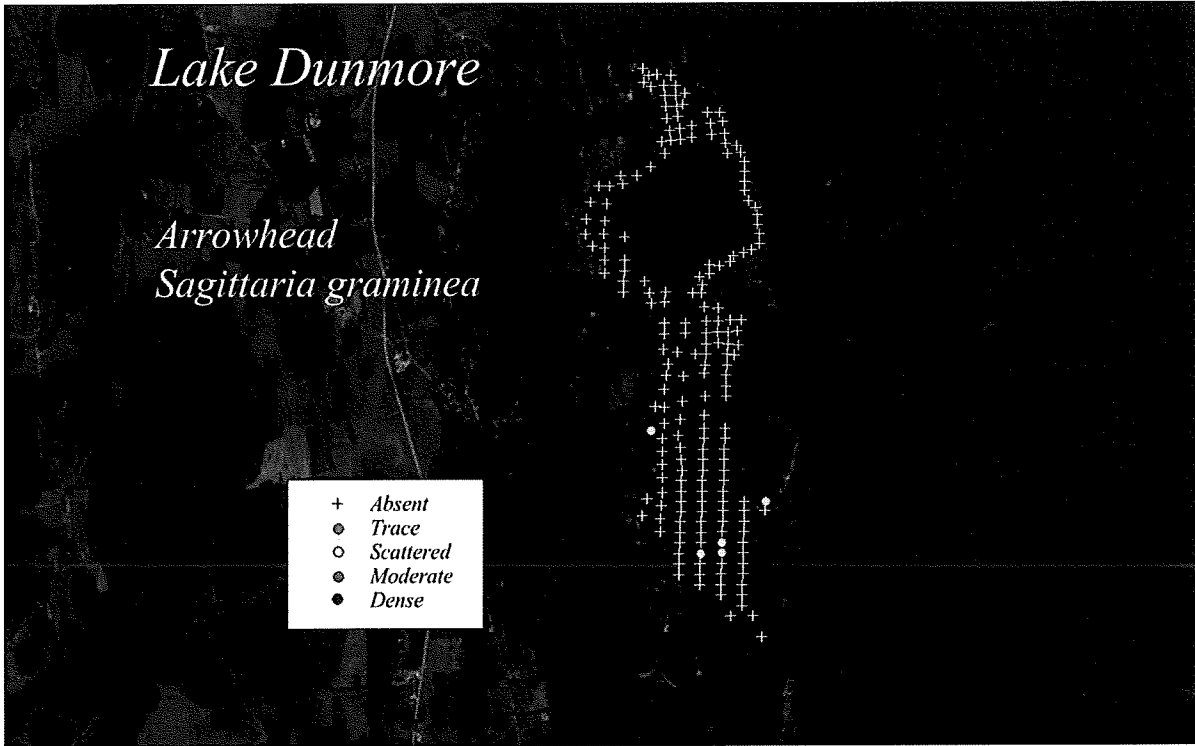


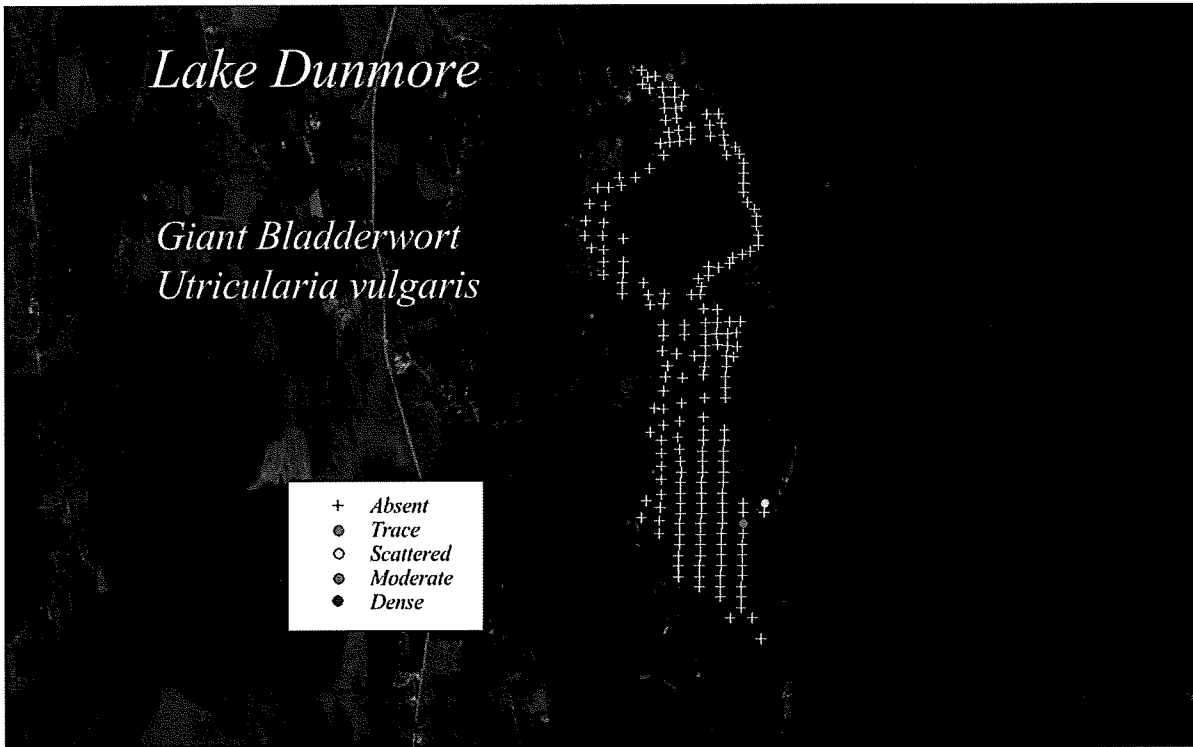
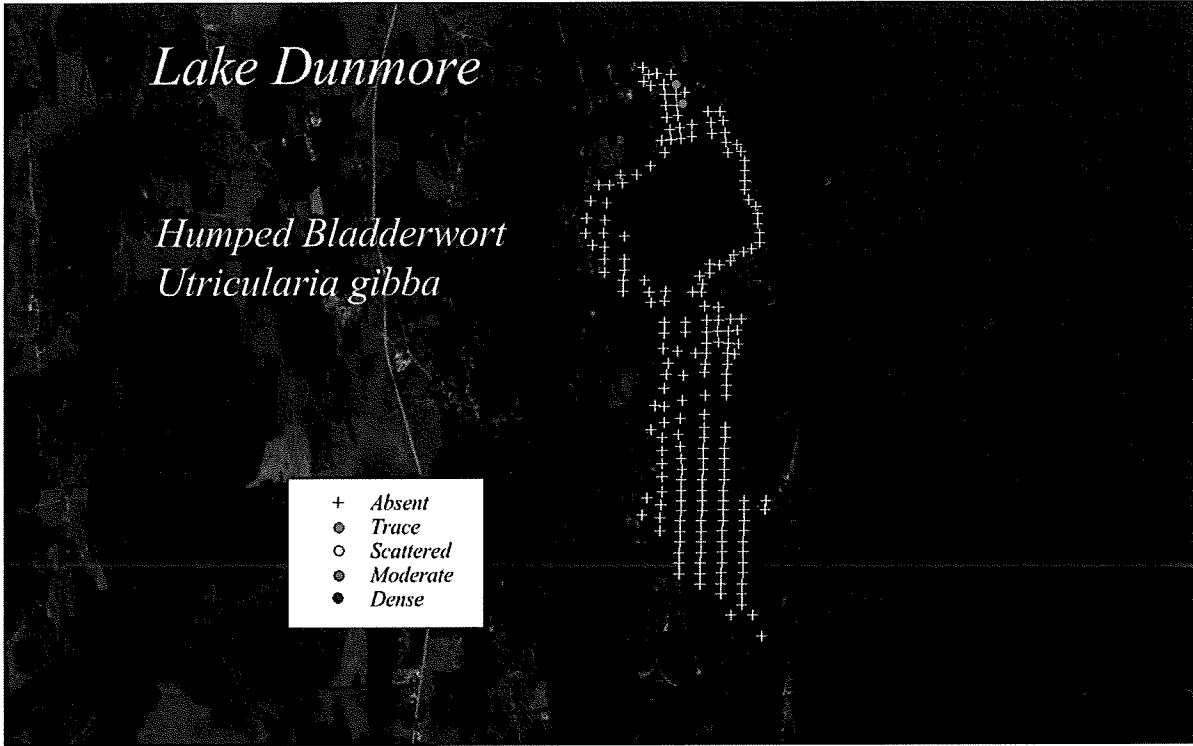


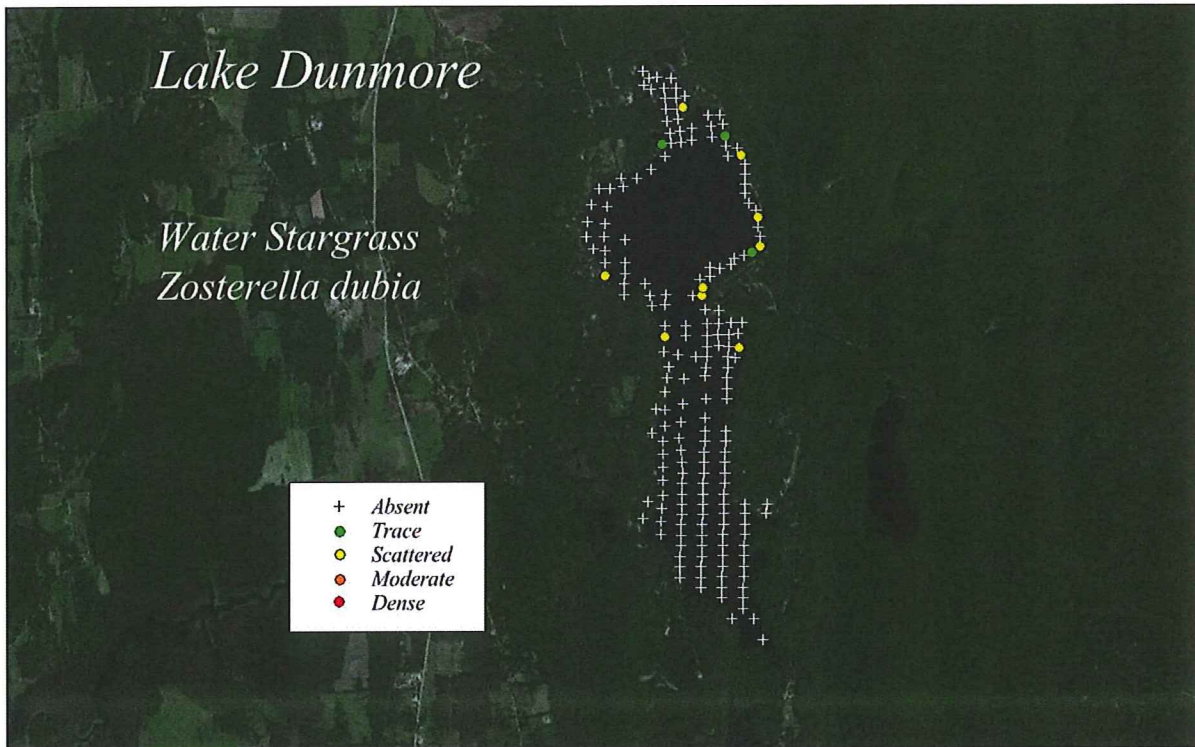
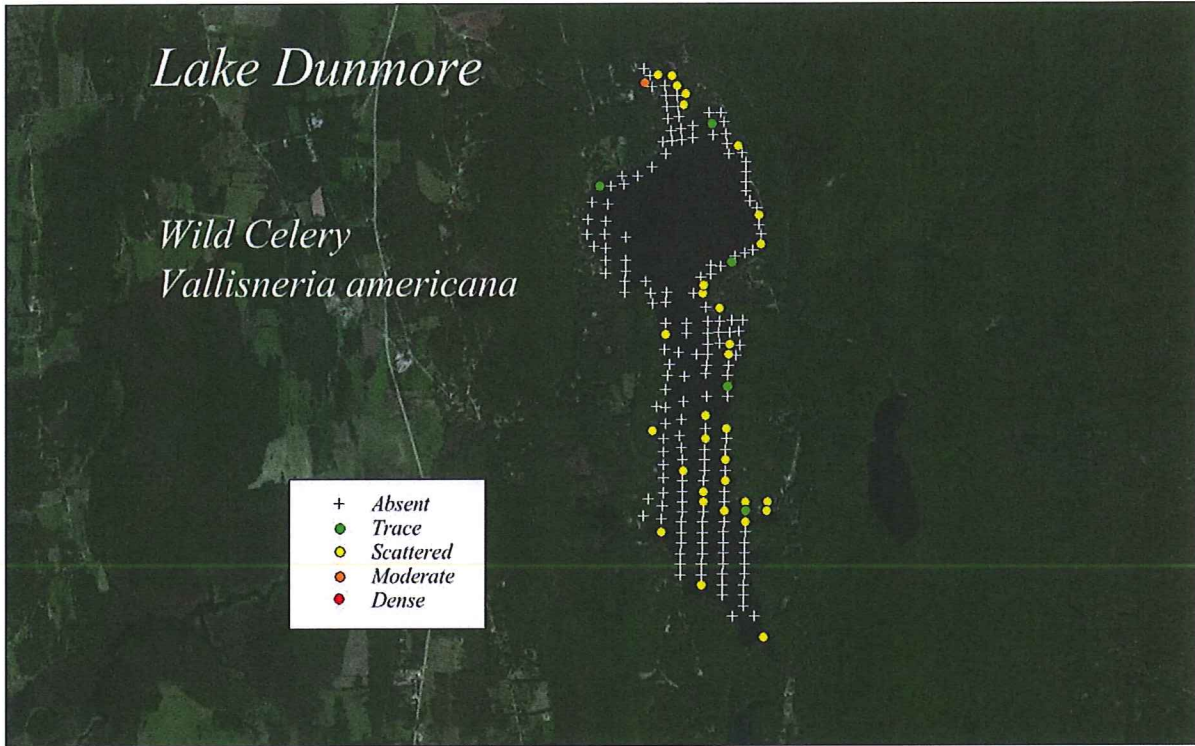












Appendix B

Fern Lake Aquatic Plant Distribution Maps

Fern Lake

*Distribution of Eurasian watermilfoil
Myriophyllum spicatum*

+	<i>Absent</i>
●	<i>Trace</i>
●	<i>Scattered</i>
●	<i>Moderate</i>
●	<i>Dense</i>



Fern Lake

*Distribution of Muskgrass
Chara/Nitella*

+	<i>Absent</i>
●	<i>Trace</i>
●	<i>Scattered</i>
●	<i>Moderate</i>
●	<i>Dense</i>



Fern Lake

*Distribution of Spikerush
Eleocharis acicularis*

+	<i>Absent</i>
●	<i>Trace</i>
●	<i>Scattered</i>
●	<i>Moderate</i>
●	<i>Dense</i>



Fern Lake

*Distribution of Waterweed
Elodea canadensis*

+	<i>Absent</i>
●	<i>Trace</i>
●	<i>Scattered</i>
●	<i>Moderate</i>
●	<i>Dense</i>



Fern Lake

*Distribution of Bushy Pondweed
Najas flexilis*

+	<i>Absent</i>
●	<i>Trace</i>
●	<i>Scattered</i>
●	<i>Moderate</i>
●	<i>Dense</i>



Fern Lake

*Distribution of Yellow Pondlily
Nuphar variegata*

+	<i>Absent</i>
●	<i>Trace</i>
●	<i>Scattered</i>
●	<i>Moderate</i>
●	<i>Dense</i>



Fern Lake

*Distribution of White Pondlily
Nymphaea odorata*

- | | |
|---|------------------|
| + | <i>Absent</i> |
| ● | <i>Trace</i> |
| ● | <i>Scattered</i> |
| ● | <i>Moderate</i> |
| ● | <i>Dense</i> |

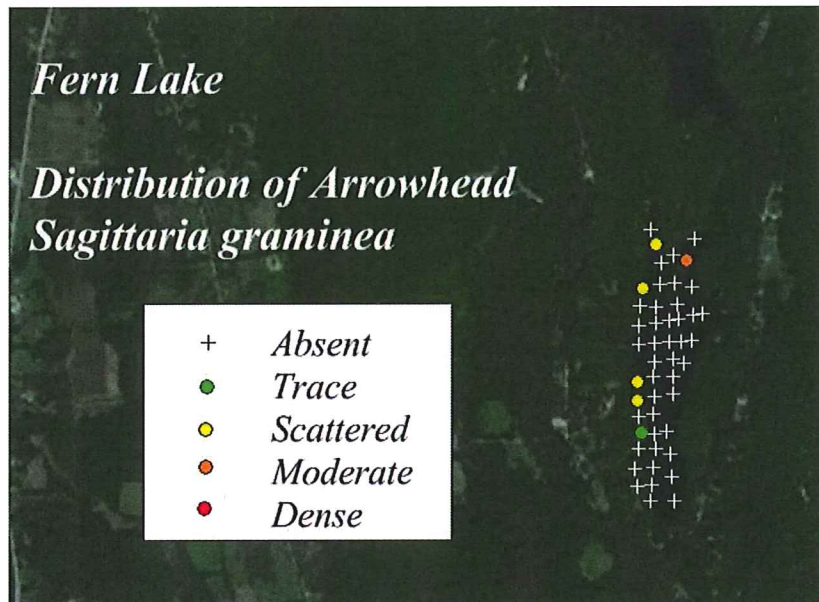
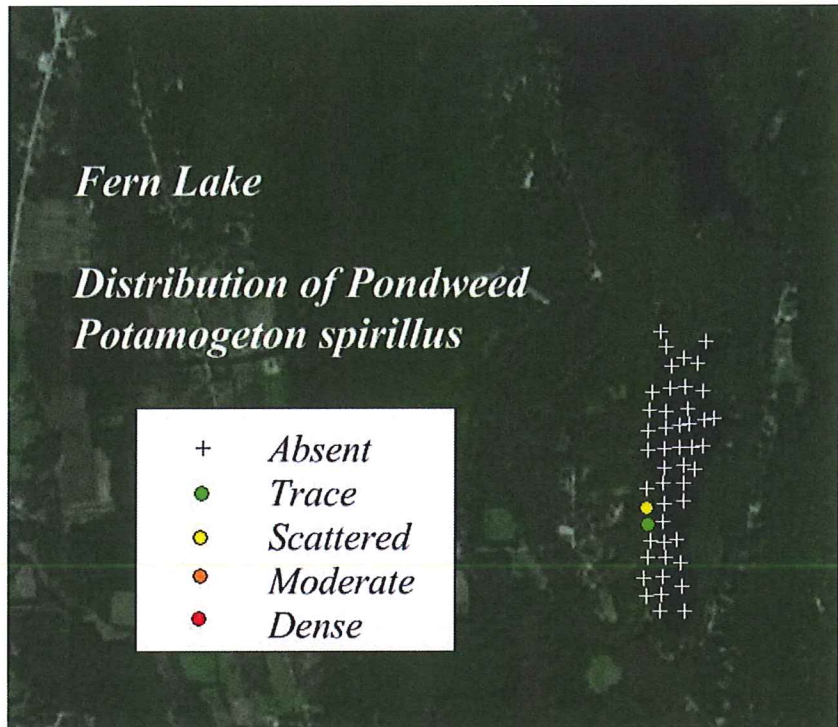


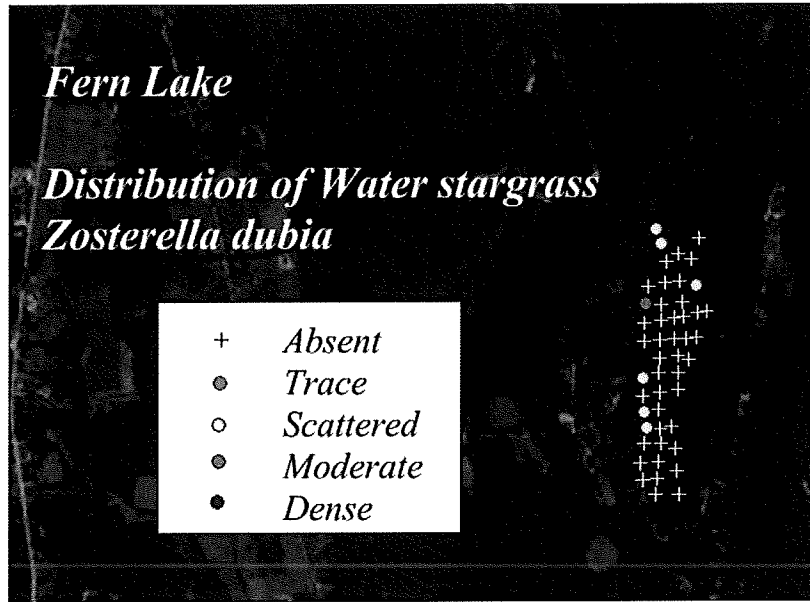
Fern Lake

*Distribution of Illinois Pondweed
Potamogeton illinoensis*

- | | |
|---|------------------|
| + | <i>Absent</i> |
| ● | <i>Trace</i> |
| ● | <i>Scattered</i> |
| ● | <i>Moderate</i> |
| ● | <i>Dense</i> |









Lake George, New York
Adirondack Field Station at Bolton Landing

Aquatic Vegetation of Lake Dunmore and Fern Lake, Salisbury, Vermont

Prepared By

Lawrence Eichler
Research Scientist

Darrin Fresh Water Institute
5060 Lakeshore Drive
Bolton Landing, NY 12814
(518) 644-3541 (voice) (518) 644-3640 (fax)
eichll@rpi.edu

November 13, 2015
DFWI Technical Report 2015-6

TABLE OF CONTENTS

Background	.....	1
Methods	.....	1
Survey Sites	.....	1
Species List and Herbarium Specimens	.....	2
Point Intercept Survey	.....	3
Results and Discussion		
Lake Dunmore Survey	.....	4
Fern Lake Survey	.....	9
Summary	.....	13
References	.....	16
Acknowledgements	.....	16
Appendix A. Lake Dunmore aquatic plant distribution maps	.....	A-1
Appendix B. Fern Lake aquatic plant distribution maps	.....	B-1

List of Tables

	Page
Table 1 Species list for Lake Dunmore and Fern Lake	6
Table 2 Lake Dunmore percent frequency of occurrence data.	8
Table 3 Lake Dunmore species richness comparison.	10
Table 4 Fern Lake percent frequency of occurrence data.	12
Table 5 Fern Lake species richness comparison.	14

List of Figures

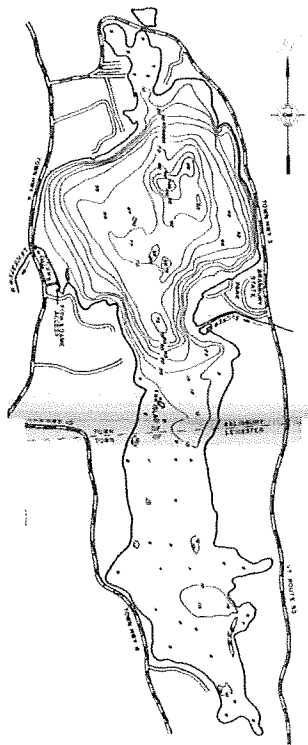
	Page
Figure 1 Eurasian watermilfoil harvest in Lake Dunmore and Fern Lake	2
Figure 2 Eurasian watermilfoil harvesting effort in 2015	3
Figure 3 Map of Lake Dunmore with point intercept survey locations	4
Figure 4 Map of Fern Lake with point intercept survey locations	4
Figure 5 Depth distribution of Lake Dunmore sampling points in 1 meter depth classes	5
Figure 6 Lake Dunmore frequency of occurrence summaries for sampling points of all water depths	9
Figure 7 Lake Dunmore frequency of occurrence summaries for sampling points less than 5 meters water depth	9
Figure 8 Lake Dunmore species richness for native species in open-lake surveys	10
Figure 9 Depth distribution of Fern Lake sampling points in 1 meter depth classes.	11
Figure 10 Fern Lake frequency of occurrence summaries for sampling points of all water depths	12
Figure 11 Fern Lake frequency of occurrence summaries for sampling points within the littoral zone (<5 m water depth)	13
Figure 12 Fern Lake species richness for native species	14
Figure 13 Distribution of Eurasian watermilfoil in Lake Dunmore	15
Figure 14 Distribution of Eurasian watermilfoil in Fern Lake.....	16

Background.

At the request of Mr. Chip Paison of the Lake Dunmore Fern Lake Association, quantitative aquatic plant surveys were undertaken in September of 2015 for Lake Dunmore and Fern Lake, Vermont. The surveys consisted of frequency of occurrence and relative abundance data for all aquatic plant species present in points distributed throughout both lakes, largely duplicating a survey conducted in 2014 (Eichler and Boylen 2014). The Point-Intercept Rake Toss method presently used by the US Army Corps of Engineers and others was employed. The assessment included the distribution and density of existing aquatic plant communities, the extent of exotic species infestation and a review of ongoing management efforts to control Eurasian watermilfoil (*Myriophyllum spicatum*).

Methods

Survey Sites



Lake Dunmore. Lake Dunmore is located in Addison County, in the towns of Salisbury and Leicester. The lake has a surface area of approximately 985 acres. Lake Dunmore has a single outlet with a control structure to maintain lake level. Average water depth is reported to be 28 ft, with a maximum depth of 105 ft (VT DEC 2014). Secchi disk transparency is reported to be 20 ft (6.2 m; VT DEC 2013). Eurasian watermilfoil (*Myriophyllum spicatum*) populations were first confirmed in 1988 (LDFLA 2014). A barrier was installed to contain fragments and Eurasian watermilfoil was removed by volunteers. Within a few years, a second infestation was discovered at the north end of the lake and in 1994 the current management program was initiated. Hand harvesting by skin and SCUBA divers has been the basis of the program for most years with use of diver operated suction harvesting in recent years. While there is a general sense that management efforts are controlling Eurasian watermilfoil, the level of effort to achieve control has continued to expand. By 2013, over 3600 bushels of Eurasian watermilfoil were being harvested by 2 suction harvesting teams (Figure 1). In 2015, harvesting had expanded to 4 suction harvesting teams with a substantial increase in effort and cost (Figure 2).

Fern Lake. Fern Lake is a 69 acre waterbody located in the town of Leicester, Vermont. Eurasian watermilfoil was first detected in Fern Lake in 1996, when a single milfoil plant was found and removed (VTDEC 2011). Eurasian watermilfoil was detected again in 2003, when 36 plants were removed. Since that time the population of Eurasian watermilfoil has expanded substantially. Harvesting has occurred in Fern Lake every year since 2003 with diver operated suction harvesting employed since 2010. In 2013, the aquatic weevil population of Fern Lake was augmented as an additional control measure (Ritter 2013). In addition to weevil augmentation, hand and suction harvesting removed a total of 1800 bushels of Eurasian

watermilfoil in 2013 (Figure 1). The effort in person*days had greatly expanded by 2015 (Figure 2).

Figure 1. Eurasian watermilfoil harvest from Lake Dunmore and Fern Lake.

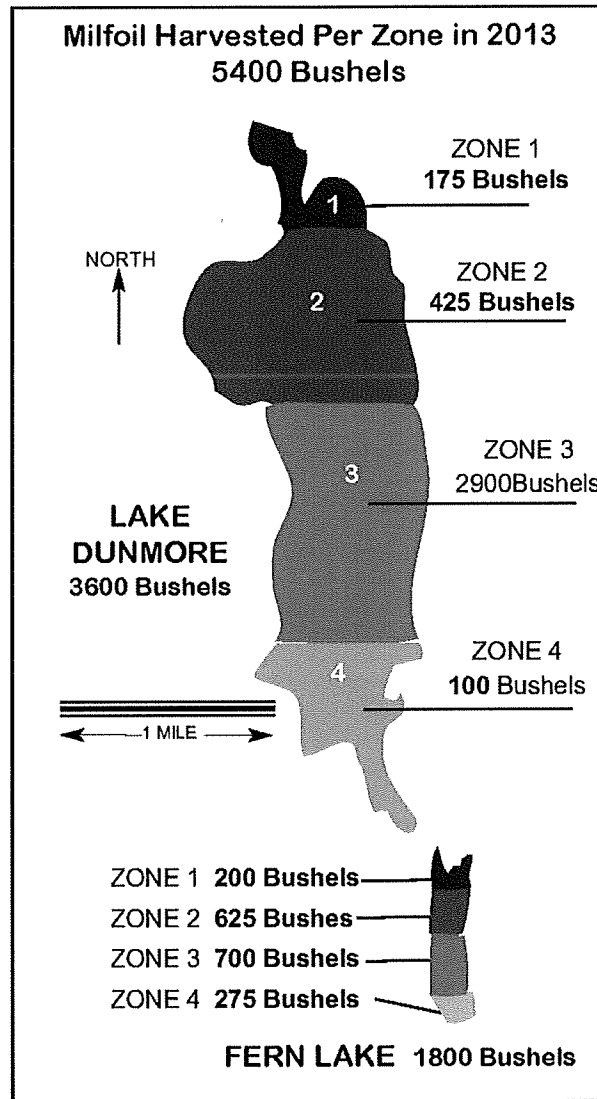


Figure 3. Map of Lake Dunmore with point intercept survey locations for 2015.

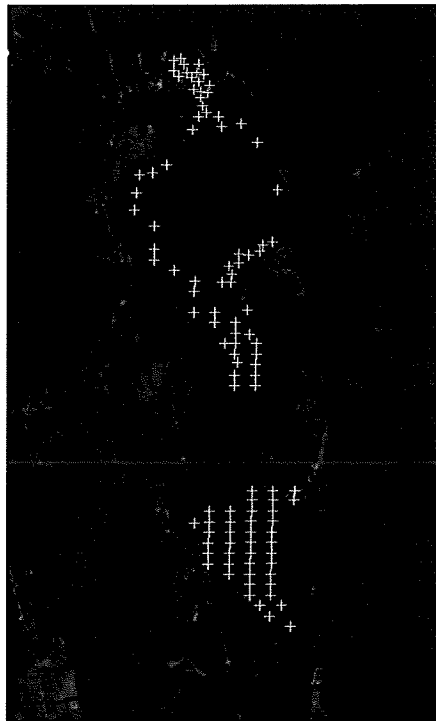
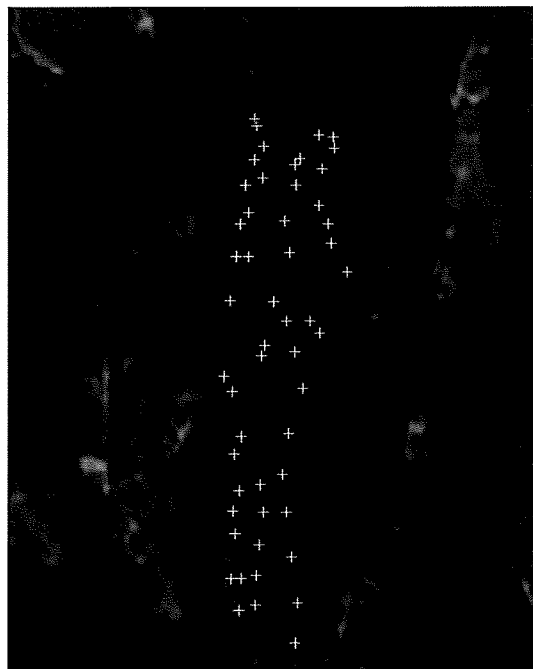


Figure 4. Map of Fern Lake with point intercept survey locations for 2015.



Species List and Herbarium Specimens. As the lakes were surveyed, the occurrence of each aquatic plant species observed in the lake was recorded and adequate herbarium specimens were collected. The herbarium specimens were returned to the Darrin Fresh Water Institute, where they were pressed, dried, and mounted (Hellquist 1993). A number of species which were collected as reference specimens for each lake were not found in line intercept or wetland transect surveys.

Point Intercept Surveys. The frequency and diversity of aquatic plant species were evaluated using a point intercept method (Madsen 1999). At each grid point intersection, all species located at that point were recorded, as well as water depth. Species were located by a visual inspection of the point and by deploying a rake to the bottom, and examining the plants retrieved. A total of 54 points were selected for Fern Lake, and 106 points were surveyed for Lake Dunmore, based on a 100 m grid. A global positioning system (GPS) was used to navigate to each point for the survey observation. Point intercept plant frequencies were surveyed on September 3, 2015 at a time of maximum aquatic plant abundance.

Results and Discussion

Lake Dunmore Survey Results

In September of 2015, the aquatic plant community of Lake Dunmore included twenty-one submersed species, four floating-leaved species, six emergent species and one floating species (Table 1) and included some species observed but not collected in the point intercept survey. Twenty-three species were present in the point intercept portion of the 2015 survey, slightly less than the 27 reported in 2014. Combining the results of the 2014 and 2015 surveys, a total of 32 species of aquatic plants have been reported for Lake Dunmore. This number of species greatly

Table 1. Species lists for Lake Dunmore and Fern Lake.

<i>Species</i>	Common Name	Lake Dunmore	Fern Lake
<i>Brasenia schreberi</i> J.F. Gmel	watershield	fl	
<i>Ceratophyllum demersum</i> L.	coontail	s	
<i>Chara/Nitella</i> sp.	muskgrass, chara	s	s
<i>Eleocharis acicularis</i> (L.) Roemer & Schultes	needle spike-rush	e	e
<i>Elodea canadensis</i> Michx.	waterweed	s	s
<i>Fontinalis</i> sp.	moss	s	
<i>Isoetes echinospora</i> Dur.	quillwort	e	
<i>Lemna minor</i>	duckweed	f	
<i>Megalodonta beckii</i> Torr.	white water crowsfoot	s	
<i>Myriophyllum tenellum</i> L.	leafless watermilfoil	s	
<i>Myriophyllum spicatum</i> L.	Eurasian watermilfoil	s	s
<i>Najas flexilis</i> (Willd.) Rostk. & Schmidt.	bushy pondweed	s	s
<i>Nuphar variegata</i> Engelm. ex Durand	yellow pondlily	fl	fl
<i>Nymphaea odorata</i> Ait.	white pondlily	fl	fl
<i>Nymphoides cordatum</i> (Ell.) Fern.	floating heart	fl	
<i>Polygonum amphibium</i> L.	Water smartweed		e
<i>Pontederia cordata</i> L.	pickerelweed	e	e
<i>Potamogeton amplifolius</i> Tuckerm.	largeleaf pondweed	s	
<i>Potamogeton epihydrus</i> Raf.	variable-leaf pondweed	s	
<i>Potamogeton gramineus</i> L.	small pondweed	s	
<i>Potamogeton illinoensis</i> Morong	Illinois pondweed	s	s
<i>Potamogeton praelongus</i> Wulf.	White-stem pondweed	s	s
<i>Potamogeton pusillus</i> L.	Narrow-leaf pondweed	s	s
<i>Potamogeton robbinsii</i> Oakes	Robbins pondweed	s	
<i>Potamogeton spirillus</i> Tuckerm.	pondweed		s
<i>Sagittaria graminea</i> Michx.	arrowhead	s	s

<i>Species</i>	Common Name	Lake Dunmore	Fern Lake
<i>Scirpus sp.</i>	rush	e	
<i>Sparganium sp.</i>	burreed	e	
<i>Typha</i>	cattail	e	e
<i>Utricularia gibba</i> Hayne	bladderwort	s	
<i>Utricularia vulgaris</i> L.	giant bladderwort	s	
<i>Vallisneria americana</i> L.	wild celery	s	
<i>Zosterella dubia</i> (Jacq.) Small	water stargrass	s	s

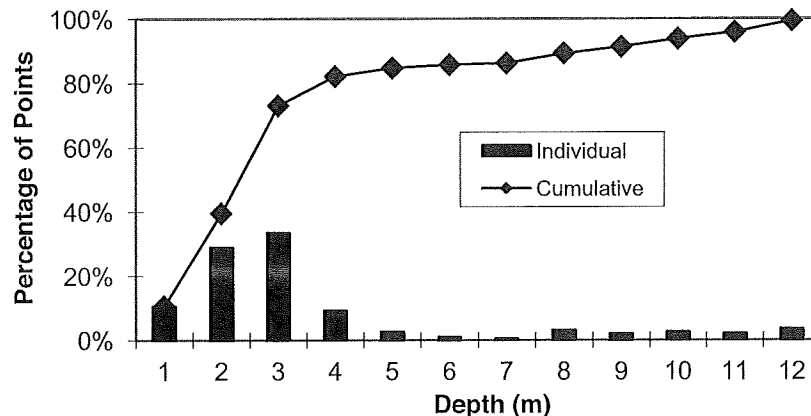
fl=floating leaved e=emergent s=submersed

exceeds the 15 species typically reported for moderately productive lakes in our region and indicates good water quality and a variety of habitat types. Eurasian watermilfoil (*Myriophyllum spicatum*) was the only exotic species reported. Species richness was quite high, with a number of species occurring in more than 5% of survey points (Table 2). Waterweed (*Elodea canadensis*) was the most common plant (33% of survey points). Eurasian watermilfoil (*Myriophyllum spicatum*) was present in 27% of survey points, an increase from the 18% of survey points reported in 2014. This increase may be an artifact of a change in the survey to focus on areas known to support Eurasian watermilfoil. Comparing only the points from both 2014 and 2015, a small decline from 30% of survey points in 2014 to 27% in 2015 was reported. One of the species present in Lake Dunmore, Humped Bladderwort (*Utricularia gibba*) is found on Vermont’s rare plant list (VT DEC 2012).

Maximum Depth of Colonization

Maximum depth of rooted aquatic plant growth was similar for the two lakes, with the littoral zone extending to a depth of approximately 5.0 meters. Specimens of *Chara* sp. were observed in a single sample from 7 m depth. The extensive shallow areas at the south end of Lake Dunmore are responsible for the predominance of sample points in water depths less than 5 meters.

Figure 5. Depth Distribution of Lake Dunmore Sampling Points in 1 meter depth classes.



Species Lists

Maps of the distribution of aquatic plant species for Lake Dunmore are included in Appendix A. Frequency of occurrence results are presented in Table 2. Waterweed (*Elodea canadensis*) was the most common plant (33% of survey points). Eurasian watermilfoil (*Myriophyllum spicatum*) was present in 27% of survey points. Other common native species for Lake Dunmore included *Potamogeton robbinsii* (29% of survey points), *Najas flexilis* (25%), *Chara/Nitella* (26%), *Vallisneria americana* (22%), *Potamogeton illinoensis* (17%) *Potamogeton amplifolius* (15%), and *Zosterella dubia* (7%). Native species results are comparable to those reported in 2014 with differences primarily in the less common species.

Table 2. Lake Dunmore percent frequency of occurrence data.

Species	Common Name	2014	2015
<i>Brasenia schreberi</i>	watershield	1.0%	
<i>Chara/Nitella</i>	Muskgrass	26.5%	25.5%
<i>Ceratophyllum demersum</i>	Coontail	0.5%	0.9%
<i>Eleocharis acicularis</i>	Spikerush	0.5%	1.9%
<i>Elodea canadensis</i>	Waterweed	33.7%	33.0%
<i>Isoetes echinospora</i>	Quillwort	1.5%	
<i>Megalodonta beckii</i>	White water crowsfoot	1.5%	1.9%
<i>Lemna minor</i>	Duckweed		0.9%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	18.4%	27.4%
<i>Myriophyllum tenellum</i>	Leafless milfoil	2.6%	0.9%
<i>Najas flexilis</i>	Water naiad	27.6%	24.5%
<i>Nuphar variegata</i>	Yellow water lily	0.5%	1.9%
<i>Nymphaea odorata</i>	White water lily	1.5%	1.9%
<i>Potamogeton amplifolius</i>	Broad-leaf pondweed	10.2%	15.1%
<i>Potamogeton epihydrus</i>	Ribbon-leaf pondweed	0.5%	
<i>Potamogeton pusillus</i>	Narrow-leaf pondweed	3.1%	4.7%
<i>Potamogeton praelongus</i>	White-stem pondweed	0.5%	1.9%
<i>Potamogeton gramineus</i>	Variable pondweed	4.6%	3.8%
<i>Potamogeton illinoensis</i>	Illinois pondweed	12.2%	17.0%
<i>Potamogeton robbinsii</i>	Robbins pondweed	30.1%	29.2%
<i>Potamogeton sp 1</i>	Pondweed	2.6%	0.9%
<i>Sagittaria graminea</i>	Slender arrowhead	2.6%	2.8%
<i>Sparganium sp.</i>	Burred	1.5%	
<i>Stuckenia pectinata</i>	Sago pondweed		0.9%
<i>Utricularia gibba</i>	Humped bladderwort	1.0%	
<i>Utricularia sp. 1</i>	bladderwort	0.5%	
<i>Utricularia vulgaris</i>	Giant bladderwort	1.5%	0.9%
<i>Vallisneria americana</i>	Duck celery	18.9%	21.7%
<i>Zosterella dubia</i>	Water stargrass	6.1%	6.6%

Sixty-nine percent of whole lake sampling points were vegetated by at least one native plant species (Figure 6), 90% of survey points with depths less than 5 m (Figure 7) and 89% of survey points with depths less than 2 meters depth yielded native aquatic plants in 2015. These results are comparable to values reported in 2014 of 73%, 83% and 78% of survey points, respectively. Management efforts appear to have little or no impact on native species populations. In 2015, Eurasian watermilfoil was present in 27% of whole lake survey points, and 51% of survey points less than 5 m water depth, representing the littoral zone or zone of aquatic plant growth. For 2014 survey results, Eurasian watermilfoil was present in 18% of whole lake survey points and 30% of survey points less than 5 m water depth.

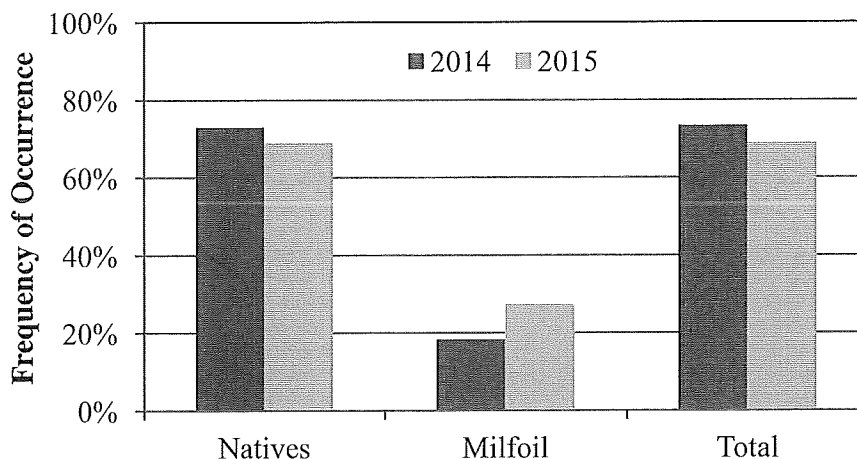


Figure 6. Lake Dunmore frequency of occurrence summaries.

For survey points within the littoral zone, water depth less than 5 m (Figure 7), results similar to whole lake surveys are reported. The expected relationship of greater frequency of occurrence of aquatic plants with shallower water depth is consistent with that reported by other regional studies. Littoral zone frequency of occurrence values (Figure 7) were dominated by native species and similar to nearby lakes (Getsinger et al. 2002).

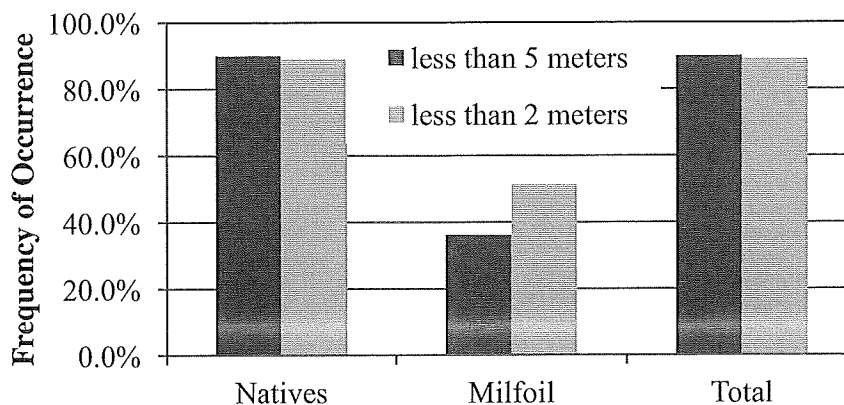


Figure 7. Lake Dunmore frequency of occurrence summaries for sampling points less than 5 and 2 meters water depth.

Species richness results are presented in Table 3 and Figure 8. Whole lake native species richness in 2015 was 1.99 species per sample point and within relative error of the 2014 result (1.93 ± 0.18). Species richness in this range is comparable to other nearby lakes (Eichler et al. 2013) and supports the conclusion that current management efforts are having a minimal impact on native species.

Table 3. Lake Dunmore species richness comparison.

Plant Grouping	Depth Class	Summary Statistic	2014	2015
Native plant species	Whole Lake (all depths)	Mean	1.93	1.99
		N	196	106
		Std. Error	0.12	0.18
	Points with depths <5m	Mean	2.23	2.59
		N	167	80
		Std. Error	0.13	0.19
	Points with depths <2m	Mean	2.31	3.19
		N	78	34
		Std. Error	0.23	0.31
All plant species	Whole Lake (all depths)	Mean	2.12	2.26
		N	196	106
		Std. Error	0.14	0.20
	Points with depths <5m	Mean	3.11	2.95
		N	167	80
		Std. Error	0.15	0.22
	Points with depths <2m	Mean	2.60	3.70
		N	78	34
		Std. Error	0.25	0.36

For survey points exclusively within the littoral zone (depths less than 5 meters), native species richness was 3.19 species per survey point (Figure 9) and greater than 2014. As expected, species richness in the littoral zone and its shallow fringe was higher than whole lake species richness.

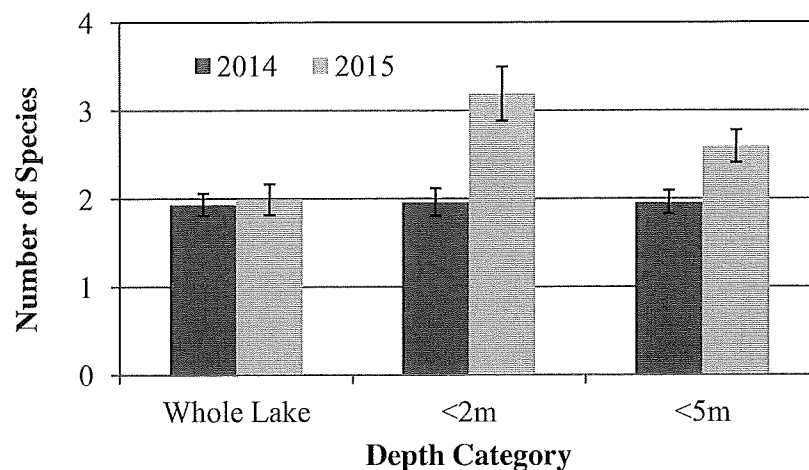


Figure 8. Lake Dunmore species richness for native species. Error bars are standard error of the mean.

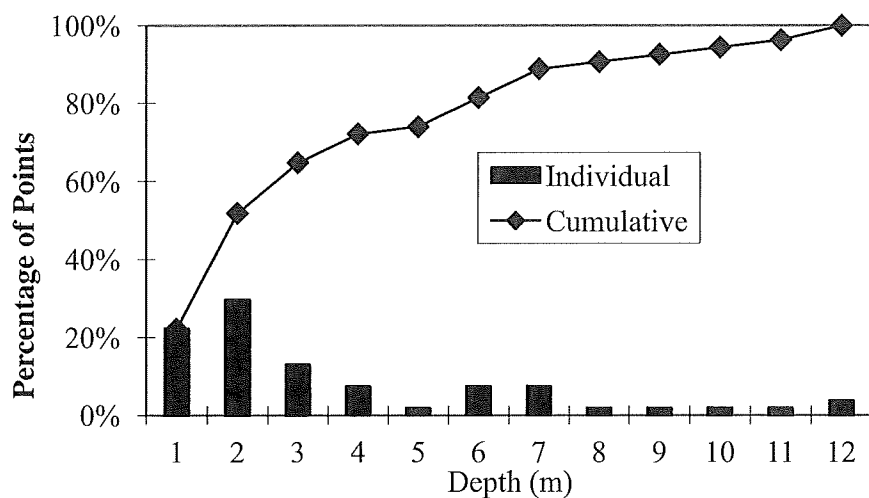
Fern Lake Survey Results

In September of 2015, the aquatic plant community of Fern Lake included nine submersed species, two floating-leaved species and four emergent species. A total of 15 species were reported in 2015, an increase from the 14 reported in 2014. None of the species reported for Fern Lake were on Vermont's rare plant list. With the exception of Eurasian watermilfoil, all other species were native to our region (Table 1). Species richness was quite high, with a large number of species occurring in more than 5% of survey points (Table 5). For Fern Lake, Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 48% of survey points in both 2014 and 2015.

Maximum Depth of Colonization

Maximum depth of rooted aquatic plant growth for Fern Lake was similar to that reported for Lake Dunmore, with the littoral zone extending to a maximum depth of 5 m. A total of 74% of survey points were within the littoral zone. In Fern Lake, viable plant specimens were collected in water depths greater than 5 m, however only for a single point with a depth of 6 m.

Figure 9. Depth Distribution of Fern Lake Sampling Points in 1-meter depth classes.



Species Lists

Maps of the distribution of aquatic plant species for Fern Lake are included in Appendix B. Frequency of occurrence results are presented in Table 4. Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 48% of survey points in both 2014 and 2015. Common native species for Fern Lake in 2015 included *Potamogeton illinoensis* (33% of survey points), *Potamogeton praelongus* (19%), *Najas flexilis* (17%), *Sagittaria graminea* (17%), *Chara/Nitella* (7%), *Potamogeton pusillus* (6%), and *Eleocharis acicularis* (4%). While the species present are comparable for both years (Table 4), their relative distribution varied. Inter-annual variability in aquatic plant populations is a well known phenomenon, with future surveys

necessary to determine the existence of trends.

Table 4. Fern Lake percent frequency of occurrence data.

Species	Common Name	2014	2015
<i>Chara/Nitella</i>	Muskgrass	16.7%	7.4%
<i>Eleocharis acicularis</i>	Spikerush	7.4%	3.7%
<i>Elodea canadensis</i>	Waterweed	1.9%	3.7%
<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	48.1%	48.1%
<i>Myriophyllum tenellum</i>	Leafless watermilfoil		1.9%
<i>Najas flexilis</i>	Water naiad	46.3%	16.7%
<i>Nuphar variegata</i>	Yellow water lily	1.9%	5.6%
<i>Nymphaea odorata</i>	White water lily	7.4%	22.2%
<i>Polygonum amphibium</i>	Water Smartweed		5.6%
<i>Potamogeton illinoensis</i>	Illinois pondweed	37.0%	33.3%
<i>Potamogeton praelongus</i>	White-stem pondweed	7.4%	18.5%
<i>Potamogeton pusillus</i>	Narrow-leaf pondweed	9.3%	5.6%
<i>Potamogeton spirillus</i>	pondweed	3.7%	1.9%
<i>Sagittaria graminea</i>	Slender arrowhead	11.1%	16.7%
<i>Zosterella dubia</i>	Water stargrass	13.0%	1.9%

In 2015, sixty-nine percent of whole lake sampling points were vegetated by at least one native plant species (Figure 10), 86% of survey points with depths less than 5 meters (Figure 11) and 97% of survey points less than 2 meters depth yielded native aquatic plants. In 2014, seventy-six percent of whole lake sampling points were vegetated by at least one native plant species, 93% of survey points with depths less than 5 meters and 96% of survey points less than 2 meters depth yielded native aquatic plants. Eurasian watermilfoil was present in 48% of whole lake survey points, 57% of survey points less than 5 meters water depth and 65% of survey points less than 2 meters water depth, largely unchanged from 2014.

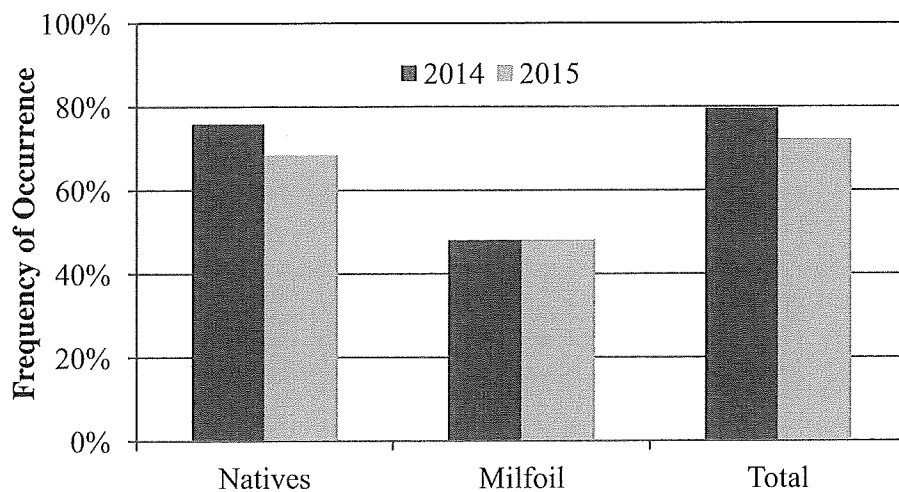


Figure 10. Fern Lake frequency of occurrence summaries.

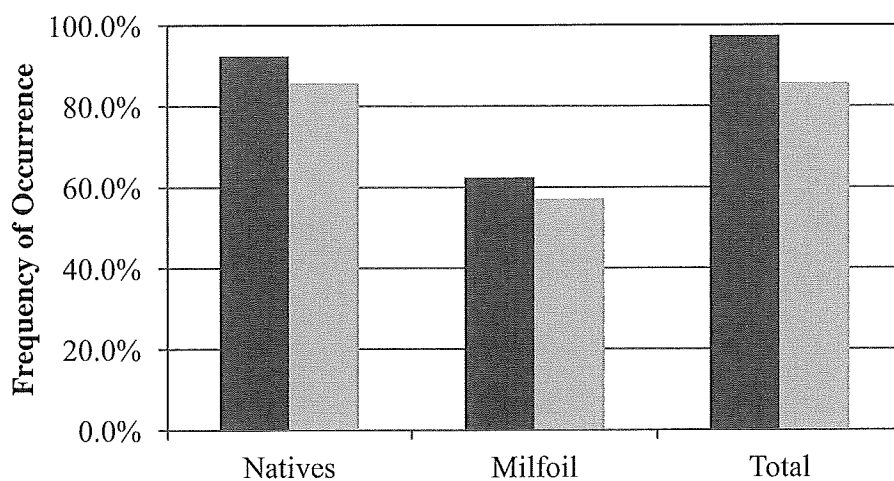


Figure 11. Fern Lake frequency of occurrence summaries for sampling points within the littoral zone (<5 m water depth).

Species richness results for Fern Lake are presented in Table 5. Whole lake native plant species richness in 2015 was 1.44 species per survey point, a slight decline from the 1.63 species per survey point reported in 2014 (Figure 12) but within relative error. Species richness in this range is comparable to other regional lakes (Eichler et al. 2013), but slightly lower than Lake Dunmore, perhaps due to the smaller size and limited habitat complexity of Fern Lake..

Table 5. Fern Lake species richness comparison.

Plant Grouping	Depth Class	Summary Statistic	2014	2015
Native Plant Species	Whole Lake (all depths)	Mean	1.63	1.44
		N	60	54
		Std. Error	0.20	0.18
	Points with depths <5m	Mean	2.37	1.81
		N	40	42
		Std. Error	0.28	0.65
	Points with depths <2m	Mean	2.05	2.12
		N	27	34
		Std. Error	0.22	0.62
All plant Species	Whole Lake (all depths)	Mean	2.11	1.96
		N	60	54
		Std. Error	0.24	0.22
	Points with depths <5m	Mean	3.04	2.43
		N	40	42
		Std. Error	0.32	0.23
	Points with depths <2m	Mean	2.68	2.76
		N	27	34
		Std. Error	0.25	0.24

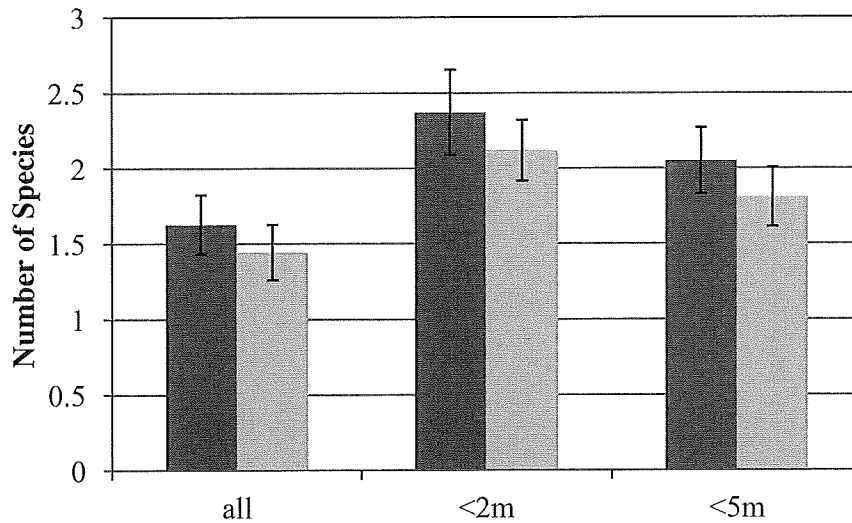


Figure 12. Fern Lake species richness for native species. Error bars are standard error of the mean.

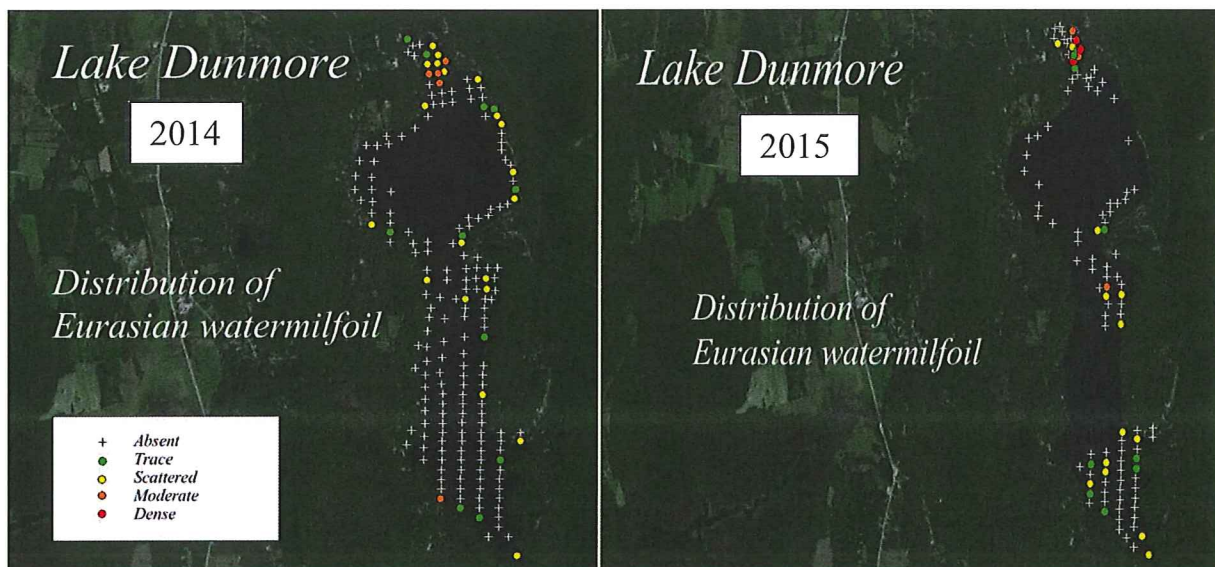
Summary

Quantitative aquatic plant surveys were undertaken for Lake Dunmore and Fern Lake, Vermont, in September of 2015. Surveys were designed to duplicate surveys in 2014 and conducted to obtain post-treatment data for hand and suction harvesting efforts to control Eurasian watermilfoil. Frequency and distribution of aquatic plant species in each lake were evaluated using a point intercept method based on a differential global positioning system of grid points.

Eurasian watermilfoil (*Myriophyllum spicatum*) populations were first confirmed in Lake Dunmore in 1988 and in 1994 the current management program was initiated. Eurasian watermilfoil was first detected in Fern Lake in 1996, with annual management efforts since 2003. Hand harvesting by skin and SCUBA divers has been the basis of the program for most years with use of diver operated suction harvesting in recent years. While there is a general sense that management efforts are controlling Eurasian watermilfoil, the level of effort required to achieve control has continued to expand. By 2013, over 3600 bushels of Eurasian watermilfoil were being harvested from Lake Dunmore by 2 suction harvesting teams. In 2015, the effort had expanded to 4 teams and a greatly increased number of harvesting days. In 2013, the aquatic weevil population of Fern Lake was augmented as an additional control measure. In addition to weevil augmentation, hand and suction harvesting removed a total of 1800 bushels of Eurasian watermilfoil.

The aquatic plant community of Lake Dunmore included twenty-one submersed species, four floating-leaved species, six emergent species and one floating species. This number of species greatly exceeds the 15 species typically reported for moderately productive lakes in our region and indicates good water quality and a variety of habitat types. Eurasian watermilfoil was present in 27% of survey points (Figure 13), an increase from the 18% of survey points reported in 2014. This increase may be an artifact of a change in the survey to focus on areas known to

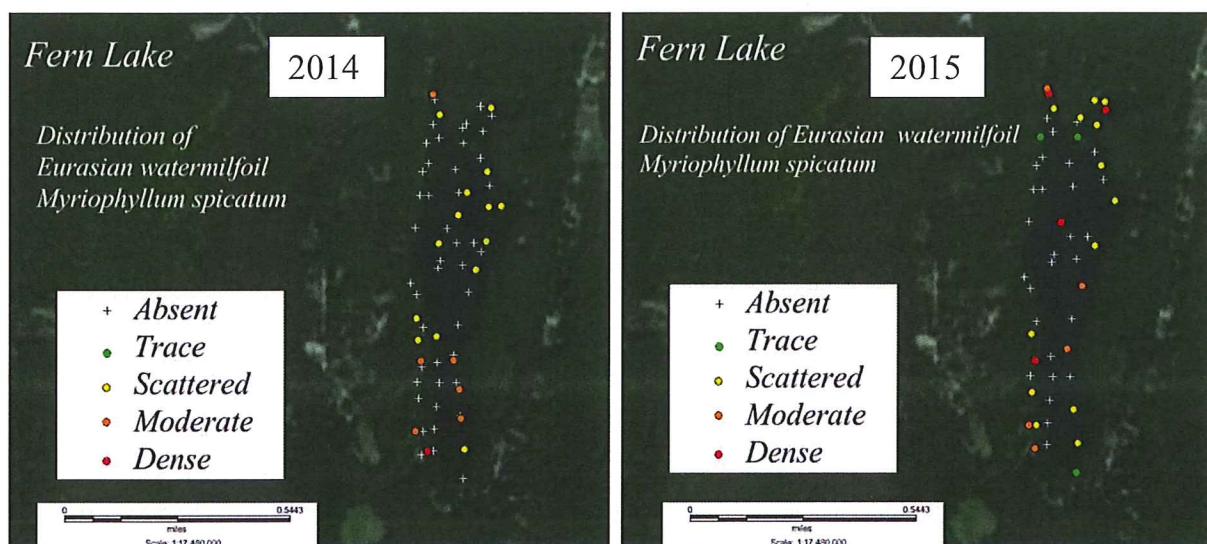
Figure 13. Distribution of Eurasian watermilfoil in Lake Dunmore.



support Eurasian watermilfoil. Comparing only the points from both 2014 and 2015, a small decline from 30% of survey points in 2014 to 27% in 2015 was reported. Comparing the distribution of Eurasian watermilfoil in 2014 and 2015 for Lake Dunmore, density appears to have increased in the north and south ends. One of the species present in Lake Dunmore, Humped Bladderwort (*Utricularia gibba*) is found on Vermont's rare plant list (VT DEC 2012). Species richness was quite high, with a number of species occurring in more than 5% of survey points. Sixty-nine percent of whole lake sampling points were vegetated by at least one native plant species, a small decline from the 73% reported in 2014. The large number of points supporting native plant species suggests that Lake Dunmore is a prime candidate for recovery of its native plant population following management of Eurasian watermilfoil. Native species richness in the littoral zone was 2.59 and 2.23 species per sample, respectively in 2014 and 2015. These results are in the average range for regional lakes. Common native species for Lake Dunmore included Waterweed (*Elodea canadensis*, 33% of survey points), Robbins Pondweed (*Potamogeton robbinsii*, 29%), Bushy Pondweed (*Najas flexilis*, 25%), Muskgrass (*Chara/Nitella*, 26%), Wild Celery (*Vallisneria americana*, 22%), Illinois Pondweed (*Potamogeton illinoensis*, 17%), and Broad-leaf Pondweed (*Potamogeton amplifolius*, 15%). Occurrence and relative abundance of all species was similar to 2014 survey results and supports the conclusion that management efforts are not having a significant impact on native plant species.

For Fern Lake, the aquatic plant community included nine submersed species, two floating-leaved species and four emergent species. None of the species reported for Fern Lake were on Vermont's rare plant list. With the exception of Eurasian watermilfoil, all other species were native to our region. Species richness was quite high, with a large number of species occurring in more than 5% of survey points. For Fern Lake, Eurasian watermilfoil (*Myriophyllum spicatum*) was the most common species, present in 48% of survey points in both 2014 and 2015. Common native species for Fern Lake included Illinois Pondweed (*Potamogeton illinoensis*, 33% of survey points), White-stem Pondweed (*Potamogeton praelongus*, 19%), Bushy

Figure 14. Distribution of Eurasian watermilfoil in Fern Lake.



Pondweed (*Najas flexilis*, 17%), Arrowhead (*Sagittaria graminea*, 17%), Muskgrass (*Chara/Nitella*, 7%), Narrow-leaf Pondweed (*Potamogeton pusillus*, 6%), and Spike-rush (*Eleocharis acicularis*, 4%). While the species present are comparable for both years, their relative distribution is different. With this diversity and distribution of native species, the test for treatment selectivity should be sensitive to a number of species, and native plant restoration in areas formerly inhabited by Eurasian watermilfoil appears to be rapid following management efforts.

Eurasian watermilfoil growth in both Lake Dunmore and Fern Lake was present as low to moderate density growth in September of 2015, while the native plant populations appear robust and similar to other regional lakes. Survey results suggest that Eurasian watermilfoil is slowly expanding its coverage in both Lake Dunmore and Fern Lakes, even with annual increases in management efforts. While the current management effort is slowing the spread of Eurasian watermilfoil, the amount of plant material harvested and harvesting effort continues to increase on an annual basis. For Lake Dunmore, a more aggressive effort appears necessary for both the north cove and south end of the lake. For Fern Lake, Eurasian watermilfoil continues to dominate the aquatic plant population. The area adjacent to the boat launch and the two northern coves continues to support dense populations of flowering Eurasian watermilfoil which should be a focus of future efforts.

References

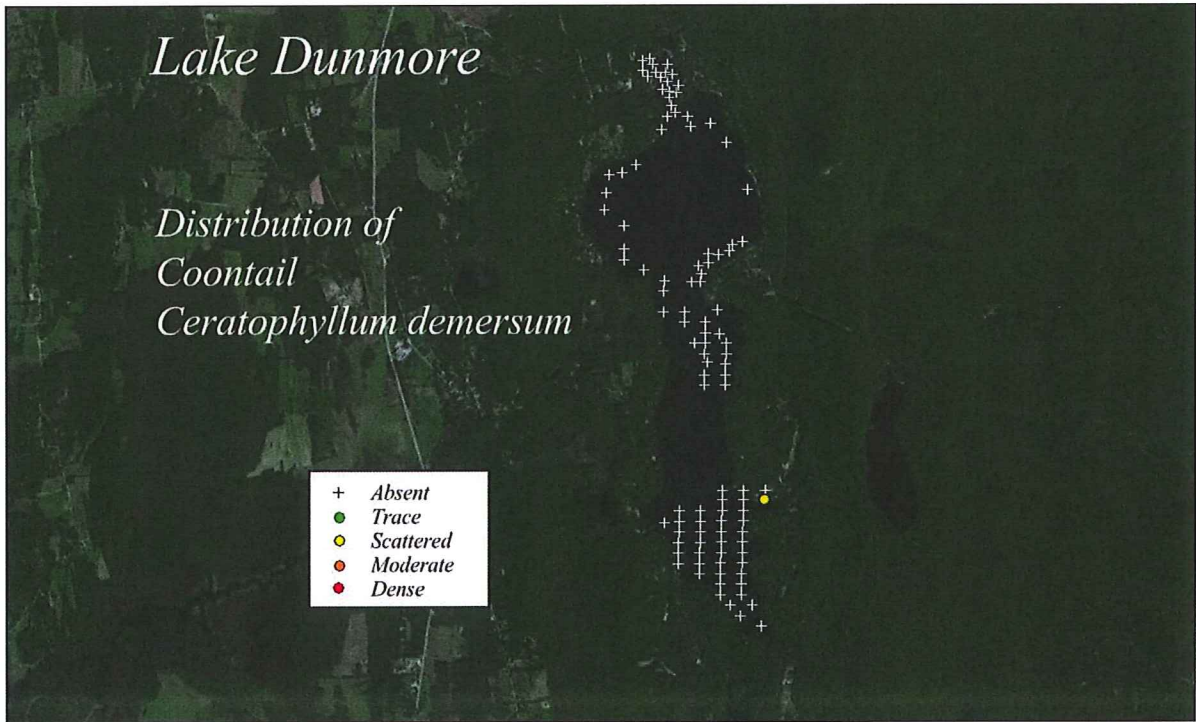
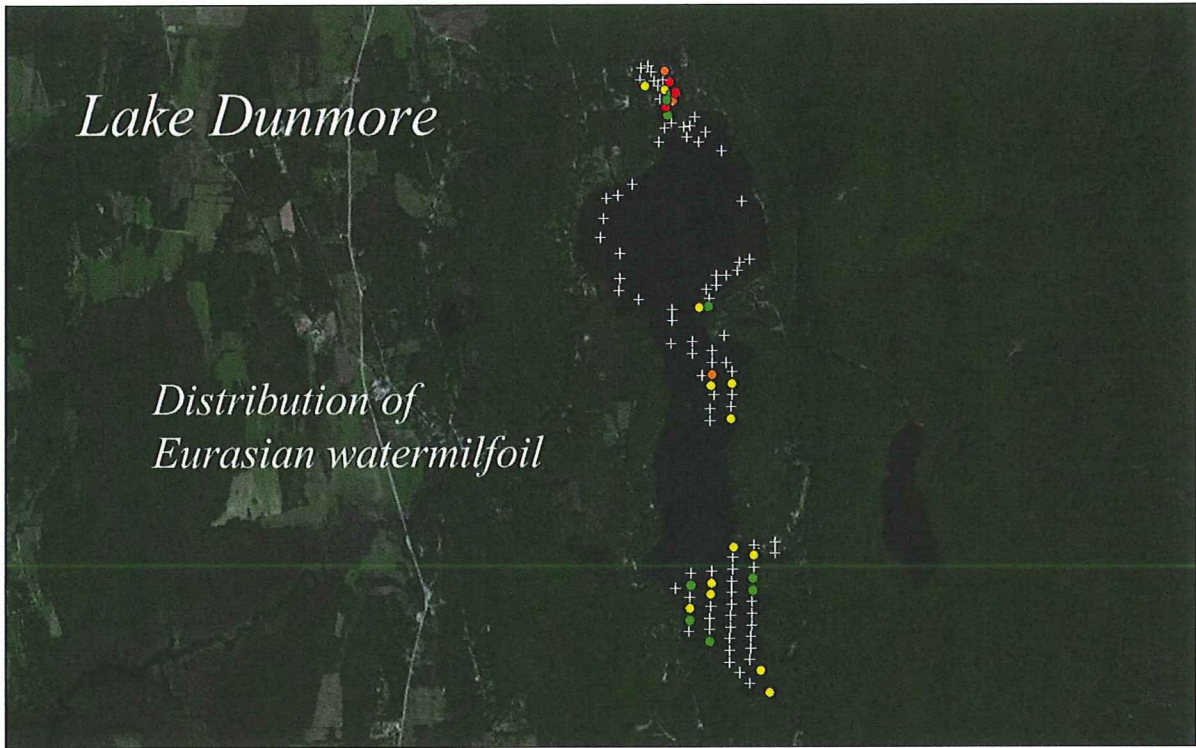
- Crow, G.E. and C.B. Hellquist. 2000. Aquatic and wetland plants of northeastern North America. 2 Volumes. University of Wisconsin Press, Madison, WI.
- Eichler, L.W. and C.W. Boylen. 2013. Aquatic vegetation of Burr Pond and Lake Hortonia, Vermont. Prepared for the Vermont DEC & the Lake Hortonia & Burr Pond Property Owners Association. Darrin Fresh Water Institute, Bolton Landing, NY. November 2013
- Eichler, L.W. and C.W. Boylen. 2014. Aquatic vegetation of Lake Dunmore and Fern Lake, Vermont - 2014. Prepared for the Lake Dunmore Association. DFWI Technical Report 2014-6. Darrin Fresh Water Institute, Bolton Landing, NY.
- Getsinger et al., K.D., R.M. Stewart, J.D. Madsen, A.S. Way, C.S. Owens, H.A. Crosson, and A.J. Burns. 2002. Use of Whole-Lake Fluridone Treatments to Selectively Control Eurasian Watermilfoil in Burr Pond and Lake Hortonia, VT. US Army Corps of Engineers, Engineer Research and Development Ctr., Aquatic Plant Control Res. Program. ERDC/EL TR-02-39.
- Hellquist, C.B. 1993. Taxonomic considerations in aquatic vegetation assessments. *Lake and Reserv. Manage.* 7:175-183.
- LDFLA. 2013. Lake Dunmore Fern Lake Association Milfoil Annual Report 2013. www.ldfla.com.
- LDFLA. 2015. Lake Dunmore Fern Lake Association Milfoil Fall Report 2015. <http://www.ldfla.com/newsletters/documents/fall2015online.pdf>
- Madsen, J.D. 1999. Point intercept and line intercept methods for aquatic plant management. US Army Engineer Waterways Experiment Station Aquatic Plant Control Research Program Technical Note CC-02, Vicksburg, MS.
- Madsen, J.D., L.W. Eichler, and C.W. Boylen. 1988. Vegetative spread of Eurasian watermilfoil in Lake George, New York. *J. Aquat. Plant Manage.* 26, 47-50.
- Madsen J.D., J.W. Sutherland, J.A. Bloomfield, L.W. Eichler and C.W. Boylen. 1991. Decline of native vegetation under a canopy of Eurasian watermilfoil. *J. Aquatic Plant Manage.* 29:94-99.
- VT DEC. 2010. Vermont Department of Environmental Conservation – Lay Monitoring Program. www.anr.state.vt.us/dec/waterq/cfm/lakerep/lakerep_details.cfm
- VT DEC. 2012. Rare and Uncommon Native Vascular Plants of Vermont. Vermont Natural Heritage Inventory. Vermont Fish & Wildlife Department. 21 November 2012. www.vtfishandwildlife.com/.../List_of_Rare_and_Uncommon_Native_Plants_of_Vermont.pdf

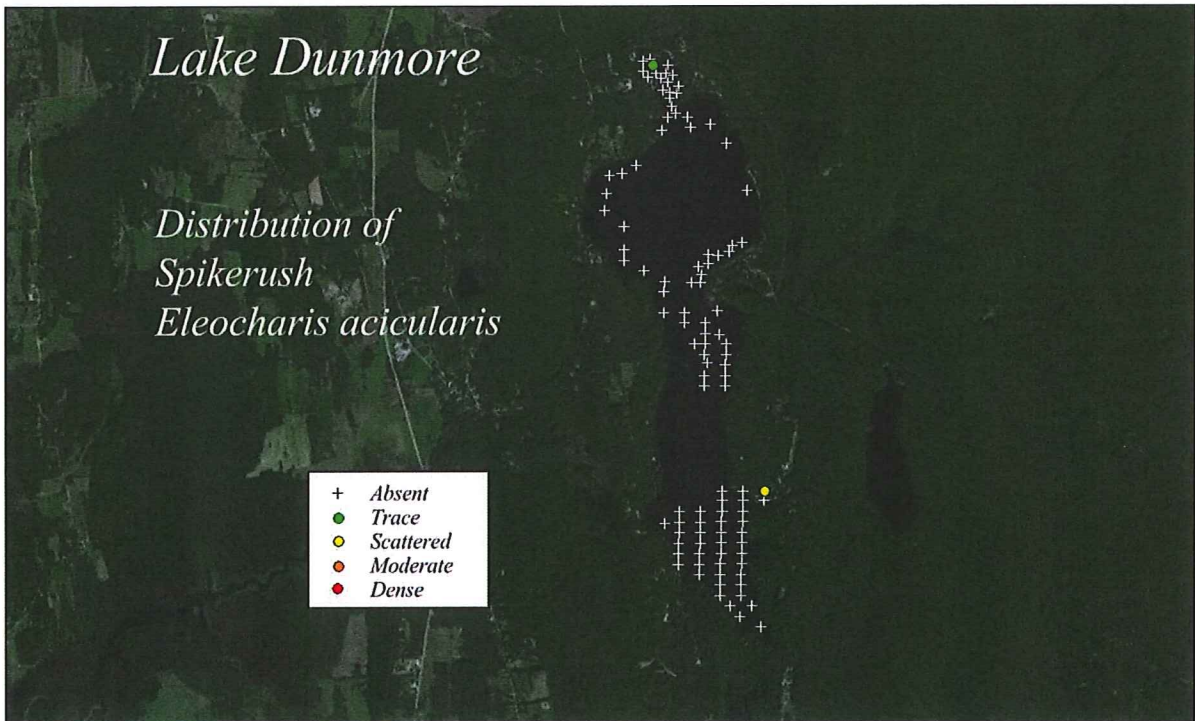
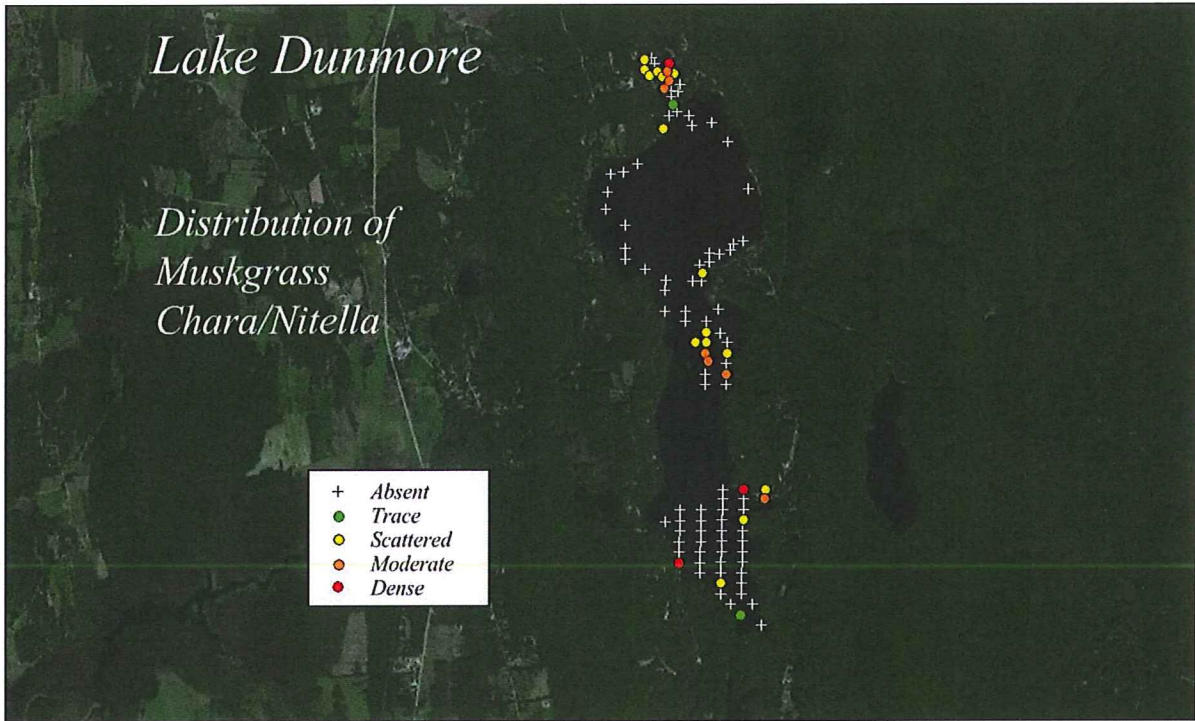
Acknowledgements

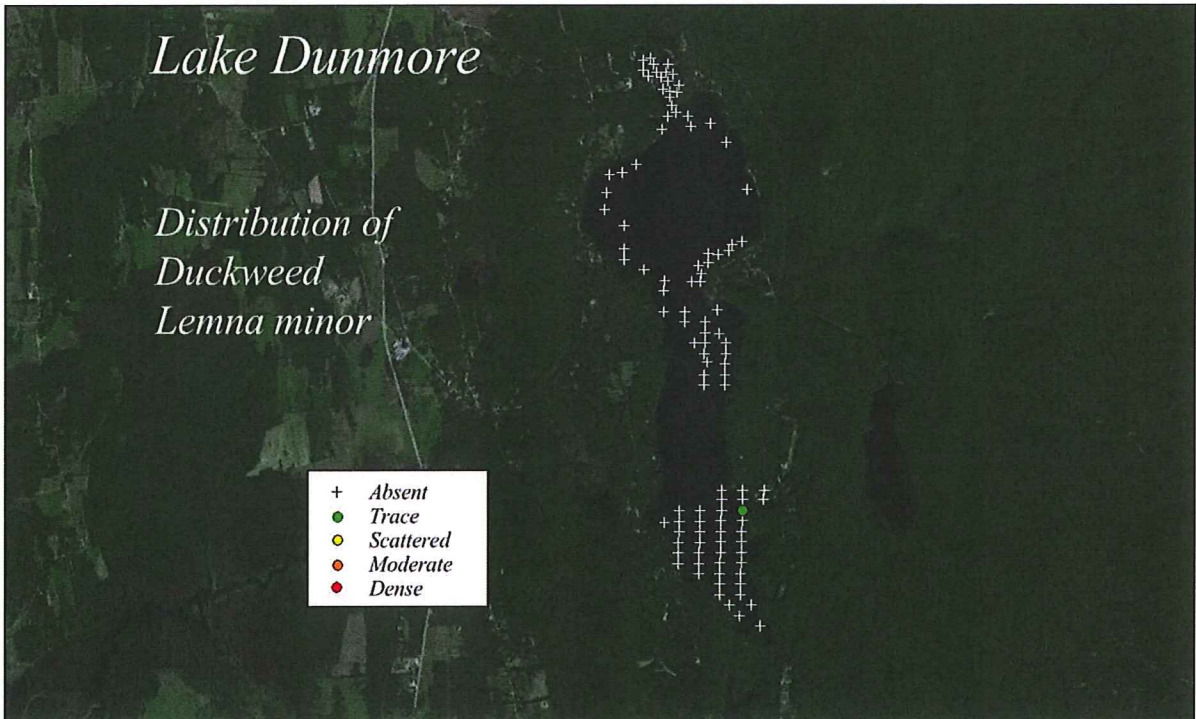
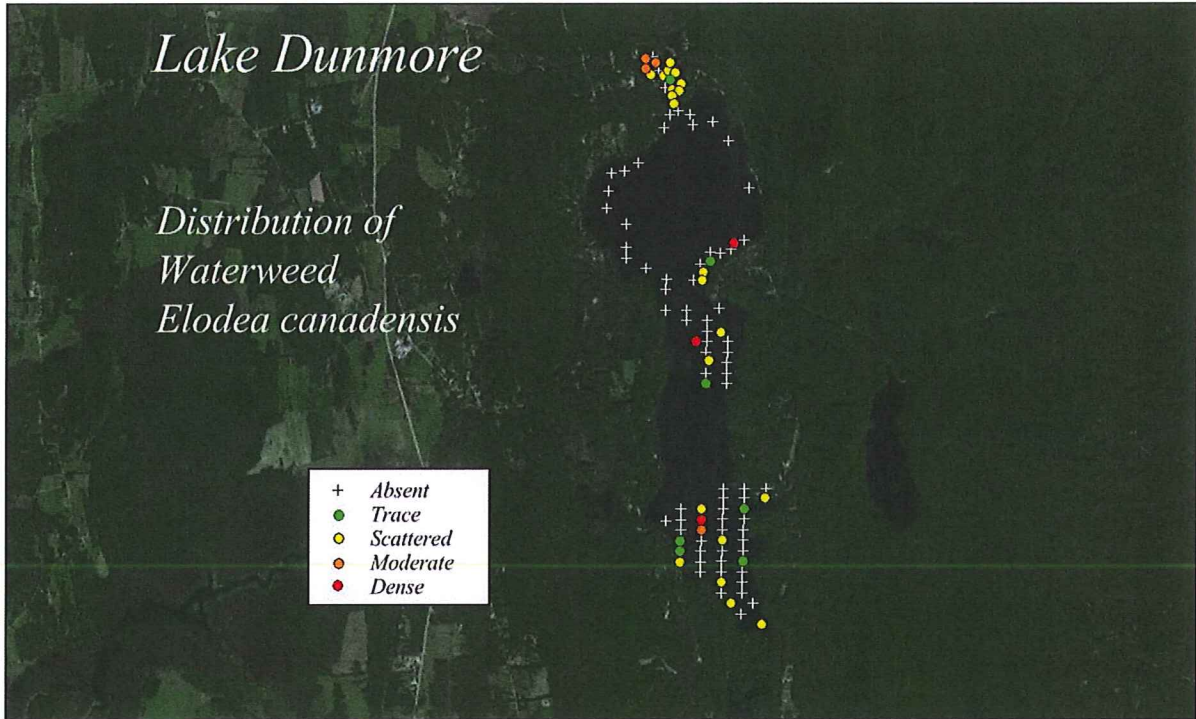
The authors would like to acknowledge Mr. Chip Paison of the Lake Dunmore Fern Lake Property Owners Association for his assistance in coordinating the current survey project.

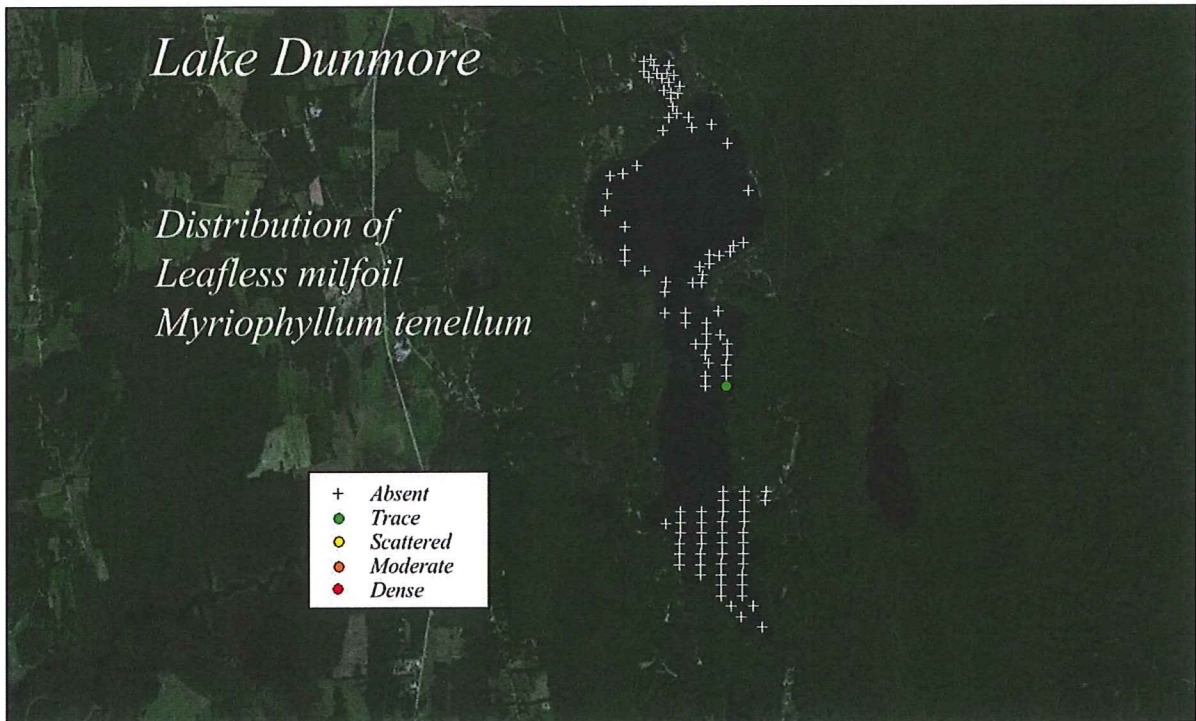
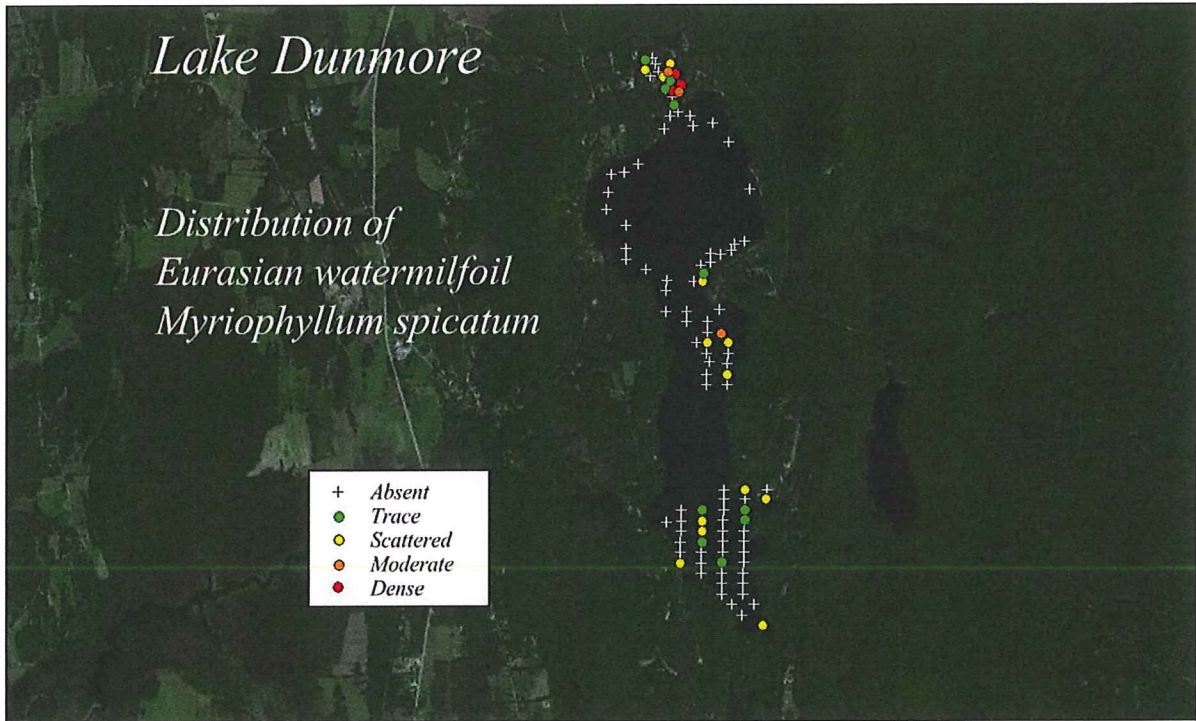
Appendix A

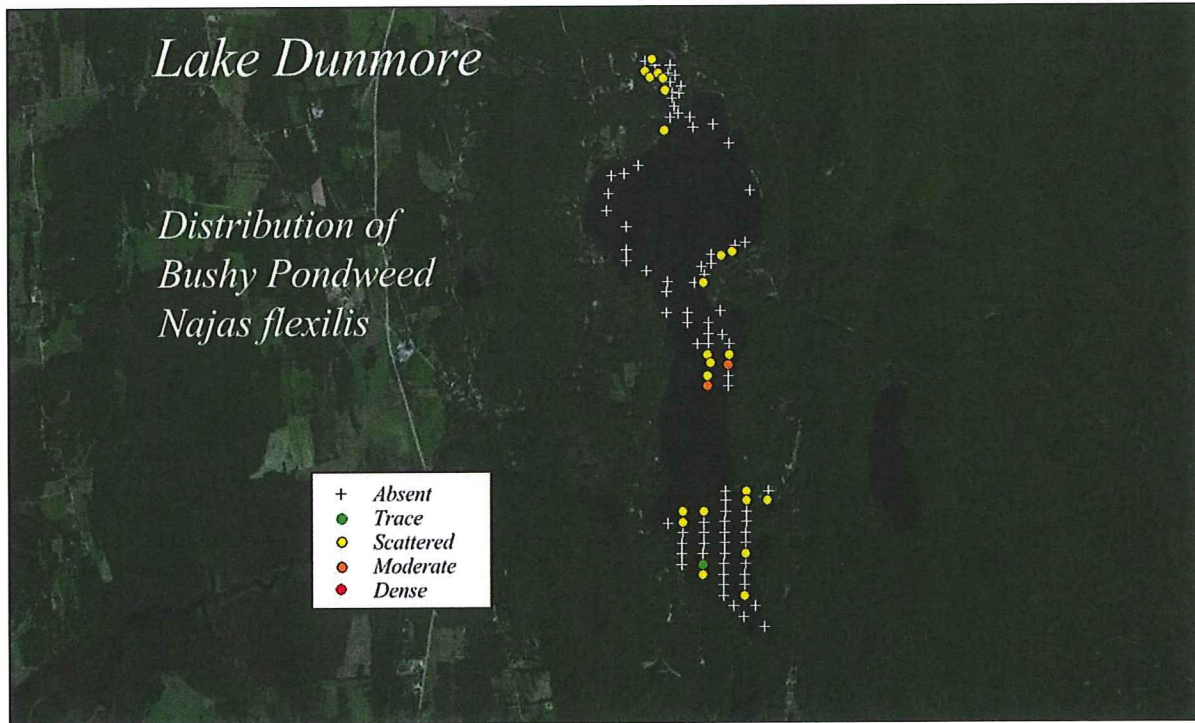
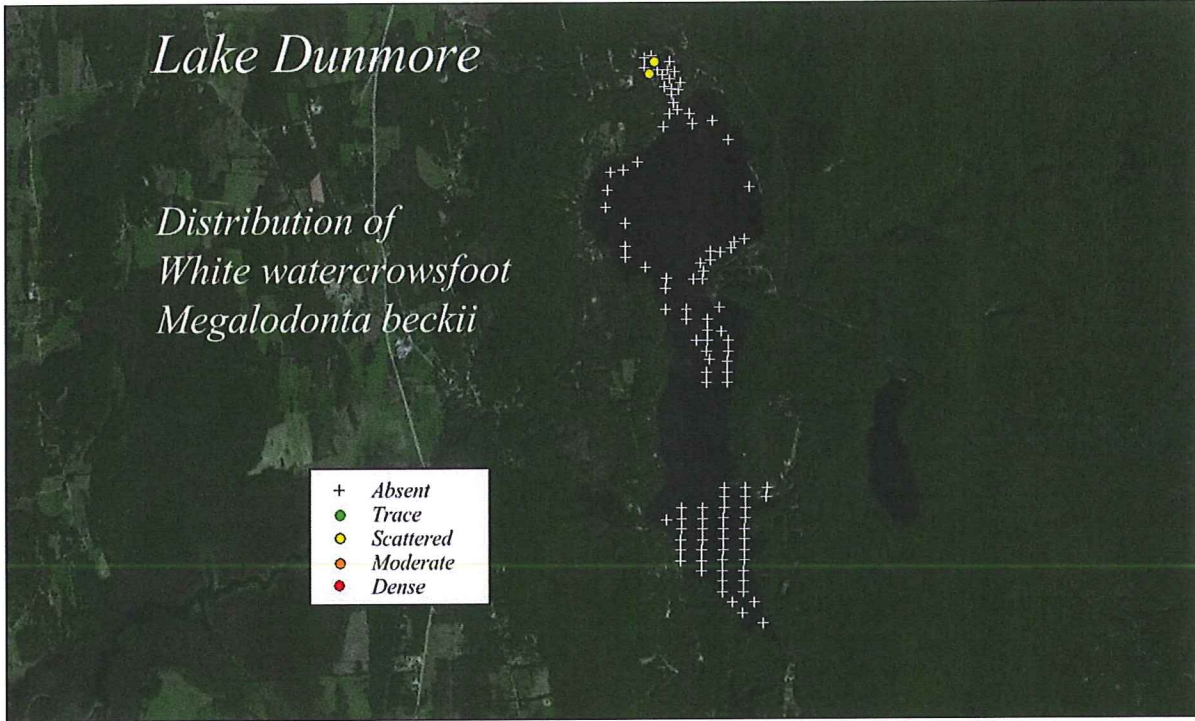
Lake Dunmore Aquatic Plant Distribution Maps

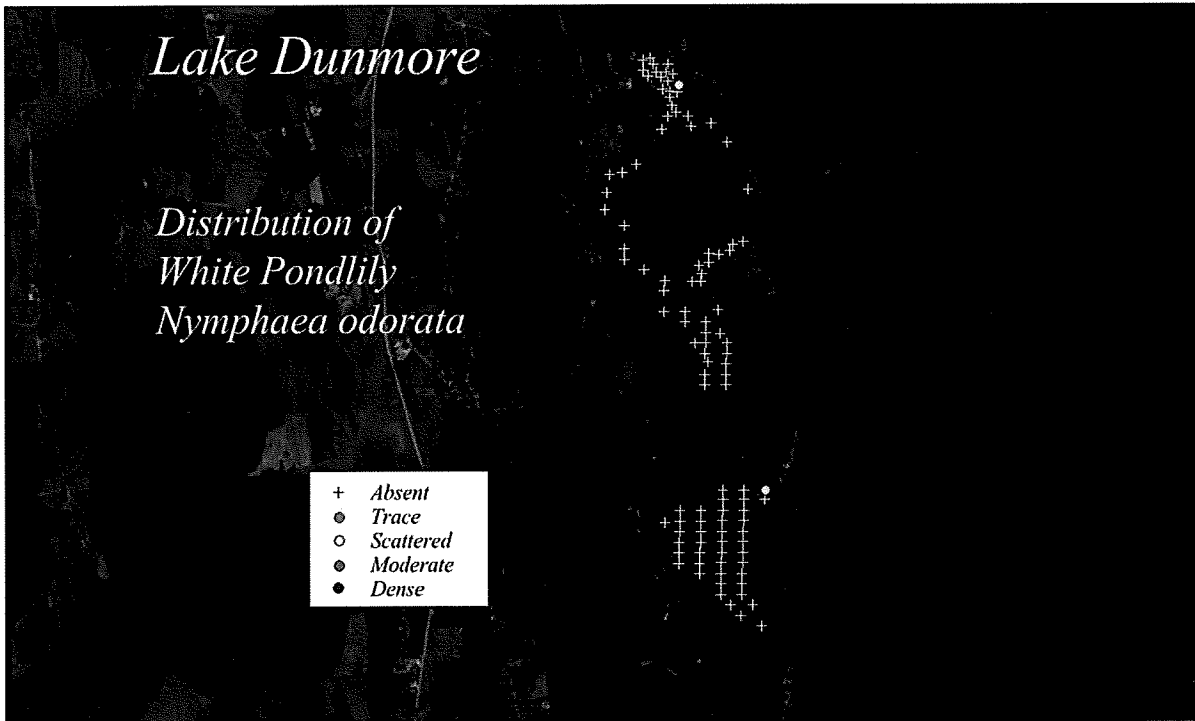
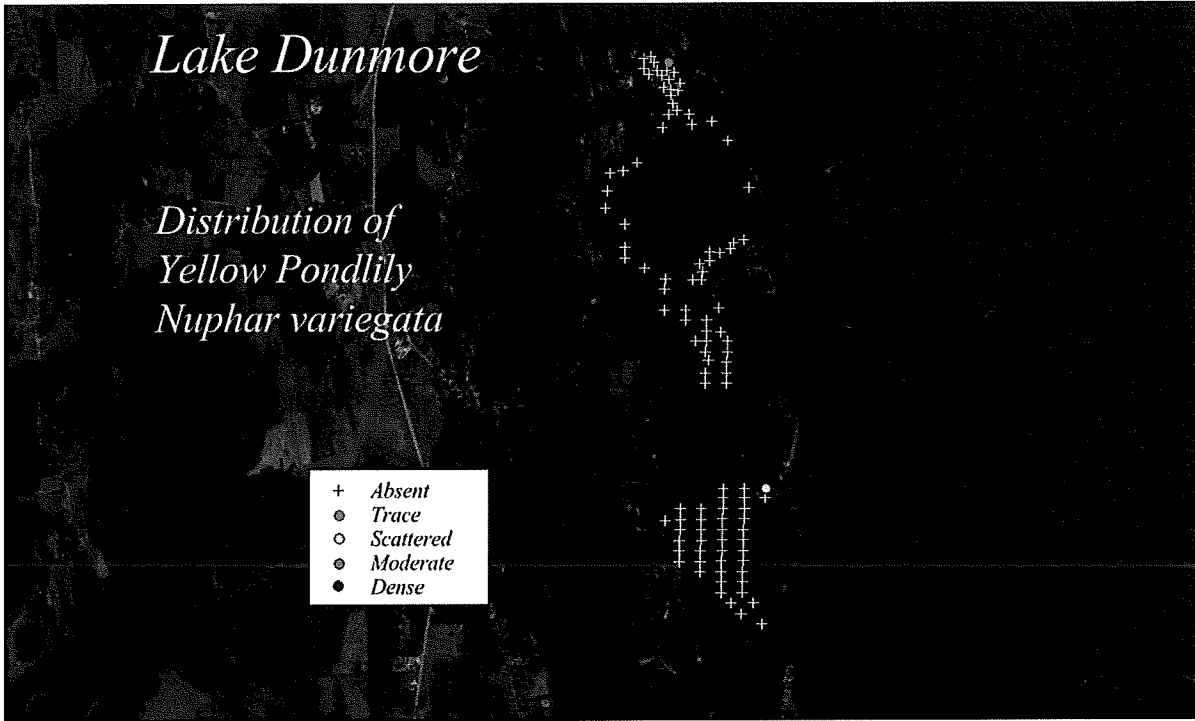


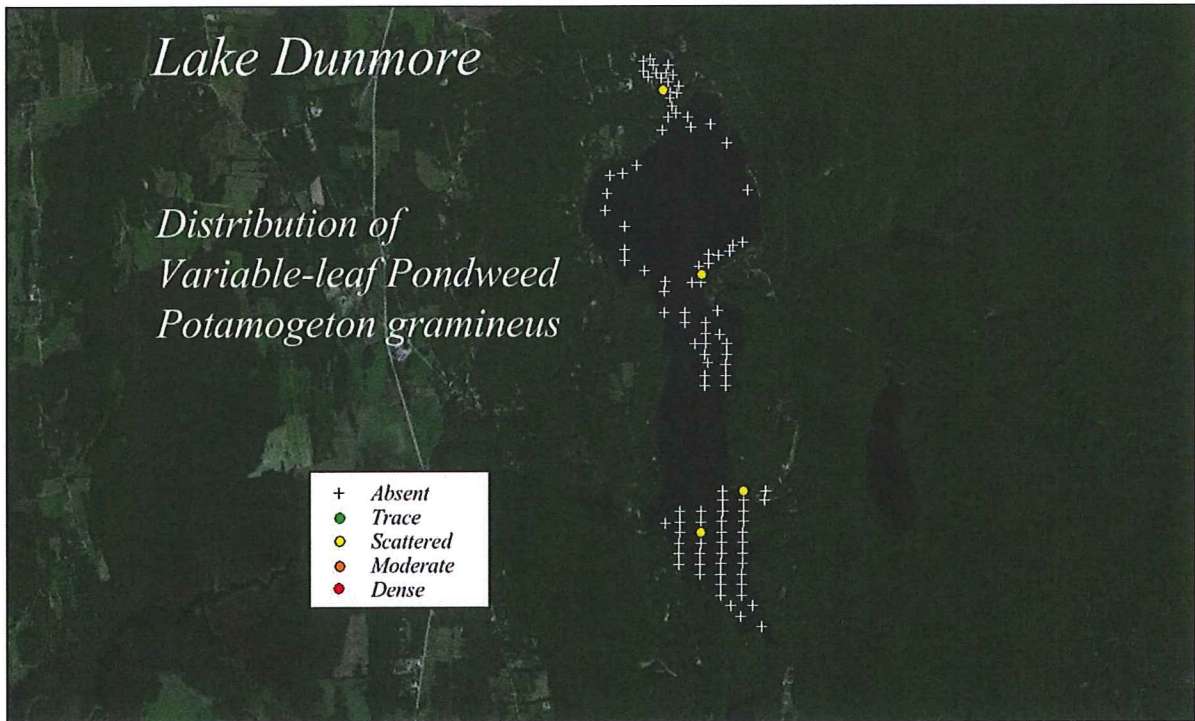
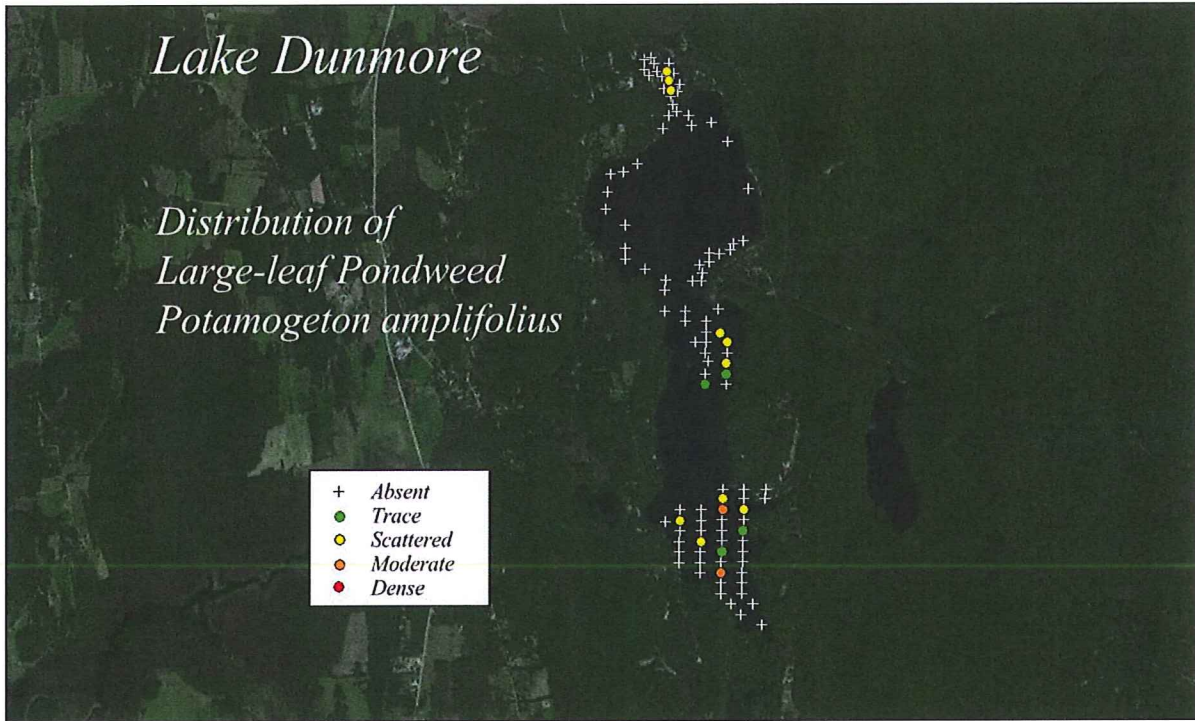






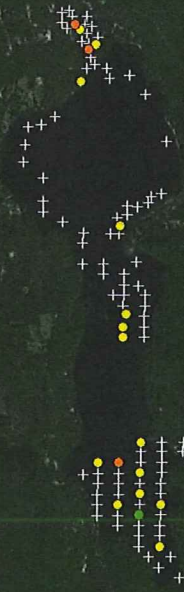
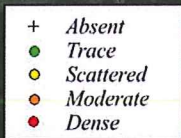






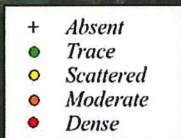
Lake Dunmore

Distribution of Illinois Pondweed *Potamogeton illinoensis*



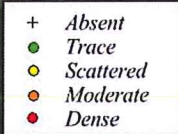
Lake Dunmore

Distribution of White-stem Pondweed *Potamogeton praelongus*



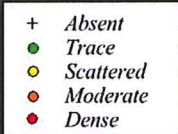
Lake Dunmore

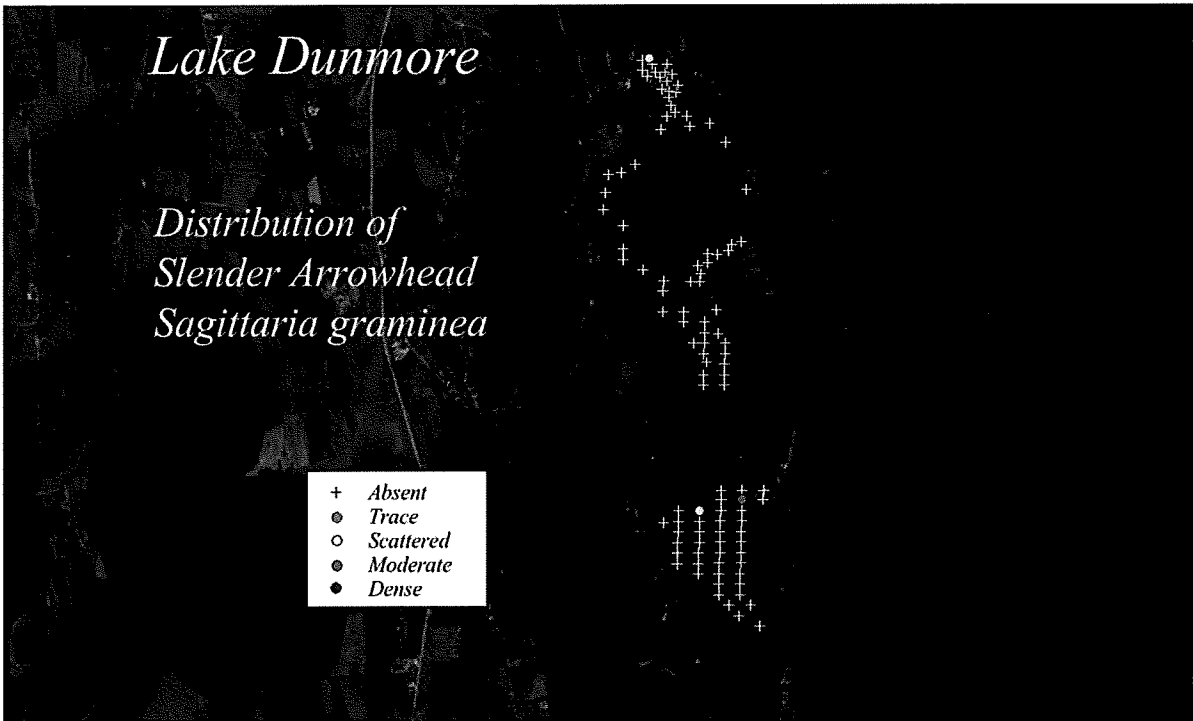
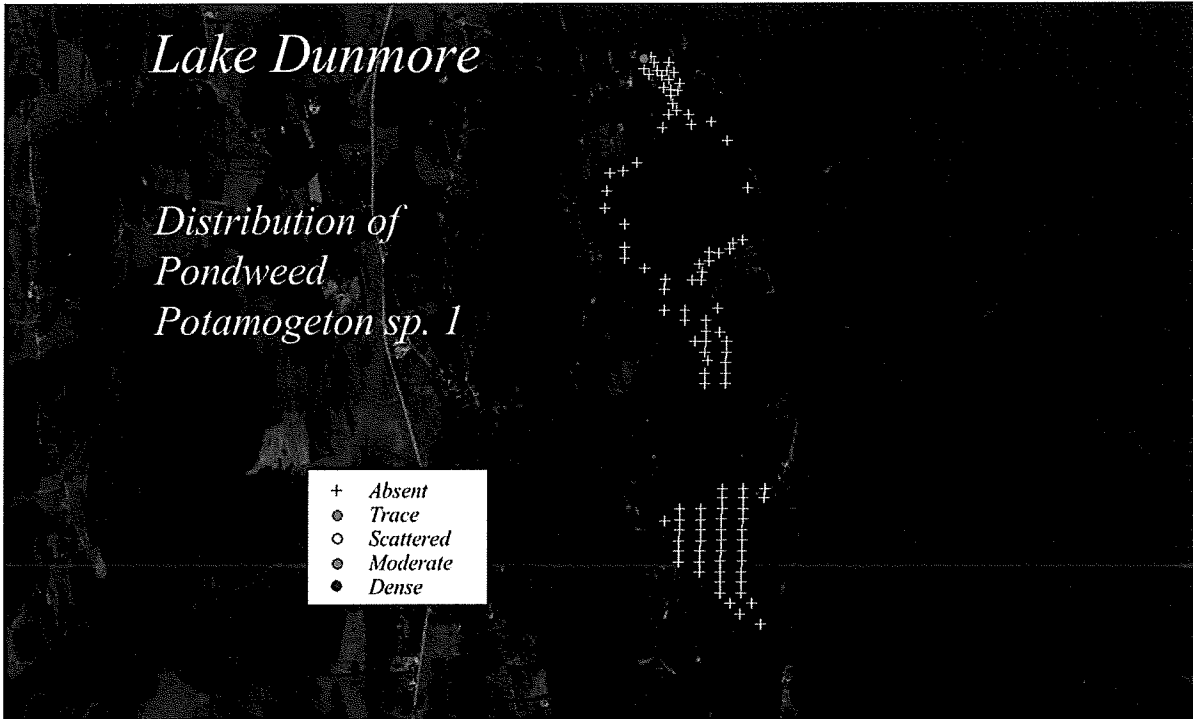
Distribution of Narrow-leaf Pondweed *Potamogeton pusillus*

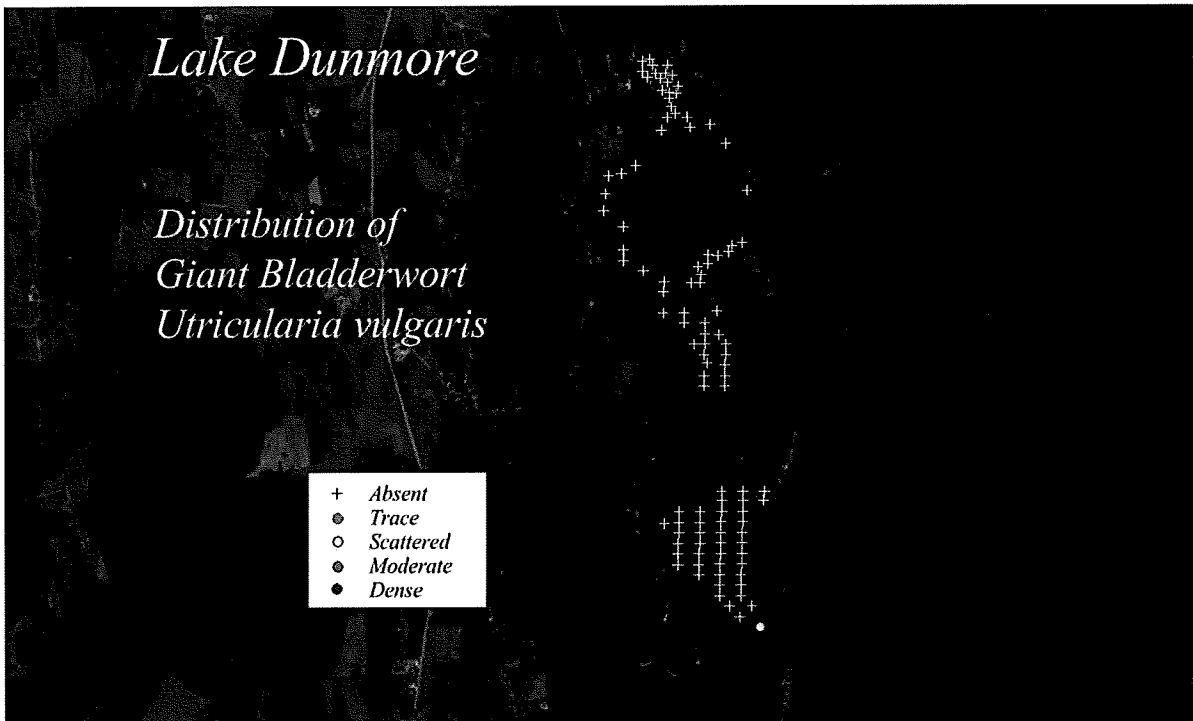
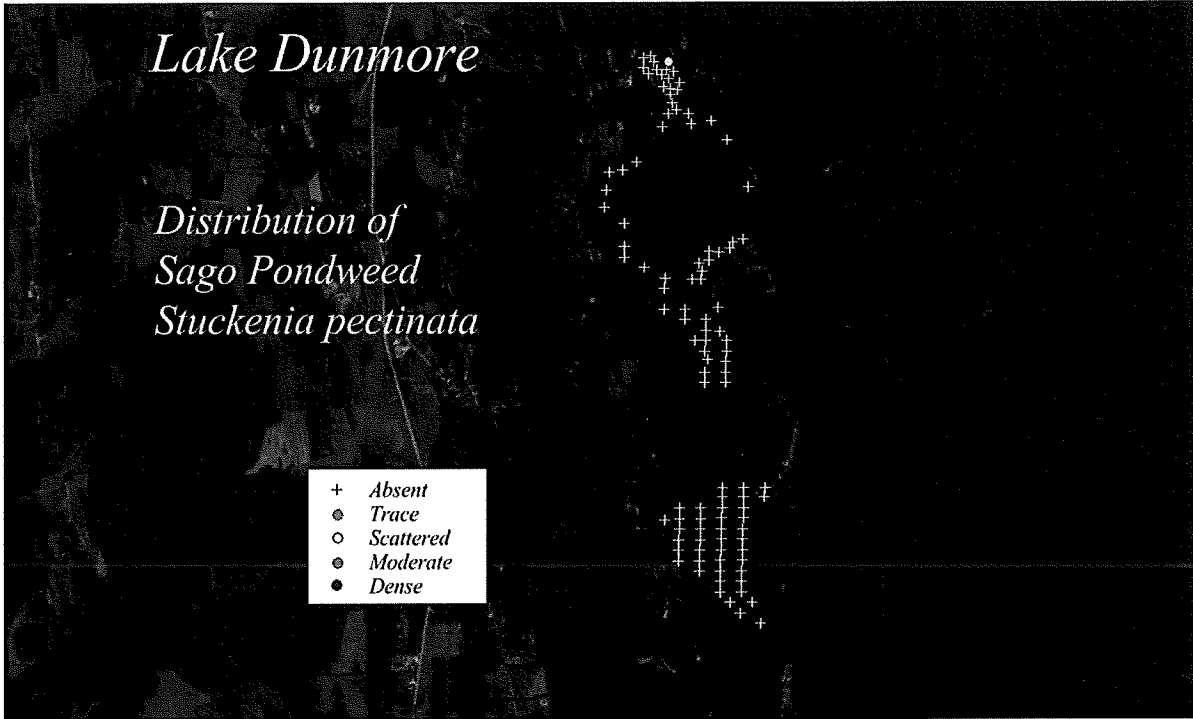


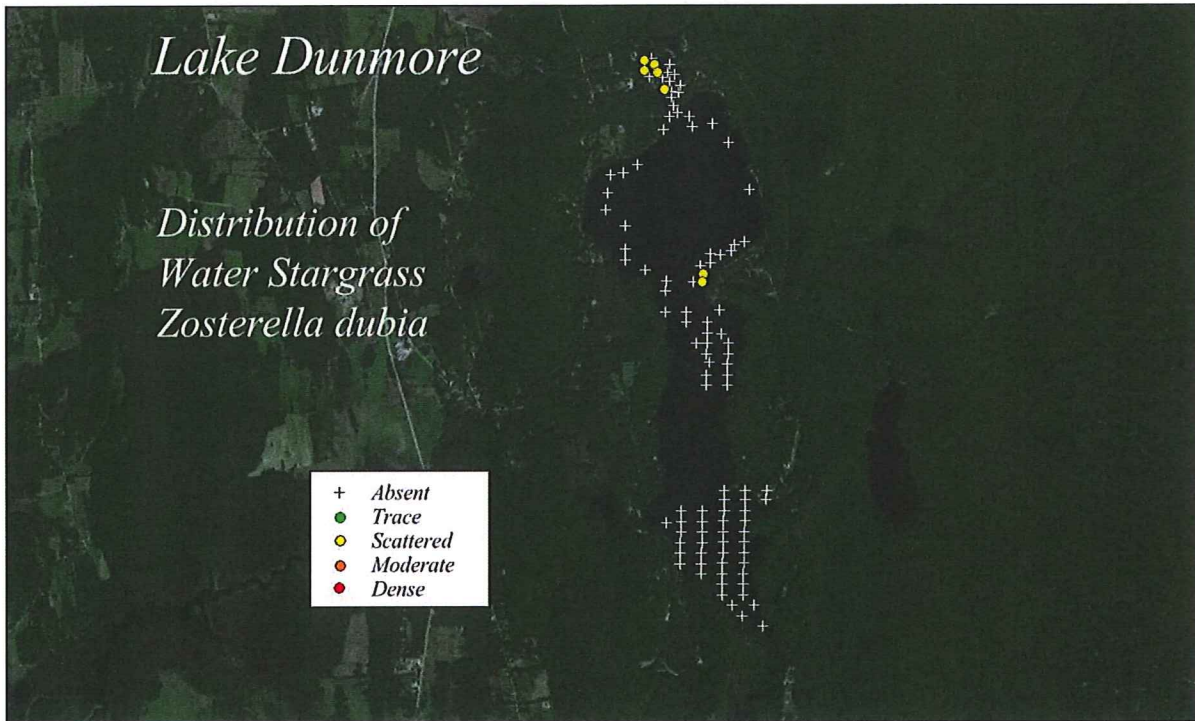
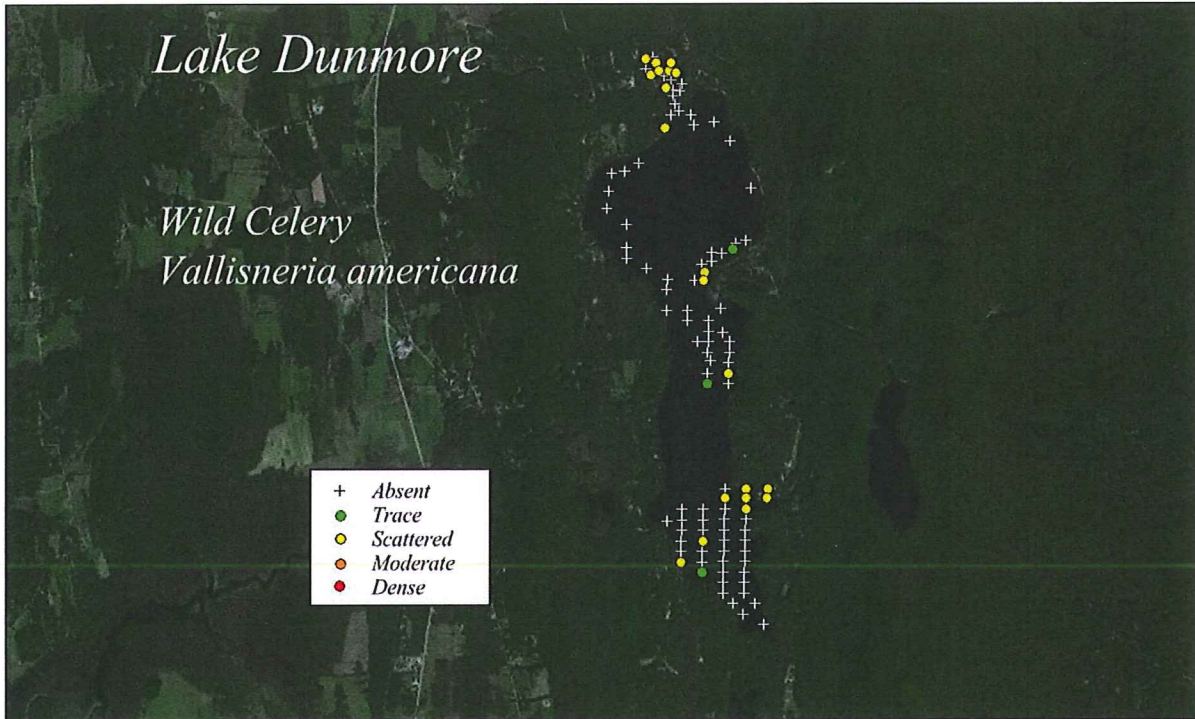
Lake Dunmore

Distribution of Robbins Pondweed *Potamogeton robbinsii*







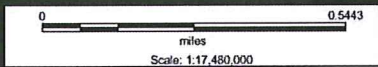
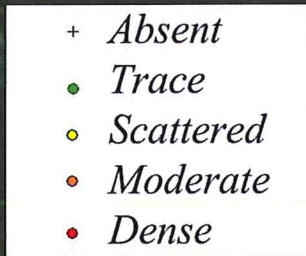


Appendix B

Fern Lake Aquatic Plant Distribution Maps

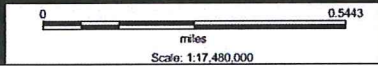
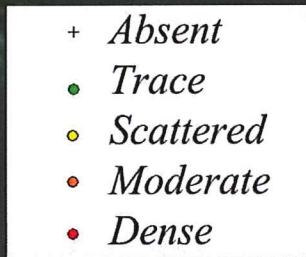
Fern Lake

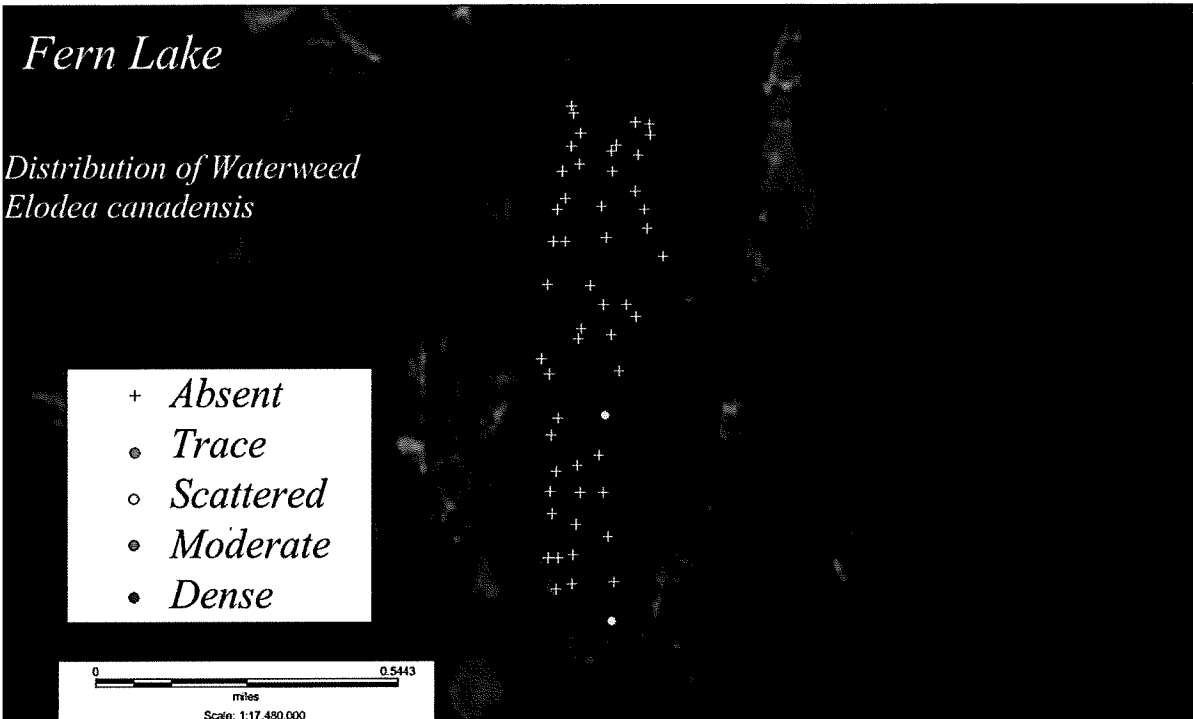
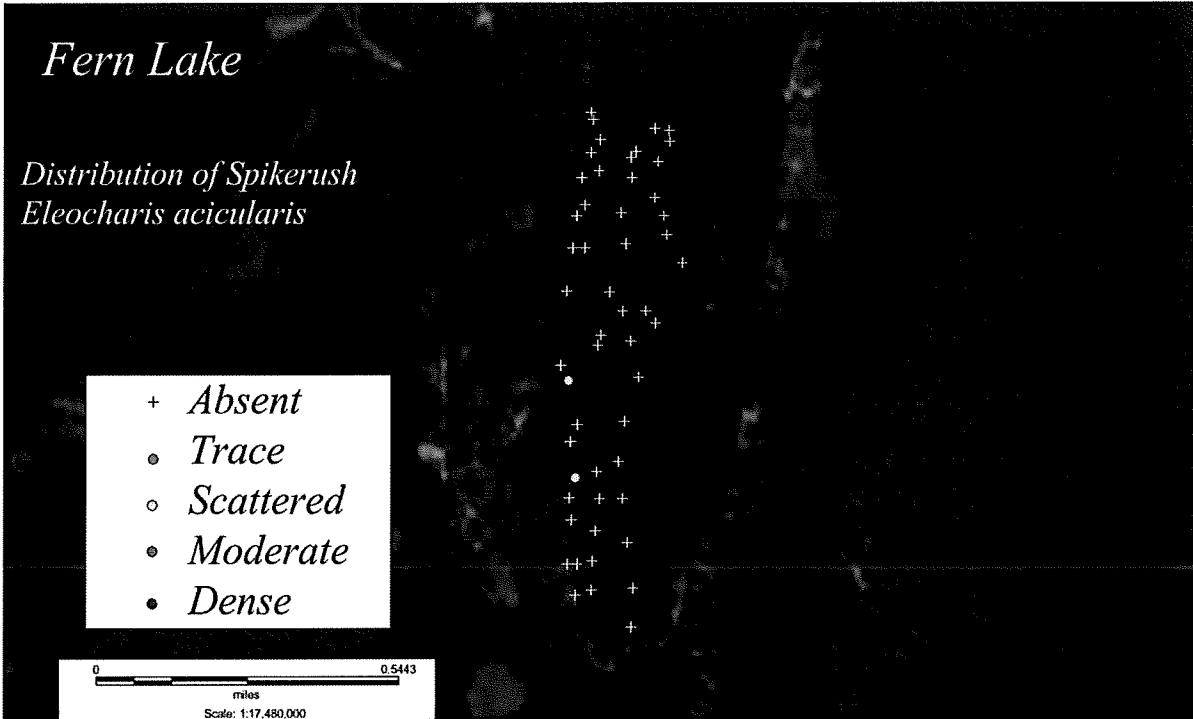
Distribution of Eurasian watermilfoil
Myriophyllum spicatum



Fern Lake

Distribution of Muskgrass
Chara/Nitella

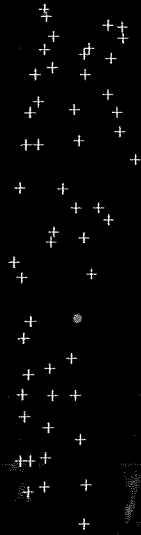
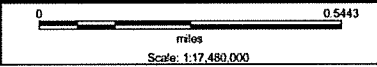




Fern Lake

Distribution of Leafless Milfoil
Myriophyllum tenellum

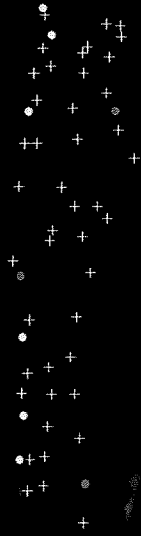
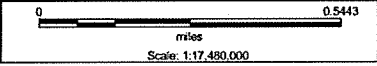
- + Absent
- Trace
- Scattered
- Moderate
- Dense



Fern Lake

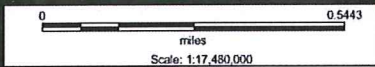
Distribution of Bushy Pondweed
Najas flexilis

- + Absent
- Trace
- Scattered
- Moderate
- Dense



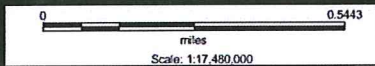
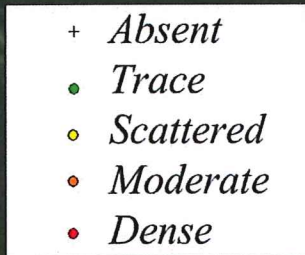
Fern Lake

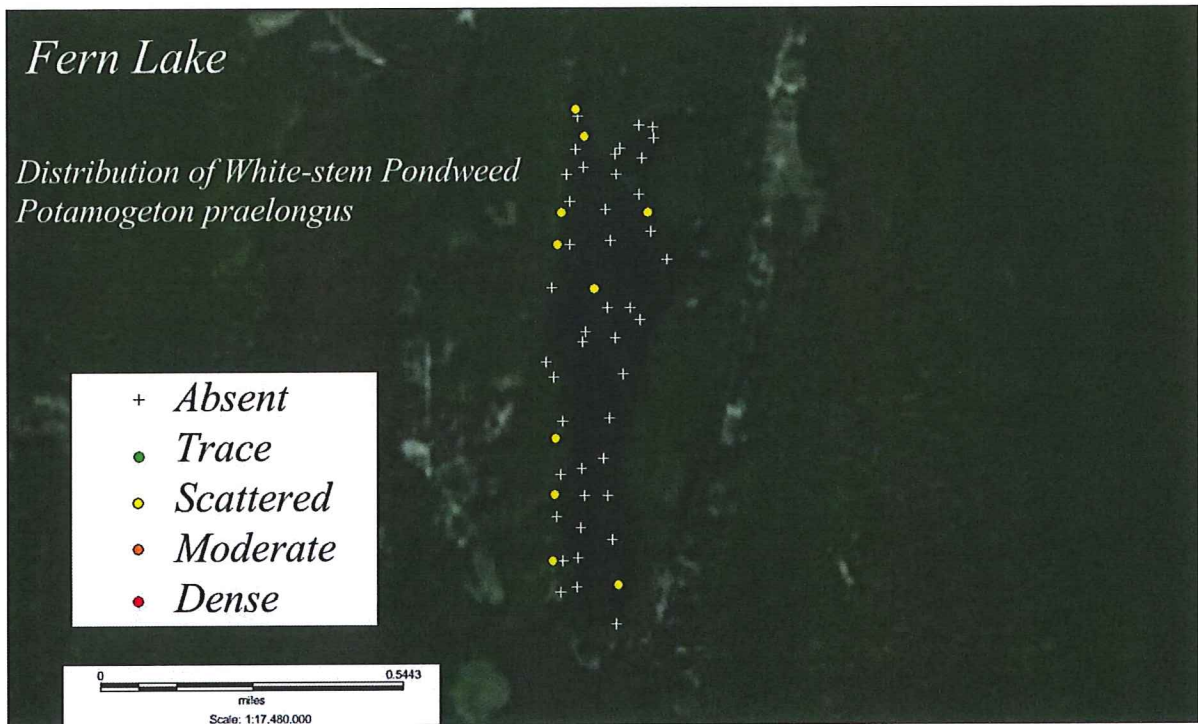
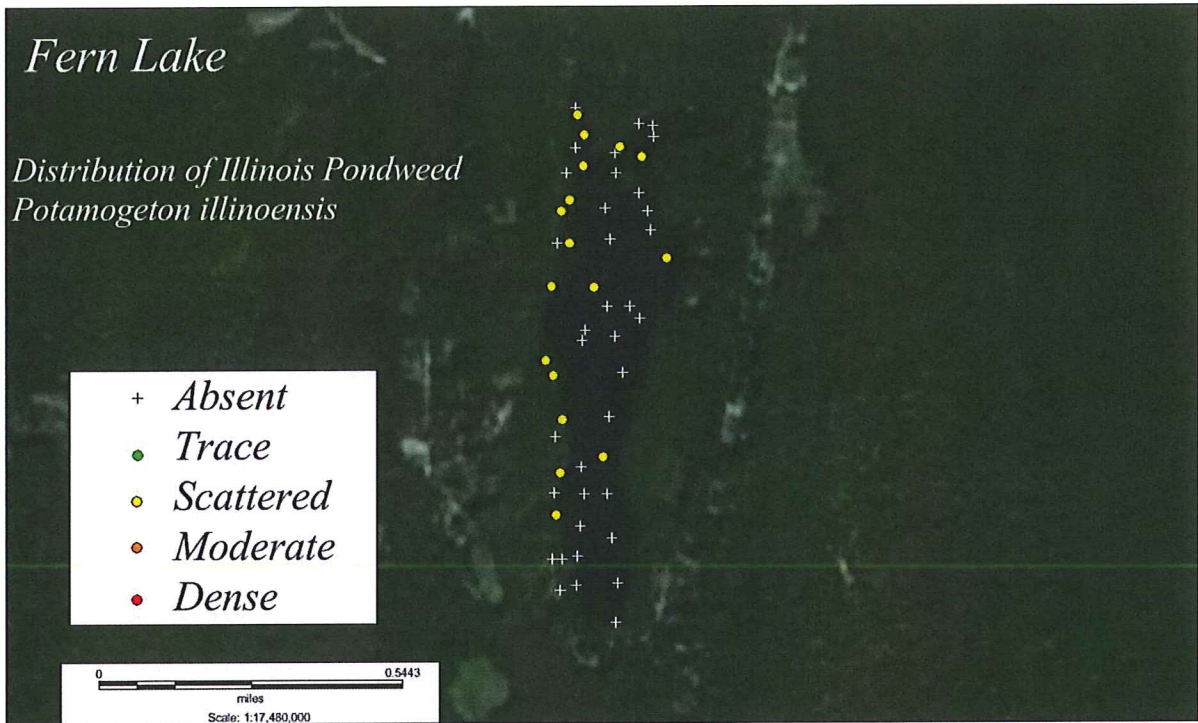
Distribution of Yellow Waterlily
Nuphar variegata



Fern Lake

Distribution of White Waterlily
Nymphaea odorata

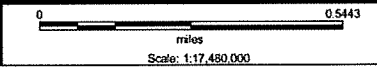




Fern Lake

Distribution of Narrow-leaf Pondweed
Potamogeton pusillus

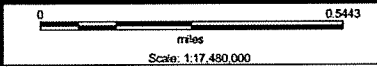
- + Absent
- Trace
- Scattered
- Moderate
- Dense

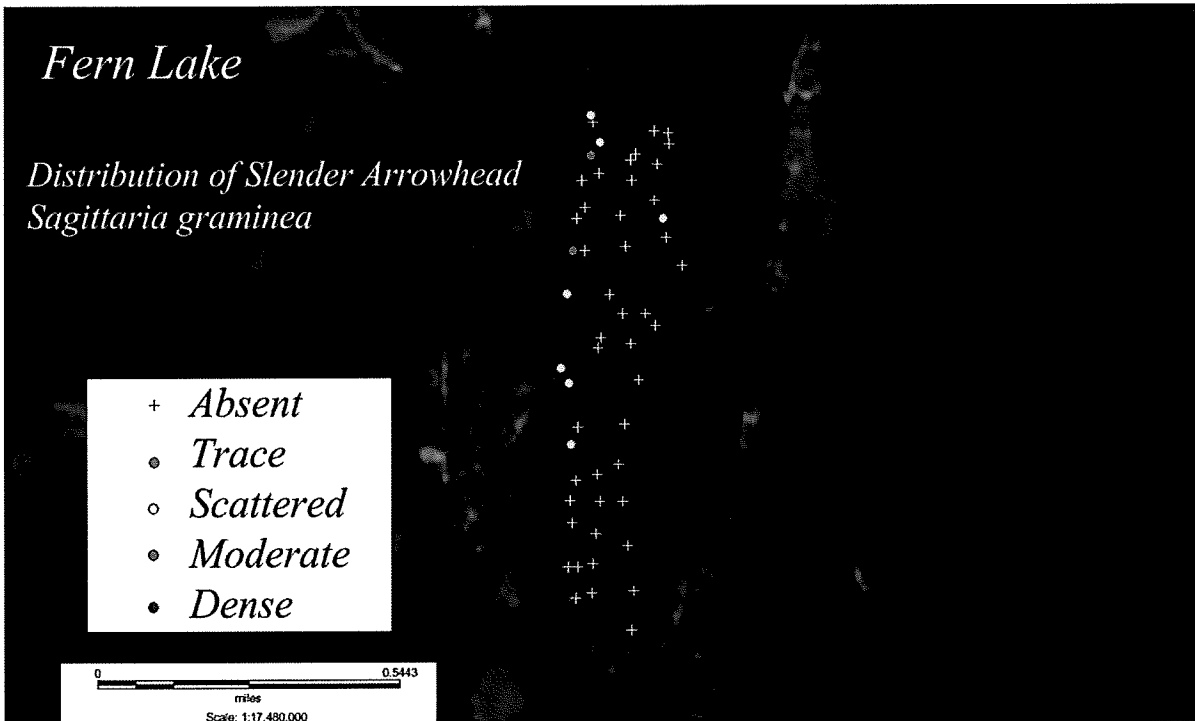
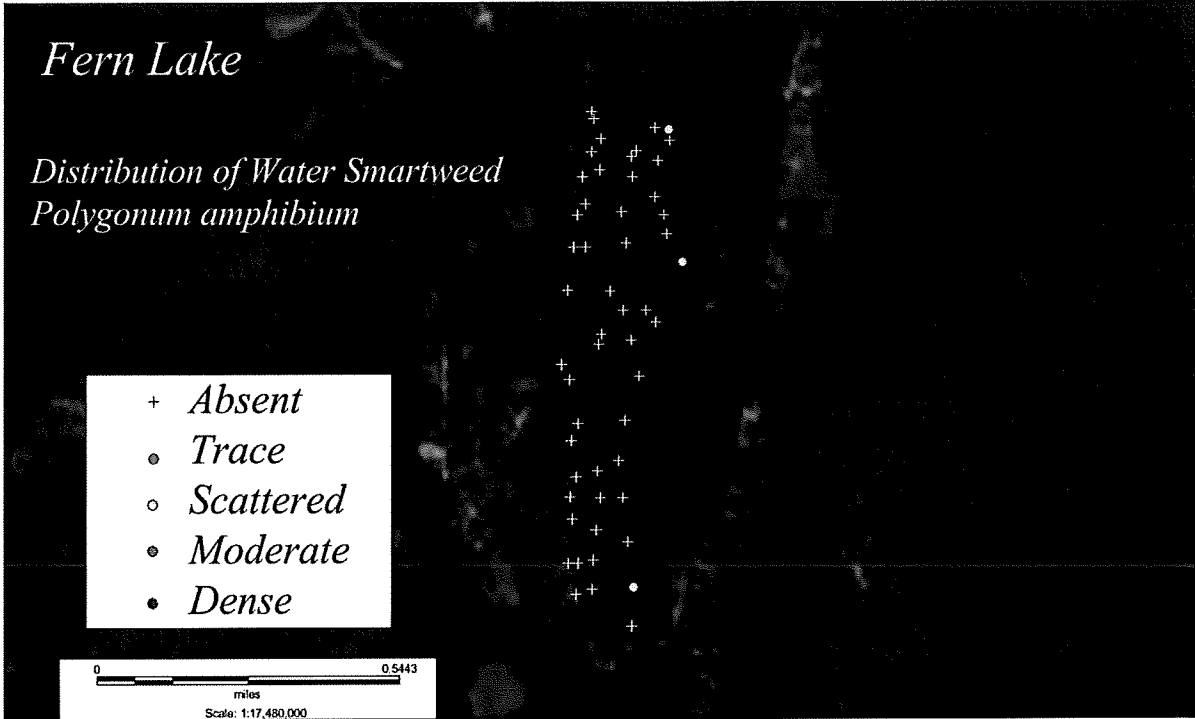


Fern Lake

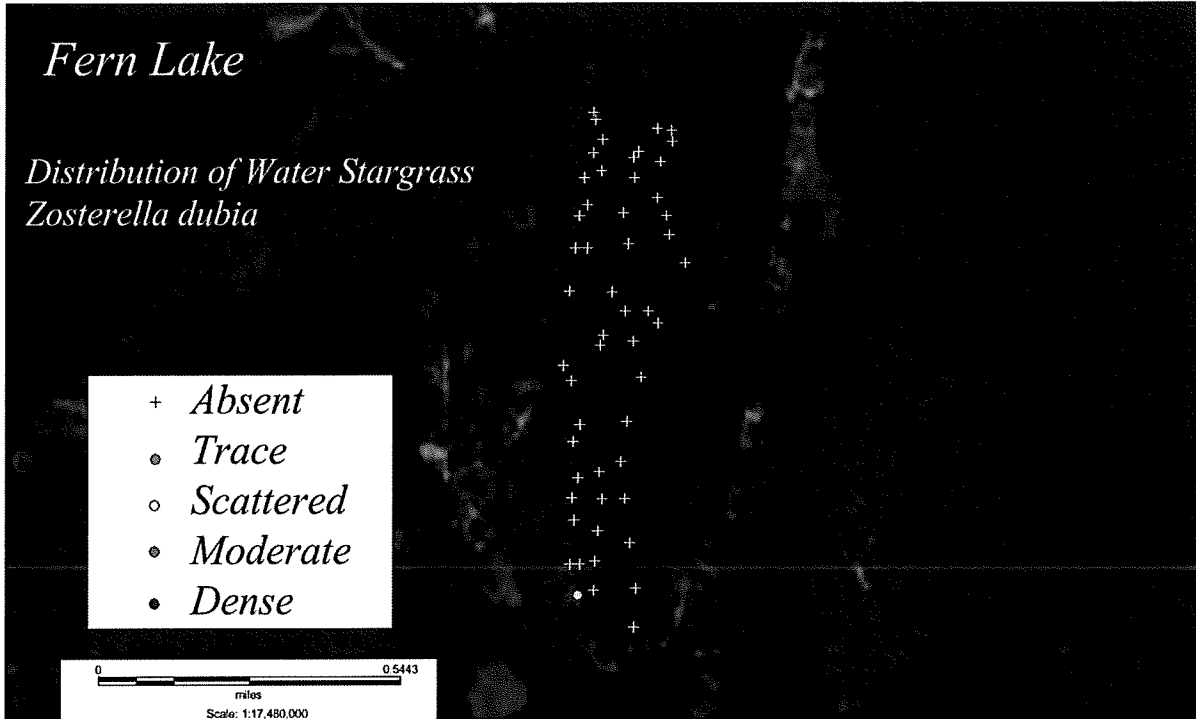
Distribution of Pondweed
Potamogeton spirillus

- + Absent
- Trace
- Scattered
- Moderate
- Dense





□





DEPARTMENT OF HEALTH

Environmental Health
108 Cherry Street – PO Box 70
Burlington, VT 05402-0070
HealthVermont.gov

Agency of Human Services

[phone] 802-863-7220
[fax] 802-863-7483

MEMORANDUM

TO: Misha Cetner
DEPARTMENT: Department of Environmental Conservation, Watershed Management

FROM: Razelle Hoffman-Contois *RstH*
DEPARTMENT: Radiological and Toxicological Sciences Program

SUBJECT: Aquatic Nuisance Control Permit Application 2015-07
DATE: April 26, 2016

=====
The Vermont Department of Environmental Conservation (DEC) recently received an aquatic nuisance control permit application from the Lake Dunmore Fern Lake Association (LDFLA) that proposes use of the product Renovate 3® (a liquid formulation) and/or Renovate OTF® (a flake formulation), both with active ingredient triclopyr (3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt), on potentially a yearly basis under a five year permit, to help control the growth and spread of the aquatic nuisance plant Eurasian watermilfoil in various areas of Lake Dunmore located in the towns of Leicester and Salisbury, Vermont. Maximum flexibility regarding timing of treatment has been requested such that application could potentially occur once in the spring with a booster in the fall. Treatment with herbicides is proposed as part of an Integrated Aquatic Vegetation Management Plan that incorporates both chemical and non-chemical means of control. No prior authorized herbicide treatment of Lake Dunmore has occurred (A. Bove, personal communication 3/17/16).

As a result, per the request of DEC, the state of Vermont Department of Health (Health) has examined the potential level of concern for public health that may be associated with exposure to water that has been treated with either product in question.

The federal product labels for both Renovate 3® and Renovate OTF® establish minimum setback distances for application to water bodies that contain functioning potable water intakes (although the label for Renovate 3® appears to be missing from this permit application, a current label was located for review in application #2016-C02). The labels also specify that if either product is to be used around or within the appropriate setback distance “...the [potable water] intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.”

®Renovate is a registered trademark of Dow AgroSciences LLC.

However, due to the influence of many site-specific factors, neither label can indicate what the maximum concentration of active ingredient is expected to be in the waters of concern at any location at any point in time after application. In addition, it is not possible to predetermine the exact extent of product use that will occur during each year of the permit lifetime as the LDFLA has requested contingent approval to chemically treat up to 100 acres per year with actual treatment needs finalized on an annual basis based on the results of pre-treatment surveys conducted shortly before application occurs.

Therefore, if either Renovate 3® or Renovate OTF® is to be used as proposed, Health recommends that certain water use restrictions beyond the federal label requirements should be instituted in order to ensure protection of public health.

If a multiple year permit allowing treatment on more than one occasion is issued, DEC will need to perform an annual search to determine if updated toxicity and/or breakdown data has become available. DEC will need to provide such information to Health for review in order to determine if the recommendations noted below warrant revision. Similarly, any revision in product formulation will need to be provided to the State Toxicologist for Health for review.

The following recommended water use conditions are based upon review of the most current scientific information available for triclopyr including, but not limited to, any potential health effects, the half-life of the compound, an evaluation of the time for dissolution of the OTF flake formulation, consideration of who is likely to come into contact with treated waters and in what manner, several very health protective assumptions and standard risk assessment procedures, knowledge of previous authorized chemical control efforts and the assumption that **only one product** will be applied per growing season.

In the event that a **combination** of the liquid and flake products will be used during the same growing season, it is recommended that the **more conservative recommendations** listed for Renovate OTF® be followed overall.

Note, based on review by the State Toxicologist for Health, it is reasonable to conclude that human exposure to the inert compounds contained in the products proposed for use at the concentrations that would result under the following conditions, is not likely to result in an increase in the level of concern for public health.

SPECIFIC RECOMMENDATIONS

Because it is not possible to predict the nature and extent of product use and distribution, the following whole water body use conditions are recommended as default.

RENOVATE 3® (liquid formulation)

No use of the treated water body and its associated outlet stream(s) (for one mile downstream of the effluent) **for any purpose** (including recreational uses such as boating and fishing) is recommended on the day of application.

Boating, fishing and toilet flushing may resume at the beginning of the day following application.

Swimming and domestic use other than drinking and using to prepare food or drink, may resume 24 hours after application.

Drinking and using such waters to prepare food or drink should not resume until the conditions that follow have been met.

Twenty-four hours after the initial application of Renovate 3[®], representative samples of the treated water body and its outlet stream(s) (within one-quarter mile of the effluent) should be chemically tested to determine if triclopyr is present at less than or equal to 75 parts per billion (ppb). Analysis of multiple samples is necessary in order to account for the influence of many chemical, media and site specific factors.

If triclopyr is confirmed to be at or below 75 ppb, full use of the treated water body, its waters and outlet stream(s), including all domestic uses may resume. However, if triclopyr is detected in representative samples from these waters above 75 ppb, an additional 24 hour waiting period should occur during which time the treated water body and its outlet stream(s) (within one mile downstream of the effluent) should again not be used for drinking water or in the preparation of food or drink. At the end of this second 24 hour waiting period, representative samples of the treated water body and its outlet stream(s) (within one-quarter mile downstream of the effluent) should again be taken and chemically analyzed for triclopyr. This process should be repeated until representative sampling indicates that the level of triclopyr in the treated water body and outlet stream(s) is at or below 75 ppb. This process also applies to **any and all** booster applications.

Only once residues of triclopyr are confirmed to be below 75 ppb should full use of the treated water body and/or its outlet stream(s) resume. Until full use can be resumed, bottled water should be supplied by the applicant to those who may depend up on the treated water body and/or its outlet stream(s) (within one mile of the effluent) for their domestic drinking water or food and drink preparation water supply.

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

RENOVATE OTF[®] (flake formulation)

No use of the treated water body and its associated outlet stream(s) (for one mile downstream of the effluent) for any purpose (including recreational uses such as boating, fishing and swimming and all domestic uses including toilet flushing) is recommended on the day of application and the entire day after.

Recreational uses such as boating, fishing and swimming may resume at the beginning of the **second** day following application.

Domestic use **other than** drinking and using such waters to prepare food or drink, may resume at the beginning of the second day following application.

Drinking and using such waters to prepare food or drink should not resume until the conditions that follow have been met.

Forty-eight hours after the initial application of Renovate OTF®, representative samples of the treated water body and its outlet stream(s) (within one-quarter mile of the effluent) should be chemically tested to determine if triclopyr is present at less than or equal to 75 ppb. Analysis of multiple samples is necessary in order to account for the influence of many chemical, media and site specific factors.

If triclopyr is confirmed to be at or below 75 ppb, full use of the treated water body, its waters and outlet stream(s), including **all** domestic uses may resume. However, if triclopyr is detected in representative samples from these waters above 75 ppb, an additional 24 hour waiting period should occur during which time the treated water body and its outlet stream(s) (within one mile downstream of the effluent) should again not be used for drinking water or in the preparation of food or drink. At the end of this second 24 hour waiting period, representative samples of the treated water body and its outlet stream(s) (within one-quarter mile downstream of the effluent) should again be taken and chemically analyzed for triclopyr. This process should be repeated until representative sampling indicates that the level of triclopyr in the treated water body and outlet stream(s) is at or below 75 ppb. This process also applies to **any and all** booster applications.

Only once residues of triclopyr are confirmed to be below 75 ppb should full use of the treated water body and/or its outlet stream(s) resume. Until full use can be resumed, bottled water should be supplied by the applicant to those who may depend up on the treated water body and/or its outlet stream(s) (within one mile of the effluent) for their domestic drinking water or food and drink preparation water supply.

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