

REPORT OF THE AQUATIC NUISANCE CONTROL STUDY COMMITTEE

Act Number 57 (H.31 of 2023)

Submitted to the  
Senate Committee on Natural Resources and Energy  
House Committee on Natural Resources, Fish, and Wildlife

Aquatic Nuisance Control Study Committee

December 15, 2023

## Table of Contents

<b>Executive Summary</b> .....	1
<b>Scope</b> .....	1
<b>Study Committee Members and Affiliations</b> .....	2
<b>Overview of Study Committee Meetings and Discussions</b> .....	2
<b>Overview of Title 10: Conservation and Development, Chapter 50: Aquatic Nuisance Control</b> .....	2
<b>§ 1452. Definitions</b> .....	3
<b>§ 1453. Aquatic Nuisance Control Program</b> .....	3
<b>§ 1455. Aquatic Nuisance Control Permit</b> .....	4
<b>§ 1456. Aquatic Species Rapid Response General Permits</b> .....	5
<b>Additional Aquatic Nuisance Control Chapter 10 Sections</b> .....	6
<b>Summary of Pesticides, Chemicals Other than Pesticides, and Biological Controls used in Vermont Lakes and Ponds 2000-2023</b> .....	6
<b>Aquatic Nuisance Control Overview</b> .....	6
Pesticides Approved for Use in Vermont .....	11
Aquatic Nuisance Control Permitting – Current Statewide Herbicide Permits .....	11
Procellacor Projects in Perspective.....	12
Aquatic Nuisance Control Permitting – Current USFWS Lampricide and Lamprey Control on Lake Champlain (NY & VT) .....	13
<b>Pesticide Use Approval and Registration in Vermont</b> .....	13
Vermont Agency of Agriculture Food and Markets .....	13
Current Practice for Evaluating the Acceptable Use of Pesticides in Vermont Waters .....	14
<b>Types of ANC Pesticides Approved for Use in Vermont</b> .....	15
Sonar A.S. (Fluridone).....	15
Renovate 3/OTF (Triclopyr).....	15
Procellacor EC (Florpyrauxifen-benzyl).....	16
TFM (3-Trifluoro-Methyl-4-Nitro-Phenol).....	16
Bayluscide (Niclosamide).....	17
<b>Chemicals Other Than Pesticides</b> .....	17
Pond Dyes .....	17
Copper-based Algaecides .....	17
Aluminum Sulfate and Sodium Aluminate (Alum).....	18
<b>Biological Controls</b> .....	18
Milfoil Weevils ( <i>Eurychiopsis lecontei</i> ).....	18
Others Biocontrols.....	19
<b>Non-Chemical Controls</b> .....	19
Hand Pulling.....	19
Bottom (Benthic) Barriers .....	19
Diver Assisted (Operated) Suction Harvesting.....	19
Hydroraking .....	20
Mechanical Harvesting .....	20
Structural Controls.....	20
<b>Assessment of the Use of Pesticides on the Nontarget Environment or Nontarget Species</b> .....	21
<b>Ecotoxicity</b> .....	21
Sonar A.S. (Fluridone).....	21
Renovate 3/OTF (Triclopyr).....	21
Procellacor EC (Florpyrauxifen-benzyl).....	22
TFM (3-Trifluoro-Methyl-4-Nitro-Phenol).....	22
Bayluscide (Niclosamide).....	23

<b>Public Health .....</b>	<b>23</b>
Sonar (Fluridone).....	23
Renovate (Triclopyr).....	24
Procellacor (Florpyrauxifen-benzyl).....	24
TFM (3-trifluoromethyl-4-nitrophenol) .....	24
Bayluscide (Niclosamide).....	24
Inert Compounds.....	24
<b>Recommended Legislative Changes to Title 10 Chapter 50 .....</b>	<b>24</b>
<b>Precautions for the Use of Pesticides.....</b>	<b>24</b>
Precautions to Protect State Waters and Aquatic Biota .....	24
ANC Individual Permit Internal Review Procedure .....	25
ANC Permit for Pesticide Precautions.....	26
Limitations on the Use of Pesticides.....	27
Recommendations for Additional Precautions.....	28
<b>Establish Appropriate Standards for Approval of the Use of Pesticides .....</b>	<b>28</b>
Present Standards for Approval of the Use of Pesticides .....	28
Additional Standards for Approval of the Use of Pesticides .....	29
<b>ANC Application, Permitting Process and Public Participation .....</b>	<b>31</b>
ANC Application, Permitting Process and Public Participation at Present.....	31
ANC Permit for Pesticides - Public Notification Conditions .....	33
Who Can Apply for an ANC Permit for Pesticides.....	33
Proposed ANC Application and Permitting Process Amendments .....	34
<b>Recommendations for Proposed Changes to Title 10 Chapter 50 Summary .....</b>	<b>34</b>
<b>Other Changes .....</b>	<b>36</b>
<b>Public Comments – Link to Public Webpage .....</b>	<b>36</b>

# **Aquatic Nuisance Control Study Committee Report**

## **Act Number 57 (H.31 of 2023)**

### **Executive Summary**

Act No. 57 (H.31 of 2023) established a Study Committee to review the aquatic nuisance control permit process. The Act 57 Study Committee members reviewed the current aquatic nuisance control permit requirements in Title 10, Chapter 50, Section 1451 (10 V.S.A. § 1451). The Committee summarized the use of aquatic nuisance control pesticides, chemicals other than pesticides, and biological controls and non-chemical controls in Vermont Lakes and Ponds from 2000-2023 to assess their impact on the nontarget environment or nontarget species. The Committee found that the established precautions, standards, internal procedures, and permit conditions outlined in the Aquatic Nuisance Control Permit (10 V.S.A. § 1455) for Pesticides adequately ensure the protection of State waters and are designed to protect fish, reptiles, amphibians, and all other aquatic biota. The Study Committee statutory recommendations include improving definitions within 10 V.S.A. § 1452 terms that may be used to guide permitting decisions; requiring that the Aquatic Nuisance Control Permit for Pesticides is subject to Type 2 Procedures (10 V.S.A. § 7713); and requiring that a municipality, state agency, or federal agency be included as the applicant OR co-applicant for the use of a pesticide in a public body of water. Additional non-statutory Committee recommendations include improving the public notification process for Aquatic Nuisance Control Permit for Pesticides applications and permits thereby providing the opportunity to inform potential interested parties.

### **Scope**

Through the passage of [Act No. 57 \(H.31 of 2023\)](#), an act relating to aquatic nuisance control, the Vermont Legislature established the [Aquatic Nuisance Control Study Committee](#). Act 57 established this Study Committee to assess the environmental and public health effects of the use of pesticides, chemicals other than pesticides, and biological controls for aquatic nuisance control in State waters. The Study Committee report to the Vermont General Assembly includes recommendations regarding whether and when pesticides, chemicals other than pesticides, or biological controls should be used to control aquatic nuisances in Vermont.

### **Act 57 Highlights**

- (1) a summary of the use of pesticides, chemicals other than pesticides, and biological controls in the lakes and ponds of Vermont since January 1, 2000, including the types of pesticides, chemicals other than pesticides, and biological controls approved for use and why they were approved instead of nonchemical controls;
- (2) an assessment of the use of pesticides, chemicals other than pesticides, or biological controls on the nontarget environment or nontarget species; and
- (3) recommended legislative changes to the aquatic nuisance control requirements under 10 V.S.A. chapter 50 to:
  - (A) implement the use of pesticides, chemicals other than pesticides, or biological controls in a more precautionary manner that ensures the protection of State waters and is designed to protect fish, reptiles, amphibians, and all other aquatic biota;

- (B) establish the appropriate standard for approval of the use of pesticides, chemicals other than pesticides, and biological controls for aquatic nuisance control;
- (C) amend the process for the application of an aquatic nuisance control permit in a manner that improves the opportunity for interested parties to participate in the permitting process and that ensures full transparency in the permitting process; and
- (D) provide other changes that the Study Committee determines are necessary or appropriate for implementation of effective aquatic nuisance control in the State.

## Study Committee Members and Affiliations

- Department of Environmental Conservation (DEC): Kim Jensen, Aquatic Biologist and AIS Section Lead (Chair)
- Fish and Wildlife Department (FWD): Eric Palmer, Fish Division Director
- Vermont Department of Health (Health): Sarah Owen, PhD, State Toxicologist
- University of Vermont Aquatic Biologist: Ellen Marsden, PhD, Professor, Fisheries
- University of Vermont Public Health Expert: William Bress, PhD, Assistant Professor, Environmental Public Health, Toxicology, Occupational Health
- House of Representatives: Amy Sheldon, Addison-1, Chair - House Committee on Environment and Energy,
- Senate: Chris Bray, Addison District, Chair - Senate Committee on Natural Resources and Energy
- Administrative / Technical Support: Olin Reed, Aquatic Biologist and Permit Specialist, DEC

## Overview of Study Committee Meetings and Discussions

The Aquatic Nuisance Control Study Committee meetings were held bi-weekly by committee members and were recorded. The meetings were held online and open to the public. The meeting topics were decided by Committee members and included approved agendas, presentations, discussions, and a public comment period at the end of each meeting. The agendas, meeting minutes, presentations, and meeting recordings are available on the DEC Act 57 (2023) Aquatic Nuisance Control Study Committee [webpage](#). Public comments were also sent to the ANR – WSMD Lakes email and were made available for review by the Committee members to consider in drafting the report. A link to the compiled public comments is available on this webpage.

## Overview of Title 10: Conservation and Development, Chapter 50: Aquatic Nuisance Control

Title 10, Chapter 50, Section 1451 ([10 V.S.A. § 1451](#)) Findings:

The General Assembly finds that:

- (1) It is the policy of the State of Vermont that the water resources of the State shall be protected, regulated, and where necessary controlled under the authority of the State in the public interest to promote the general welfare and to protect public health and the environment.
- (2) It is the policy of the State of Vermont to prevent the infestation and proliferation of invasive species in the State that result in negative environmental impacts, including habitat loss and a

reduction in native biodiversity along with adverse social and economic impacts and impacts to the public health and safety.

(3) The Agency of Agriculture, Food and Markets and the Department of Forests, Parks and Recreation have established an informal working group to address invasive and noxious weeds, but additional authority is necessary for the Agency of Natural Resources to adequately respond to invasive aquatic nuisance species.

(4) The ability to initiate quickly a response to contain and control a new aquatic species introduction before it can spread is critical to reduce future management costs and protect the integrity of Vermont's ecosystems.

(5) Infestations of new aquatic species must be detected early and acted upon swiftly to minimize economic, social, and ecological impacts as well as to increase the probability of a successful eradication effort. (Added 2009, No. 46, § 1, eff. July 1, 2010.)

In Title 10, Chapter 50, sections 1452-1461 support these findings and impose statutory requirements for the implementation of the Aquatic Nuisance Control Program. The Agency of Natural Resources (ANR) Department of Environmental Conservation (DEC) Lakes and Ponds Management and Protection (Lakes and Ponds) Program has jurisdiction over the state's [Aquatic Nuisance Control \(ANC\) Program](#), which issues ANC permits pursuant to the requirements of Title 10, Chapter 50, Section 1455 ([10 V.S.A. § 1455](#)). A summary of those relevant sections is included here:

#### § 1452. Definitions

Terms that are defined in the chapter relevant to the Study Committee's charge include but are not limited to:

(1) "Aquatic nuisance" that means undesirable or excessive substances or populations that interfere with the recreational potential or aquatic habitat of a body of water, including rooted aquatic plants and animal and algal populations. Aquatic nuisances include zebra mussels (*Dreissena polymorpha*), quagga mussels (*Dreissena bugensis*), Asian clam (*Corbicula fluminea*), fishhook waterflea (*Cercopagis pengoi*), rusty crayfish (*Orconectes rusticus*), spiny waterflea (*Bythotrephes longimanus*), or other species identified by the Secretary by rule.

(3) "Aquatic plant" means a plant that naturally grows in water, saturated soils, or seasonally saturated soils, including algae and submerged, floating-leafed, floating, or emergent plants.

(4) "Biological controls" means multi-cellular organisms.

(8) "Pesticide" means any substance produced, distributed, or used for preventing, destroying, or repelling nuisance aquatic plants, insects, or other aquatic life, including lamprey. Pesticide includes unicellular organisms or extracts from unicellular organisms and does not include biological controls.

#### § 1453. Aquatic Nuisance Control Program

Responsibilities that are outlined in the chapter relevant to the Study Committee's charge include but are not limited to:

(a) The Agency of Natural Resources shall establish and maintain an aquatic nuisance control program.

(b) The aquatic nuisance control program shall perform the following services:

- (1) receive and respond to aquatic nuisance complaints;
- (2) work with municipalities, local interest organizations, private individuals, and agencies of the state to develop long-range programs regarding aquatic nuisance controls;
- (3) work with federal, state, and local governments to obtain funding for aquatic nuisance control programs;
- (4) implement an aquatic species rapid response program under this chapter;
- (5) administer a grant-in-aid program under section 1458 of this title.

#### § 1455. Aquatic Nuisance Control Permit

Responsibilities that are outlined in the chapter relevant to the Study Committee's charge include but are not limited to:

(a) A person shall not use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices in waters of the State to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, unless that person has been issued a permit by the Secretary.

(b) Notwithstanding other requirements set forth in chapter 47 of this title to the contrary, the Secretary may issue permits under this section.

(c) Persons desiring a permit under this section shall make application to the Secretary on a form prescribed by the Secretary.

(d) The Secretary shall issue a permit for the use of pesticides in waters of the State for the control of nuisance aquatic plants, insects, or other aquatic life, including lamprey, when the applicant demonstrates and the Secretary finds:

- (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.

(e) A landowner applying to use a pesticide on a pond located entirely on the landowner's property is exempt from the requirement of subdivision (d)(4) of this section.

(f) The Secretary shall issue a permit for the control of aquatic nuisances by biological controls, bottom barriers, structural barriers, structural controls, powered mechanical devices, or chemicals other than pesticides when the Secretary finds:

- (1) there is acceptable risk to the nontarget environment;
- (2) there is negligible risk to public health; and
- (3) there is either benefit to or no undue adverse effect upon the public good.

(g) The use of bottom barriers, structural barriers, structural controls, powered mechanical devices, and copper compounds as an algacide in waters with a surface area of one acre or less located entirely on a person's property and with an outlet where the flow can be controlled for at least three days is exempt from the permit requirements of this section.

(h) When an application is filed under this section, the Secretary shall proceed in accordance with chapter 170 of this title.

(i) An aquatic nuisance control permit issued under this section shall:

- (1) specify in writing the Secretary's findings under subsection (d) or (f) of this section;
- (2) specify the location, manner, nature, and frequency of the permitted activity;
- (3) contain additional conditions, requirements, and restrictions as the Secretary deems necessary to preserve and protect the quality of the receiving waters, to protect the public health, and to minimize the impact on the nontarget environment. Such conditions may include requirements concerning recording, reporting, and monitoring;
- (4) be valid for the period of time specified in the permit, not to exceed five years for chemical control, and not to exceed ten years for nonchemical control.

(j) An aquatic nuisance control permit issued under this chapter may be renewed from time to time upon application to the Secretary. The process of permit renewal will be consistent with the requirements of this section.

(k) An applicant for a permit under this section shall pay an application fee as required by 3 V.S.A. § 2822. The Agency of Natural Resources shall be exempt from this fee requirement.

(l) No permit shall be required under this section for mosquito control activities that are regulated by the Agency of Agriculture, Food and Markets, provided that:

- (1) Prior to authorizing the use of larvicides or pupicides in waters of the State, the Secretary of Agriculture, Food and Markets shall designate acceptable control products and methods for their use and issue permits pursuant to 6 V.S.A. § 1083(a)(5); and

(m) The Secretary may issue general permits for the use of nonchemical aquatic nuisance control activities provided that the Secretary makes the findings required in subsection (f) of this section. A general permit issued under this subsection is not required to specify the exact location or the frequency of the permitted activity. (Added 2009, No. 46, § 1, eff. July 1, 2010; amended 2013, No. 142 (Adj. Sess.), § 89; 2015, No. 150 (Adj. Sess.), § 21, eff. Jan. 1, 2018; 2017, No. 67, § 3, eff. June 8, 2017.)

#### § 1456. Aquatic Species Rapid Response General Permits

Responsibilities that are outlined in the chapter relevant to the Study Committee's charge include but are not limited to:

(a) Notwithstanding the requirements of section 1455 of this title, the Secretary may issue an aquatic species rapid response general permit under this section for a term not to exceed ten years for the control of a nonindigenous new aquatic species. This general permit shall identify the control technique, including the use of biological controls, pesticides, and any other control techniques for the nonindigenous new aquatic species for which coverage may be sought under the permit.

(b) Applications for coverage under this general permit shall be limited to the Commissioner of Environmental Conservation and the Commissioner of Fish and Wildlife. The application shall state the grounds for declaring an emergency situation as defined in subsection (f) of this section. The application shall identify the nonindigenous new aquatic species and control techniques selected to respond to the emergency.



## Additional Aquatic Nuisance Control Chapter 10 Sections

[§ 1454](#). Transport of Aquatic Plants and Aquatic Nuisance Species

[§ 1457](#). Entrance upon Lands to Prevent the Introduction and Spread of New Aquatic Species

[§ 1458](#). Grant-in-Aid to Municipalities and Agencies of the State

[§ 1459](#). Joint Municipal Participation

[§ 1460](#). Rulemaking

[§ 1461](#). Aquatic Nuisance Inspection Stations; Training Program

## Summary of Pesticides, Chemicals Other than Pesticides, and Biological Controls used in Vermont Lakes and Ponds 2000-2023

### Aquatic Nuisance Control Overview

Per Chapter 50, Section 1453 ([10 V.S.A. § 1453](#)), the policy objectives of the Aquatic Nuisance Control Program are to protect, regulate, and, where necessary, prevent and control the infestation and proliferation of invasive species in the State that would result in negative environmental impacts, including habitat loss and a reduction in native biodiversity along with adverse social and economic impacts and impacts to the public health and safety. Furthermore, the statute provides authority to the program to respond to, contain, and control new aquatic species introduction threats to reduce future management costs and protect the integrity of Vermont's ecosystems. Finally, the program is responsible for early detection and action to address the introduction of new invasives in order to minimize economic, social, and ecological impacts as well as to increase the probability of a successful eradication effort.

Since its formal inception in 1982, the Aquatic Invasive Species Program was developed in response to early infestations of Water chestnut (*Trapa natans*), Eurasian watermilfoil (*Myriophyllum spicatum*) and Zebra mussels (*Dreissena polymorpha*). The goal of the initial program was to prevent or reduce the environmental and socioeconomic impacts of nuisance (primarily non-native and invasive) aquatic plant and animal species in Vermont. The terms Aquatic Invasive Species (AIS) and Aquatic Nuisance Species (ANC) are used interchangeably but with some nuances applicable to both terms. Throughout the years, the ANC Statute revised the responsibilities of the program to receive and respond to aquatic nuisance complaints; to work with municipalities, local interest organizations, private individuals, and agencies of the state to develop long-range programs regarding aquatic nuisance controls; to work with federal, state, and local governments to obtain funding for aquatic nuisance control programs; to implement an aquatic species rapid response program; to administer a grant-in-aid program; to place and maintain signage throughout the state to support the transport regulations; and to provide written educational information about aquatic nuisances with agency partners.

In the late 1990s and early 2000s, the program partnered with various state and federal agencies, mainly US Army Corps of Engineers Research Program, US Fish and Wildlife Service, Lake Champlain Basin Program, National Aquatic Nuisance Species Task Force, and the National Exotic Pest Plant Council to conduct and implement control technology research and demonstration projects in Vermont on various practices including the use of herbicides to manage Eurasian watermilfoil in the few waterbodies that

were considered vectors for the species spread, and the long-term management of Water chestnut in Lake Champlain to provide navigability for watercraft. As the number of infested waterbodies increased and the need for administrative support for municipalities, local interest organizations, private individuals, and agencies of the state increased, the priorities of the program shifted away from control technology research, demonstration projects, and environmental monitoring, towards the established responsibilities outlined in statute.

With this integral scientific background and foundational agency collaborative effort, the program considered all known and effective practices to manage ANC threats based on the best available technological methods known at the time. In the history of the program, these methods and tools are researched, monitored, and implemented for their effectiveness in reducing the infestation and their impacts to nontarget species and the nontarget environment, and their short-term and long-term impacts to the public health and safety. Other factors are also considered that include the availability of contractors or consultants to complete the work in Vermont, the cost effectiveness for the practices to be implemented, whether the tools are applicable and reliable for the size and scope of the project, whether the tools are potentially permissible in Vermont, and whether these available tools are developmental rather than a maintenance practice. The non-chemical and chemical controls that are available in Vermont range from simple methods such as handpulling to more complicated labor intensive and financially, socially, and environmentally impactful methods, like lake drawdowns. When considering the appropriate aquatic plant control, conservation managers and DEC considers the applicability of a technique, whether the technique can be properly implemented, the reliability, and the primary impediments to determine the potential success of the technique. As demonstrated by Kenneth J. Wagner, Ph.D., CLM, Water Resource Services, in a 2023 North American Lake Management Society conference presentation, the table below outlines these factors when deciding and planning techniques for an aquatic plant control method.

Technique	Applicability	Potential for Proper Implementation	Reliability	Primary Impediments
Techniques to control rooted plants				
Dredging	M	M	M	Incomplete removal of fertile substrate
Benthic barriers	H	M	H	Difficult to cover large areas
Drawdown - annual	L	M	L	Variable plant susceptibility and weather
Drawdown - long-term	M	M	M	Inadequate slope to move fine sediment
Hand harvesting	H	M	M	Limits on control of expansive growths
Diver-Assisted Suction Harvesting	H	M	M	Limits on thoroughness of removal
Mechanical harvesting	H	M	H	Areal coverage limits, equipment needs
Hydroraking	L	M	M	Limits on thoroughness of removal
Herbicides	H	H	H	Susceptibility of species, exposure limits
Dyes	M	H	M	Flushing rate, depth of effectiveness limits
Plant competition	L	L	L	Invasive tend to outcompete natives
Phytophagous fish	M	L	M	Spatial and temporal variation in fish and plants
Phytophagous invertebrates	L	L	L	Fish predation, population oscillations

Table 1. Aquatic plant control techniques applicability, potential for proper implementation, reliability, and primary impediments from low (L) to medium (M) to high (H). Used with permission

from Kenneth J. Wagner, Ph.D., CLM, Water Resource Services, 2023 North American Lake Management Society Conference Presentation.

Based on the past and present scientific, social, and cultural information, the acceptable techniques used to control and manage aquatic nuisances now consist of handpulling, benthic barriers, diver-assisted suction harvesting, mechanical harvesting, and pesticides. Other methods have been used in the past such as drawdowns, dredging, and use of phytophagous invertebrates, but these methods have been superseded by more effective and less environmentally detrimental techniques.

In the early 2000s the philosophy for aquatic nuisance plant control was to aggressively control aquatic invasive species upon their introduction to a new waterbody. The methodology of the techniques was, and are, still used presently when considering the potential for eradication. The methodology takes into consideration the order of the magnitude of the infested area, the estimated time the infestation has been present, and whether there is an active lake community able to take on a project. DEC does not actively manage AIS infestations, except for Water chestnut, due to the sheer amount of personnel time, required effort, and exponential cost attributed to successfully manage existing and new infestations. DEC does assist lake communities with early detection rapid response (EDRR) activities when an aquatic invasive species is introduced into new waterbodies.

Handpulling is an effective technique used for EDRR introductions for a small population of AIS. This technique is a useful and a successful operational method for managing Water chestnut, an annual floating leaved plant. Some lakeshore owners use this method to maintain a plant free area along docks or beaches. Beyond these applications, handpulling is not an effective method for large, dense, populations, nor for submerged aquatic plants like Eurasian watermilfoil.

Bottom (Benthic) barriers are used as the next effective technique for small AIS patches that may be found throughout a waterbody or can also be used by landowners along beaches and docks. Depending on the application, this technique can be successful in controlling patches of new infestations, but the cost of the material, placement, and removal of the underwater mats, can be both time and cost prohibitive. Purchasing the materials, and the installation and removal of the material that requires skilled labor, makes this a costly technique. The use of bottom barriers is not a feasible technique for dense populations of infestations that are found throughout an entire lake.

Diver-assisted (or operated) suction harvesting (DASH or DOSH) is a very effective, applicable, and reliable technique that is used for EDRR efforts, or for long-term maintenance projects in combination with other techniques. However, this technique requires skill, expertise in diving, and costly equipment (motorboats and suction devices). Unfortunately, there are only a handful of DASH contractors in Vermont, and the costs are extremely high. DASH is not feasible for dense populations of infestations that are found throughout an entire lake.

Mechanical harvesting equipment consisting of large floating barges that cut aquatic plants below or at the water surface, is the next technique utilized once an infestation has reached an unmanageable level or is found throughout the entire waterbody. A characteristic that allows AIS to be prolific is their ability to vegetatively sprout from fragments, therefore mechanical harvesting can be an effective management

technique but once used, the AIS infestation may increase if fragments from this technique are prolific. This technique is used in some long-term management projects generally to “mow the weeds” and to maintain lane ways and clear shorelines of AIS. The costs to annually run mechanical harvesting equipment are generally high, involving upfront capital costs, annual maintenance, and skilled labor.

The last resort technique to control and manage ANS infestations is pesticides. Precedence to use this technique has been in waterbodies where the infestation, mainly Eurasian watermilfoil and Sea Lamprey, have reached levels in which non-chemical means are found to no longer be suitable in managing the population. Pesticides, when used in conjunction with non-chemical methods, have been proven to reduce nuisance populations to levels in which non-chemical control methods may be utilized as the sole tool in controlling these populations.

A description of the aquatic nuisance controls used from 2000-2023 is found on page 10. The advantages, limitations, and estimated costs for the approved control practices used in Vermont are found in Table 2.

**Table 2. Comparison of Aquatic Plant Control Techniques and Estimated Costs\***

Approach	Typical Application	Advantages	Limitations	Approximate Unit Cost
Hand-Pulling	Widely scattered plants <500 stems per acre	<ul style="list-style-type: none"> <li>• Highly selective</li> <li>• Can utilize trained volunteers in some cases</li> </ul>	<ul style="list-style-type: none"> <li>• Impractical for large areas with milfoil coverage greater than ~1-5%</li> <li>• Labor/physically intensive</li> <li>• Reduced visibility from poor water clarity or suspended sediments from a mucky bottom</li> </ul>	\$500 - \$2,500/acre
Benthic Barriers	Small dense patches (< 0.25 acres)	<ul style="list-style-type: none"> <li>• Quick control for small areas</li> <li>• Prevents re-infestation</li> <li>• Barriers can be reused</li> </ul>	<ul style="list-style-type: none"> <li>• Non-selective, impacts all plants, and may impact macroinvertebrates and other nontarget organisms</li> <li>• Barriers require routine, annual maintenance, install &amp; removal</li> <li>• Skilled staff required</li> <li>• High cost per acre</li> </ul>	\$25,000 - \$50,000/acre
Suction Harvesting / DASH	Small scattered to moderate infestations (< 1 acre in size)	<ul style="list-style-type: none"> <li>• More efficient than hand pulling for higher plant densities</li> </ul>	<ul style="list-style-type: none"> <li>• Increases turbidity</li> <li>• Skilled staff required and technical equipment</li> <li>• Very high cost per acre</li> </ul>	\$5,000 – \$15,000/acre
Mechanical Harvesting	Dense infestations	<ul style="list-style-type: none"> <li>• Creates travel laneways for recreational/navigable activities</li> <li>• Reduces volume of submersed and floating mats</li> </ul>	<ul style="list-style-type: none"> <li>• Non-selective, harvests all plants and may impact macroinvertebrates and other nontarget organisms</li> <li>• Requires upfront capital costs, annual maintenance, and skilled labor</li> <li>• Creates fragments that expand the infestation throughout lake</li> <li>• Spoils removal and transport</li> </ul>	\$500 - \$2,500/acre

Herbicide (Procellacor)	Dense infestations	<ul style="list-style-type: none"> <li>• Targets select species</li> <li>• Reduces volume of selected species</li> </ul>	<ul style="list-style-type: none"> <li>• Additional permit requirements</li> <li>• Specialized staff and equipment</li> <li>• Potential for nontarget impact</li> <li>• Plant surveys and water quality tests required</li> </ul>	\$1,000 – \$3,000/acre
-------------------------	--------------------	--	---	------------------------

Table 2. \*Estimates are based on a variety of sources and personal communication at the time of the report, adapted with permission from the Practical Guide to Lake Management in Massachusetts 2013, Massachusetts Department of Conservation and Recreation.

Dense populations of AIS particularly in waterbodies that are popular, heavily used, and have recreational motorboats, are considered a major vector for other waterbodies that do not have AIS. Reducing the populations in these lakes is a priority for ANR, to reduce the threat of new AIS introductions. The likelihood of eradicating Eurasian watermilfoil once introduced is highly unlikely. While some waterbodies have engaged lake communities or lake associations with a large membership that provides donations, a robust well-staffed and engaged municipality, and an economically advantageous community to assist or volunteer to manage AIS spread prevention or harvesting projects, many lake communities and municipalities do not have the resources to control or manage new introductions, much less an infestation. Since the early 2000's Eurasian watermilfoil introductions have increased dramatically as shown in Table 3.

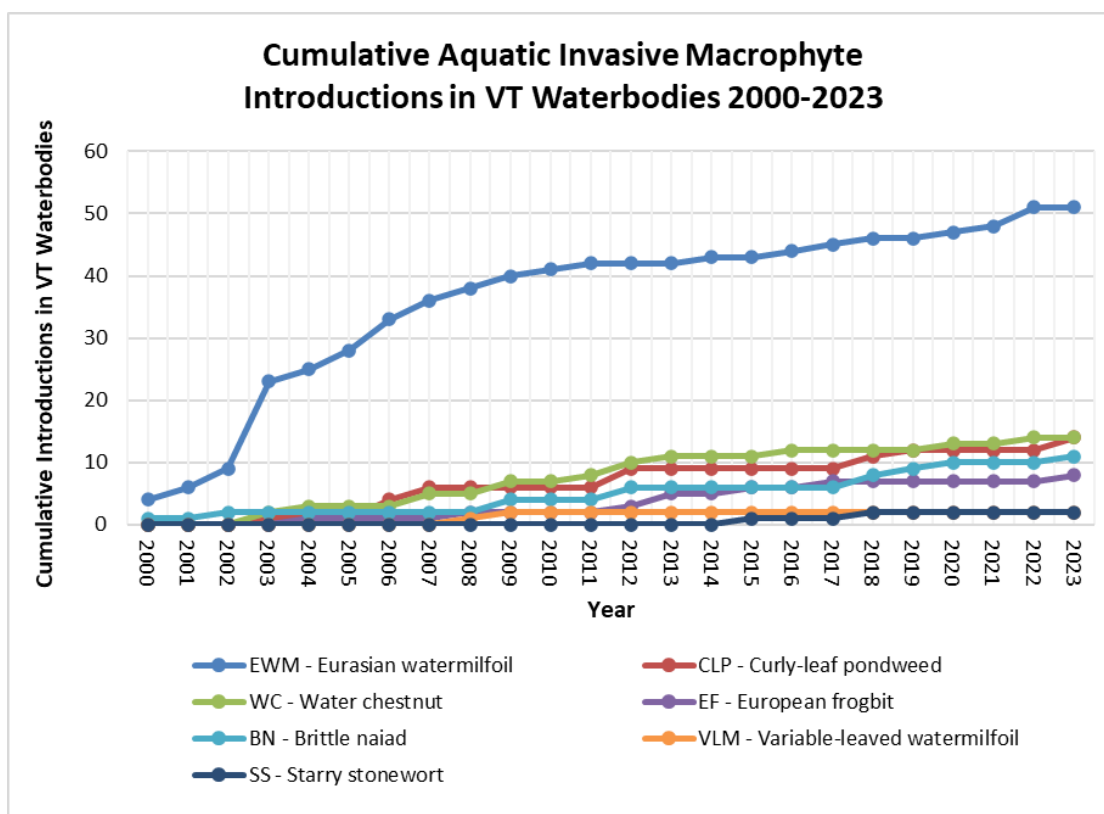


Table 3. Cumulative aquatic invasive macrophyte species introductions to new Vermont waterbodies from 2000-2023 annually since 2000. As of 2023, 102 waterbodies in Vermont contain Eurasian watermilfoil.

## Pesticides Approved for Use in Vermont

Prior to 2000, a variety of chemicals were permitted for the management of aquatic nuisance species. Records show that in 1963, 2,4-Dichlorophenoxyacetic acid was first permitted as a broad-spectrum herbicide to manage aquatic nuisance species. In 1996, Garlon 3A (triclopyr) was approved for an ANC permit to control Eurasian watermilfoil in Burr Pond, marking the first recorded herbicide treatment specifically for this species. This began the start of modern ANC permitting procedures. In 1999, Burr Pond and Lake Hortonia were both authorized for the use of Sonar (fluoridone) to manage Eurasian watermilfoil. The treatments were closely monitored by DEC, and the permits included provisions for intense sampling of the water to determine the herbicide (Sonar) concentrations throughout the summer, both in-lake and downstream, and comprehensive monitoring of the aquatic and wetland plant communities to determine the efficacy for control on Eurasian watermilfoil and any impacts to nontarget plants. Additional monitoring of fish, amphibians and macroinvertebrates also took place.

Since 2000, 16 total Vermont waterbodies have been treated with pesticides, 9 for Lampricide (for Lamprey control). The breakdown of the treatment year, pesticide type, and waterbody are as follows:

- 2000-2004 Sonar – Whole Lake Treatments in 8 Lakes  
Beebe, Burr (2000, 2004), Hortonia (2000, 2004), Lily (Poultney), Little (Wells), St. Catherine, Star, Sunrise (Benson)
- 2006-2019 Renovate – Spot Treatments in 11 Lakes  
Burr (2006, 2011); Dunmore (2016, 2019); Fairlee (2010, 2013, 2015, 2018); Fern; Hortonia (2006, 2007, 2008, 2010, 2015, 2018); Indian Brook; Lily (Poultney) (2006, 2009, 2011, 2014); Little (Wells) (2006, 2009, 2011, 2012); St. Catherine (2007-2018); Star, Sunrise (Benson)
- 2010, 2011, 2015 Sonar - Whole Lake Treatments in 2 Lakes  
Hortonia (2010, 2015); Star (2011)
- 2019 – 2023 Procellacor - Spot Treatments in 11 Lakes  
Beebe (2020-2022); Burr; Hortonia (2019-2023); Iroquois; Lily (Poultney); Little (Wells) (2021,2022); Morey; Pinneo (2020, 2021); Salem Lake; St. Catherine (2020-2022), Sunrise (Benson)
- 2000-2023 TFM (With Bayluscide as an additive in some instances)– Lewis Creek; Winooski River; Hubbardton River; Poultney River; Missisquoi River; Lamoille River; Sunderland Brook; Stone Bridge Brook; LaPlatte River

In 2019, DEC and FWD agreed to limit whole lake treatments and maintain 60% of the total littoral zone with the onset of Procellacor registration.

## Aquatic Nuisance Control Permitting – Current Statewide Pesticide Permits

- Currently 108 active ANC Permits - 38 General Permits and 70 Individual Permits
- Of the 70 Individual Permits, 53 are specifically for the control of an aquatic invasive species (51 Eurasian watermilfoil (EWM); 1 Water chestnut and 1 for EWM/Curly leaf pondweed), 11 are for native plants, 6 are for Lamprey control. (14 BB; 26 DASH; 13 MH; 2 Lampricide; 4 Structural)

- Of the 51 Individual Permits to control EWM, 11 are for Herbicide using Procellacor (15.7% of 70).
- The first permit for Procellacor was issued on 6/4/2019 (Lake Morey).
- There are no active ANC permits for biological controls; formerly used *Eurychiopsis lecontei* (Milfoil weevil) for EWM control.

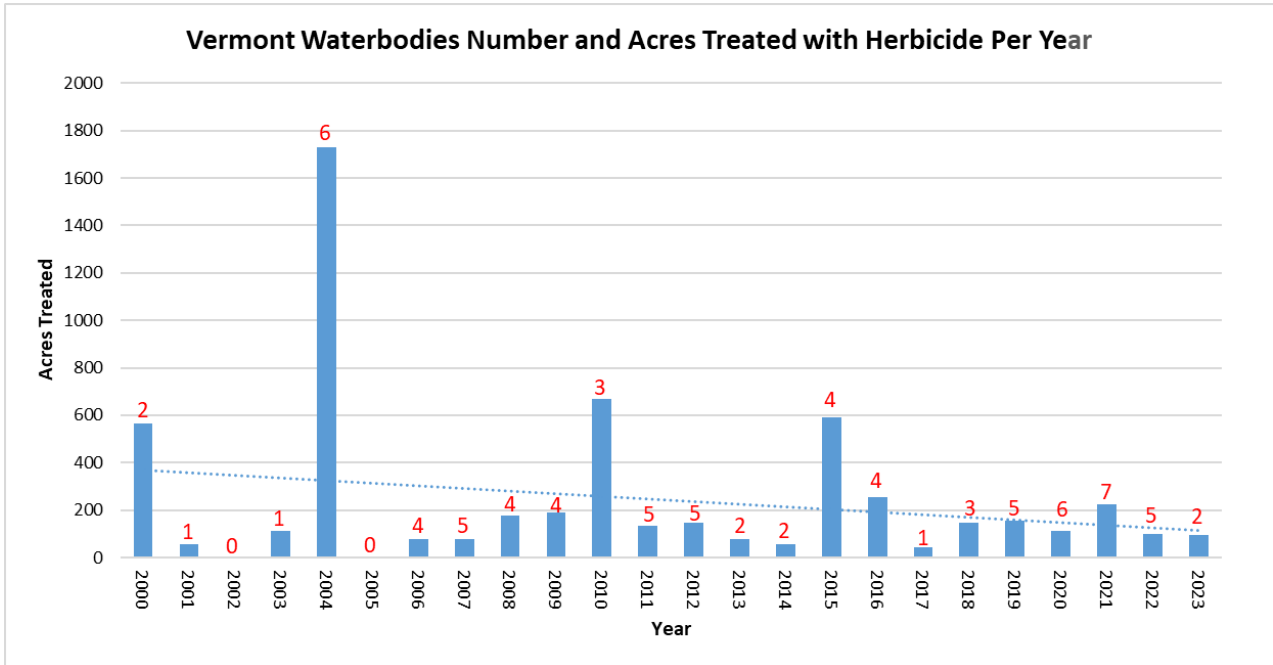


Figure 4. Vermont waterbodies total number and acres treated with herbicide from 2000-2023.

#### Procellacor Projects in Perspective

- Vermont has 438 lakes and ponds greater than 10 acres, totaling 220,334 acres
- Acreage of 11 permitted Procellacor waterbodies = 4,743 acres (2.15%)
- Procellacor acreage treatment totals:  
2019: 154 acres (0.07%), 2020: 112 acres (0.05%), 2021: 223 acres (0.1%), 2022: 100.5 acres (0.045%), 2023: 93.88 acres (0.042%)
- Active Permits for Long-Term Management:
  - Addison County (1): Lake Dunmore
  - Chittenden County (1): Lake Iroquois
  - Orange County (2): Lake Fairlee, Lake Morey
  - Orleans County (1): Salem Lake (\*EWM infestation identified in 2018)
  - Rutland County (5): Lake St. Catherine (w/ Lily Pond & Little Lake), Burr Pond, Lake Hortonia, Beebe Pond, Sunrise Lake
  - Windsor County (1): Lake Pinneo

## Aquatic Nuisance Control Permitting – Current USFWS Lampricide and Lamprey Control on Lake Champlain (NY & VT)

- 7 Rivers in Vermont and 18 Rivers and Deltas in New York are chemically treated for Sea Lamprey control on a quadrennial cycle. Lampricides (TFM and Bayluscide) are applied to rivers and deltas to kill larval Sea Lamprey larvae before they become parasitic.
- 226 Champlain tributaries are surveyed on a quadrennial cycle to identify distribution and density of larval Sea Lamprey in the basin; data guide control decisions and strategies.
- 9 Rivers controlled using barriers that block lamprey from reaching their spawning habitat. One new barrier is in the process of being built on the LaPlatte River.

## Pesticide Use Approval and Registration in Vermont

### Vermont Agency of Agriculture Food and Markets

Currently, per [6 V.S.A. § 918](#), the Agency of Agriculture Food and Markets (AAFM) Division of Public Health and Agricultural Resource Management (PHARM) registers pesticides that are distributed, sold, or offered for sale in Vermont. Per [6 V.S.A. § 1104](#), AAFM may cancel, restrict, or otherwise regulate the use of a pesticide found to have a deleterious effect on the environment. Using this authority, at the request of ANR, PHARM will review any pesticide product being considered for a permit for use in ANC Permits for environmental toxicology concerns. PHARM can recommend restrictions or modifications on proposed uses to address these issues.

The results of PHARM reviews are provided to the ANR, DEC, and Health. Prior to 2021, the Vermont Pesticide Advisory Council (VPAC) reviewed the active ingredients proposed for use under the aquatic nuisance control program. Through legislative change in 2021, VPAC was dissolved ([Vermont Act 49, 2021](#)). At this point, there is not a collective agency review of pesticides after PHARM registration. ANR has sole authority regarding the issuance of the permit and will use the reviews as part of the permit decision making process and provide the reviews as part of the public record.

AAFM's other role in the ANC permitting process is to either provide a standard pesticide application inspection for routine applications, or a pesticide application investigation for any complaints received about an application conducted pursuant to the ANC Permit. Both an inspection and investigation are handled similarly, with the below comprising the standard procedure.

1. An AAFM Agricultural Resource Management Specialist arrives on-site, usually at the boat launch area prior to the application of the pesticide and confirms the applicator's Vermont certification status.
2. The Specialist reviews with the applicator the product being used and that all the label requirements will be met, such as application rate, volume of pesticide to be applied to the body of water, target species, location of application within the waterbody, and compliance with any other cautionary label statements.
3. The Specialist confirms that, if required by the pesticide label, personal protective equipment is being worn by the applicator during handling and application of the pesticide.



4. The Specialist checks that pesticide storage requirements are being met, per both the label and the Vermont Rule for Control of Pesticides.
5. The Specialist observes the pesticide application to the body of water and takes a sample from the tank mix, as needed, to determine compliance with pesticide rates on the product's label.
6. The Specialist requests post-application paperwork from the applicator to determine compliance with the Vermont Rule for Control of Pesticides, including the requirements surrounding information left with the customer at the time of application and that the pesticide operational records are being maintained by the applicator.

#### Current Practice for Evaluating the Acceptable Use of Pesticides in Vermont Waters

The ANR DEC researches and evaluates the use of aquatic use pesticides for efficacy on the target species, the potential and known impacts on the nontarget environment and nontarget species, estimated costs related to the implementation of the treatment, other state partner's experience, findings and in-state studies, and the potential pros and cons, specifically for long-term control management projects in Vermont waterbodies. DEC continues to review applications, research, and conducts studies to address the potential and known impacts to pesticides, and reviews data or studies from partnering states to evaluate the potential impacts to nontarget environment and nontarget species. Health determines whether use of the proposed pesticide to control aquatic nuisance species will meet the criteria of negligible risk to public health as required under [10 V.S.A. § 1455\(d\)](#).

After pesticides are registered by EPA and AAFM, the ANR considers the use of pesticides to be a permissible tool when there are no reasonable nonchemical alternatives available. This means that alternative nonchemical techniques are no longer effective, applicable, or reliable to meet the goal of the project. In Vermont, chemicals other than pesticides, such as pond dyes, are not permissible due to the impacts on nontarget species and the nontarget environment. Copper-based algaecides are permissible on a limited basis in small, private ponds. Aluminum Sulfate and Sodium Aluminate (Alum) has been permitted once in Ticklenaked Pond, however the scope of using this technique is not applicable to the ANC Permit and is not considered a viable option. The use of biological controls for ANC in Vermont is very limited; the native *Eurychiopsis lecontei* (Milfoil weevil) is the one species approved for use as a biological control, but there are many challenges associated with its use that affect its efficacy.

Nonchemical control techniques are used when applicable, reliable, and have the potential to be effective when implemented properly. Numerous factors and impediments are weighed based on the scale, scope, and duration of the infestation, the realistic costs related to the technique, the accessibility of the site, and the environmental, social, and economic factors. Mentioned in the previous section, permissible nonchemical control techniques consist of handpulling, bottom (benthic) barriers, diver assisted suction harvesting, and mechanical harvesting. Other techniques such as dredging, and drawdowns are not permissible for ANC projects. Hydro-raking was permitted for one waterbody and was limited in scope.

## Types of ANC Pesticides Approved for Use in Vermont

### Sonar A.S. (Fluridone)

Sonar is a systemic herbicide that inhibits plant-specific enzymes that cause photosynthesis in aquatic submersed plants. The herbicide was registered by the EPA for aquatic use in 1986 and was registered with the AAFM in 1994. The conditions for its use included large-scale or whole lake treatments, with low use rates, and long exposure time to effectively target Eurasian watermilfoil. Sonar is a selective herbicide with specific concentrations that control submersed and floating aquatic plants by treating the water column. The chemical is absorbed through new growth shoots and roots which results in a breakdown of carotene, removing the plant's ability to perform photosynthesis causing bleaching symptoms, and the eventual die off the targeted species. Factors that may influence the effectiveness of the control can include water depth, clarity, microbes, and season of the application. The treatment symptoms may be delayed for weeks or months after the initial treatment, generally between 7-30+ days.

Sonar was approved for use in waterbodies fourteen times from 2000-2016, during this time the treatment effectively reduced Eurasian watermilfoil frequency but did not eradicate the species which may have been due to the influencing factors listed above. While Sonar is a selective herbicide to control Eurasian watermilfoil, its potential to control nontarget aquatic plants (duckweed and watermeal) is higher than more recently approved herbicides. In addition, in 2018, DEC and FWD agreed to limit the use of whole lake treatments for aquatic nuisance management control projects to maintain a 60% vegetated littoral zone to meet the FWD concerns of habitat suitability of aquatic vegetative cover for fisheries. Due to the reasons listed above, Sonar A.S. is not considered as an effective treatment control option for long-term control management of Eurasian watermilfoil.

### Renovate 3/OTF (Triclopyr)

Renovate 3 and Renovate OTF are systemic herbicides that disrupt plant tissue growth in aquatic plants. The herbicide was registered by the EPA for aquatic use in 2002. AAFM registered Renovate 3 in 2003 and Renovate OTF in 2006. The permit conditions for its use included spot treatments, with low use rates, to target Eurasian watermilfoil. The chemical is absorbed by the plants' leaves and stems, which then moves throughout the plant into the roots. The chemical interrupts hormone levels and causes rapid tissue growth in some plants, and as a growth minimizer in others. Renovate 3 and Renovate OTF are mildly selective herbicides, with Renovate OTF having a lower amount of the active ingredient triclopyr than that of Renovate 3, which concentration impacts different plants.

Renovate 3 and Renovate OTF have been used interchangeably in Vermont from 2006-2019, with forty-three different treatments being approved. These treatments were all spot treatments, with concentrations being implemented to target Eurasian watermilfoil. While used in spot treatments, the chemical was effective in reducing Eurasian watermilfoil frequency but did not eradicate the species entirely.

The active ingredient in Renovate, triclopyr, has recommended water use restrictions when found in concentrations above 75 ppb, with treatments in Vermont utilizing concentrations between 50 ppb

and 2,500 ppb. In permits where the concentrations were above 75 ppb, additional water use restriction permit conditions were included to protect public good.

Renovate 3, having a higher concentration of triclopyr than Renovate OTF, has a much higher potential to impact nontarget plants according to its label in comparison with Renovate OTF. Renovate OTF has a shorter list of species controlled by the chemical than Renovate 3, the risk to the nontarget environment and potential impact on public good is higher than that of other management methods currently approved. While Renovate proved to be a capable management tool for control of Eurasian watermilfoil, its potential impact on the non-target environment and public good are not acceptable when compared to current treatment options, and as such is no longer an acceptable pesticide to treat Eurasian watermilfoil.

#### Procellacor EC (Florpyrauxifen-benzyl)

Procellacor is a systemic herbicide used for the management of aquatic vegetation that disrupts cell structures in the plant. The herbicide was registered by the EPA for aquatic use in 2018 and approved by AAFM in 2018. The chemical is absorbed into the plant which results in a breakdown of the plant tissue. Procellacor concentrations are measured in prescription dose units (PDU) rather than in parts per million/billion, with different PDUs impacting different plants. Procellacor works in a similar way to Renovate, being absorbed by tissues in the plant which then bonds with specific target receptors. The chemical mimics a natural plant hormone, auxin, causing a disruption in related genes. This ultimately results in the plant becoming brittle and breaking down.

Procellacor has been used twenty-five times since 2019 and is currently the only actively permitted herbicide for use of controlling aquatic plants within Vermont with eleven lakes having active permits. Each of these permits have restrictive conditions allowing for spot treatments with at least 60% of the littoral zone being protected so as to comply with the 60/40 agreement between DEC and FWD. All of these treatments have been used to manage Eurasian watermilfoil populations. Procellacor has no EPA-required use restriction for activities like swimming, boating and fishing, although DEC has implemented a condition in all active permits recommending restricted use of a waterbody on the day of treatment. The permittee is required to provide potable water to all those that may be impacted.

Procellacor has a small potential for impact on the nontarget species and the DEC completed a statistical analysis in 2021, finding no significant change in species diversity in lakes that had used Procellacor. Of the nontarget species that are listed as being controlled on the product label, the DEC has found that these species typically return in frequency of occurrence the year following treatment. As such, the DEC has found that Procellacor appears to be an effective tool in the long-term management of Eurasian watermilfoil.

#### TFM (3-Trifluoro-Methyl-4-Nitro-Phenol)

TFM is a chemical used for the control of Sea Lamprey larvae in the tributaries of Lake Champlain. The pesticide was registered with the EPA in 1964 and reregistered in 1999. The pesticide was approved by AAFM in 1987. The chemical has been shown to be highly effective at controlling Sea Lamprey larvae and is currently used by the US Fish & Wildlife Services (USFWS) and was historically

used by FWD. TFM works as an uncoupler of oxidative phosphorylation, resulting in the failure of the aerobic respiration process.

TFM has been used in five tributaries of Lake Champlain since 2000 a total of 25 times. It is currently one of two pesticides permitted for the control of sea lamprey in Vermont. Treatments typically occur in various reaches of tributaries where Sea Lamprey larvae have been found historically. The EPA labels TFM as being moderately toxic to mammals, slightly to highly toxic to fish, slightly to moderately toxic to invertebrates, and toxic to aquatic plants. In 2019, Health established a drinking water health advisory of 100 ppb. The Secretary has determined that the potential nontarget impact on the environment is acceptable.

The DEC has included permit conditions to reduce nontarget impacts that include restricting use to certain rates of flows in the river and requiring physical barriers to be placed in order to protect Class I wetlands.

### Bayluscide (Niclosamide)

Bayluscide contains the active ingredient niclosamide. Like TFM, niclosamide uncouples oxidative phosphorylation. The chemical was registered with the EPA in 2003, approved by AAFM in 2009. Niclosamide is more potent than TFM, but less specific for Sea Lamprey. Bayluscide is used in combination with TFM to control Sea Lamprey larvae. Niclosamide has been shown to be highly effective at controlling Sea Lamprey larvae and is currently used by the USFWS. Niclosamide is commonly used as a medicine for treating worm infections in humans (antihelminthic) and is considered to have negligible impacts to human health at the rates used for Sea Lamprey control.

Bayluscide is a less selective pesticide, and when combined with TFM during lampricide treatments, Bayluscide may reduce the volume of TFM needed to reach the target minimum lethal concentration. The use of Bayluscide is more technically challenging as concentrations and mixtures must be monitored in real time and adjusted based on environmental conditions, resulting in it being used in only two rivers in Vermont.

## Chemicals Other Than Pesticides

### Pond Dyes

Pond dyes are primarily utilized in small ponds to reduce light availability in a body of water. There are no currently permitted uses of pond dyes in the state of Vermont as the impact to nontarget environments can be significant. As light availability reduction would impact both plant species and algae species, this impact is not viewed as acceptable. In Vermont, there have been cases of illegal use of pond dyes seeping into ground water, impacting wells downstream.

### Copper-based Algaecides

The use of copper-based algaecides exists as a permit exempt use in ponds under one acre in size, located entirely on one property, with the ability to control outflow for three days, and only for the management of nuisance algae populations. These algaecides have not been approved for use

outside of these small ponds and further extensive review would be necessary to understand the nontarget impacts in a larger system.

#### Aluminum Sulfate and Sodium Aluminate (Alum)

Alum has been used as a chemical treatment to prevent the release of phosphorus from lake sediment under specific conditions, which may mitigate cyanobacteria blooms when they are driven by internal phosphorous loading, as opposed to external phosphorus loading from the surrounding watershed. Since 2000, one ANC permit has been issued for the use of alum in Ticklenaked Pond. DEC now evaluates proposed alum discharges through its National Pollutant Discharge Elimination System (NPDES) permitting program, which requires compliance with the Vermont Water Quality Standards, including the aluminum criteria adopted in 2022.

## Biological Controls

#### Milfoil Weevils (*Eurychiopsis lecontei*)

The use of *Eurychiopsis lecontei* (Milfoil weevil) as a biological control method for Eurasian watermilfoil was approved for use in Vermont in 1993. The Milfoil weevil is a native species that primarily feeds on and targets milfoil species. After the invasive species, Eurasian watermilfoil was introduced, DEC received a grant from the EPA in 1990 to study the potential effectiveness of rearing and releasing the weevils as a biological control method. Since then, further studies have been completed by DEC and Middlebury College. Over \$800,000 was awarded through ANC Grant in Aid funds by the DEC to utilize this method, with over 100,000 weevils reared and introduced into Vermont waterbodies.

Weevils have some major limiting factors on their use in Vermont. Firstly, the rearing of thousands of weevils is both costly and labor intensive. The weevils must be raised in containment tanks and then introduced to dense milfoil populations. Presently, there are no private or commercial businesses or organizations in Vermont that are raising the species to make them available as a treatment practice. In their natural setting, for a weevil population to successfully overwinter in Vermont, they require a substantial riparian buffer with an abundance of vegetated shoreline and littoral areas. Historically, Vermont as a state has poor shoreland vegetative conditions related to over-developed shorelines prior to the Shoreline Protection Act passed in 2014. Therefore, for a substantial weevil population to control Eurasian watermilfoil, the overwintering vegetation within the littoral and shoreline areas must be robust to meet their habitat requirements.

Lastly, weevils are highly susceptible to fish predation, particularly *Lepomis spp.* Many lakes in Vermont have native, healthy populations of fish in this genus. Observations of weevil releases for Eurasian watermilfoil control demonstrated high predation as soon as the weevils were introduced. The use of Milfoil weevils as a biological control factor has shown promise in Vermont, but a substantial amount of research still needs to be done before the DEC can report that this is an effective and practical method for controlling Eurasian watermilfoil.

## Others Biocontrols

A variety of potential biological control methods exist for the management of aquatic nuisance species. Any proposed introduction of a biological control method would be reviewed on a per case basis in accordance with current statute and permitting procedures.

## Non-Chemical Controls

### Hand Pulling

Though not requiring a permit, hand pulling can be an appropriate method of removing aquatic species for early detection and small introductions of aquatic invasive species, or for managing small populations of native aquatic nuisance species (for example near docks or beaches). Hand pulling does not have a significant impact on the nontarget environment as the hand puller can selectively choose the species to manage or control. A minimal amount of benthic disturbance may occur if the species is rooted or submerged in sediment, however this disturbance is only temporary. This method is used to manage small populations of species when other methods are deemed unnecessary or unavailable.

### Bottom (Benthic) Barriers

Bottom or Benthic Barriers (BB) are a non-selective method of species management generally used for small population locations of aquatic nuisance species, whether native or invasive, that require a permit to implement regardless of the scope of the project. Bottom barriers work by placing and securing an impervious mat on the lake bottom that inhibits light and smothers plant growth within the area of placement. There are 14 active individual permits within the State. Current permitting guidelines require that this practice start after July 1<sup>st</sup> and be removed by October 30<sup>th</sup> to protect fish spawning locations. Conditions are also in place requiring permittees to remove any aquatic animals, as well as notifying DEC of any Rare, Threatened, or Endangered (RTE) plant species found. Control projects that may interfere with RTE species may require an approved FWD Threatened and Endangered Takings Permit. Projects proposing to control plants in a wetland may also require a DEC Wetlands Permit. Other states have used bottom barriers for management of large areas, however, following current procedures a project proposing to do such would likely be denied based on its unacceptable impact to the nontarget requirement.

### Diver Assisted (Operated) Suction Harvesting

Diver Assisted Suction Harvesting (DASH) utilizes hand pulling with an underwater vacuum to manage aquatic nuisance species, mainly invasive aquatic species, and Eurasian watermilfoil. There are 26 active DASH permits within the State. DASH is more selective than bottom barriers as the diver is required to identify and harvest the specific species targeted, and once identified the entire plant is uprooted then vacuumed to a vessel on water, and the spoils are taken off-site. DASH is an effective aquatic plant management practice in small to medium scale projects, but it can also be used to complement large scale projects. For large scale projects, turbidity from benthic disturbance can be a concern. To mitigate this, ANC Permits contain a condition that requires the placement of an in-water curtain to reduce turbidity, as well as capturing plant fragments. A condition also exists requiring permittees to not exceed specific turbidity amounts.

Furthermore, if a project takes place in an area that may impact RTE species, a FWD Threatened and Endangered Species Takings Permit may be required. If a project proposes to manage a location within a wetland or its associated buffer, a DEC Wetland Permit may be required. DASH is a labor-intensive and costly management practice, with a limited number of contractors that work in Vermont, which limits its effectiveness as an acceptable practice for large populations of ANC species.

### Hydroraking

Hydroraking utilizes a rake or bucket on a boat to remove species directly from the benthic (sediment) layer and within the water column. An ANC Permit is required to use hydroraking as an aquatic nuisance control method. Currently, only one permit is active that allows the use of hydroraking for the removal of an aquatic invasive species, Water chestnut within the Lake Champlain Water Chestnut Management Program. However, hydroraking has not been requested nor utilized under this permit for several years. This management method has the potential to create immense benthic disturbance and is not selective, therefore may also have high nontarget impacts.

### Mechanical Harvesting

Mechanical harvesting (MH) utilizes what are essentially floating lawn mowers to cut and remove a section of plants within the water column. An ANC Permit is required to use mechanical harvesting as an aquatic nuisance control method, mainly for aquatic invasive species. MH is a non-selective practice that equates to “mowing the grass”. This management practice has the potential to impact nontarget species as well as spread fragments of the targeted aquatic invasive species causing the spread of the plant throughout the waterbody. The practice is costly, requires expensive equipment, and annual maintenance and training to implement. As such, this method is not a common practice, although it is utilized in Vermont in 13 active permits. It is also a main component of the long-term and successful Lake Champlain Water Chestnut Management Program, as the species is an annual plant and this technique reduces the overall population of the species throughout the lake. Both a FWD Threatened or Endangered Species Takings Permit or Wetlands Permit may be required depending on the scope and location of the project.

### Structural Controls

Structural controls are a management method to physically stop the movement of a species. An ANC Permit is required to use structural controls as an aquatic nuisance control method. This management practice is currently only utilized by the US Fish and Wildlife Service to limit the movement of *Petromyzon marinus* (Sea Lamprey) in Lake Champlain and its associated tributaries. This method reduces Sea Lamprey movement upstream and downstream, and thereby reduces their population in Lake Champlain. This method is non-species specific and has the potential to impact nontarget species, however the impact of Sea Lamprey has been determined as a high enough threat that this potential nontarget impact has been determined to be acceptable.

## Assessment of the Use of Pesticides on the Nontarget Environment or Nontarget Species

### Ecotoxicity

DEC's assessment of ecological impacts to nontarget species are based on available toxicology studies and aquatic life benchmarks for aquatic vertebrates and invertebrates, as well as monitoring data from previously permitted pesticide treatments. Although the ANC permitting process does not explicitly require compliance with the Vermont Water Quality Standards, DEC generally considers whether the treatment will create water quality conditions that are toxic to nontarget aquatic biota or wildlife on an acute or chronic basis. This includes comparison of expected pollutant concentrations to the aquatic biota-based pollutant criteria in Section 29A-303(7) of the Vermont Water Quality Standards, EPA's National Recommended Water Quality Criteria, and EPA's Aquatic Life Benchmarks and Ecological Risk Assessments for Registered Pesticides.

#### Sonar A.S. (Fluridone)

In its 2017 Preliminary Ecological Risk Assessment for Registration Review, EPA classifies fluridone as slightly toxic to moderately toxic to aquatic organisms based on data for aquatic vertebrates and invertebrates on an acute exposure basis. Chronic effects from acute exposure, observed in freshwater fish and invertebrate studies include mortality, decreased survival of fry, decreased hatching success, decrease in reproduction, reductions in growth, and other sublethal effects. Bioconcentration data indicate that fluridone is not likely to appreciably accumulate in aquatic animals.

Fluridone is approved for application at up to 90 ppb in ponds and 150 ppb in lakes and reservoirs per annual growth cycle. According to EPA's risk characterization, the likelihood of direct adverse effects to aquatic-phase amphibians or freshwater fish at this application rate is considered low. However, available incident data includes reports of deaths of fish and other organisms, possibly as a result of secondary impacts such as reduced dissolved oxygen or plant life, which raises uncertainty in the risk conclusions based on toxicity studies.

The acute level of concern was exceeded in EPA's analysis for freshwater non-benthic invertebrates at the maximum approved fluridone concentration, as were the acute and chronic levels of concern for freshwater benthic invertebrates. Based on data, there is a potential for impacts to these organisms during higher levels of fluridone application.

#### Renovate 3/OTF (Triclopyr)

Pesticide products may contain triclopyr in multiple chemical forms. Renovate 3 and Renovate OTF both contain the active ingredient in the form of triclopyr triethylamine (TEA) salt. According to U.S. EPA's 2019 Draft Ecological Risk Assessment for triclopyr, triclopyr TEA is highly water soluble and rapidly dissociates (<1 minute) in water. It has a low potential to bioaccumulate in aquatic animals. The active ingredient has several major degradation products, one of which (3,5,6-trichloro-2-pyridinol) displays significantly more chronic toxicity than the parent compound. As a result, triclopyr degradation products were also included in EPA's risk assessment.



In its 2020 Interim Registration Review Decision for triclopyr, U.S. EPA did not identify any acute risks of concern to freshwater fish or invertebrates at approved pesticide application rates. EPA did identify chronic risks to freshwater fish and invertebrates from triclopyr TEA at higher application rates (5,000 ppb and 2,500 ppb, respectively). Based on the data, there is a potential for impacts to these organisms during higher levels of OTF application.

#### Procellacor EC (Florpyrauxifen-benzyl)

According to U.S. EPA's Final Registration Decision for florpyrauxifen-benzyl (2017), the active ingredient dissipates relatively rapidly when applied directly to aquatic sites. It degrades primarily via aqueous photolysis (<1 day) and aerobic aquatic metabolism (4-6 days). Studies indicate that florpyrauxifen-benzyl has low potential to bioconcentrate and that it is extensively metabolized in fish.

In its Environmental Fate and Ecological Risk Assessment, EPA focused only on the parent compound as a stressor of concern for aquatic animals, as toxicity studies indicate that florpyrauxifen-benzyl is more toxic than its degradates. Studies on the active ingredient and typical end-use products did not find acute toxicity to freshwater fish, or to freshwater water-column-dwelling or benthic invertebrates, except at concentrations significantly above those expected from proposed pesticide applications. No chronic toxicity was observed in studies on freshwater fish or freshwater water column-dwelling invertebrates. Chronic effects were observed in a study of freshwater benthic invertebrates over a 10-day exposure period at <4.3 ppb florpyrauxifen-benzyl (impacts observed at all test concentrations). However, because the active ingredient is expected to dissipate over a shorter time than the test exposure period, chronic risks are also not expected for this group.

EPA has developed aquatic life benchmarks for florpyrauxifen-benzyl, which are based on its most recent ecological risk assessment. All benchmarks for aquatic vertebrates and invertebrates are well above concentrations expected to be observed during pesticide applications.

#### TFM (3-Trifluoro-Methyl-4-Nitro-Phenol)

In its most recent registration review for 3-Trifluoro-Methyl-4-Nitro-Phenol, EPA states that TFM applied to surface water dissipates via aqueous photolysis, aerobic and anaerobic metabolism, and sediment sorption. It has a low likelihood of bioaccumulation and generally degrades <10 days after application.

EPA characterizes TFM as moderately toxic to aquatic invertebrates and highly toxic to fish. Moreover, small changes in pH and alkalinity can significantly alter TFM toxicity. Standard application rates for lampricide are based on the concentration required to kill 99% of lampreys in the treatment area. EPA's risk assessments have concluded that even with careful monitoring and adjustments to treatment doses, the prescribed application rates will impact nontarget aquatic animals. Studies indicate that community structure in the TFM application area typically returns to pre-treatment conditions within approximately six months, although there is uncertainty around the long-term impacts to communities downstream of treatment areas and to sensitive species, such as indigenous lampreys.

EPA has developed aquatic life benchmarks for TFM, which are based on its most recent ecological risk assessment. Benchmarks for aquatic vertebrates and invertebrates may be exceeded during pesticide applications.

#### Bayluscide (Niclosamide)

In its most recent registration review for niclosamide, EPA states that the active ingredient applied to surface water dissipates via aqueous photolysis, aerobic and anaerobic metabolism, and sediment sorption. It has a low likelihood of bioaccumulation and generally degrades <10 days after application.

EPA characterizes niclosamide as very highly toxic on an acute basis to aquatic invertebrates and fish. Lower pH and alkalinity correspond to increased niclosamide toxicity and, when it is used in combination with TFM, toxicity of the two compounds is additive. Standard application rates for lampricide are based on the concentration required to kill 99% of lampreys in the treatment area. EPA's risk assessments have concluded that even with careful monitoring and adjustments to treatment doses, the prescribed application rates will impact nontarget aquatic animals. Studies indicate that community structure in the lampricide application area typically returns to pre-treatment conditions within approximately six months, although there is uncertainty around the long-term impacts to communities downstream of treatment areas and to sensitive species, such as indigenous lampreys, aquatic earthworms and flatworms.

EPA has developed aquatic life benchmarks for niclosamide, which are based on its most recent ecological risk assessment. Benchmarks for aquatic vertebrates and invertebrates may be exceeded during pesticide applications.

#### **Public Health**

Impact to public health is based on drinking water ingestion and recreational exposure, as these are the most likely routes of exposure to pesticides used to control aquatic nuisance species. Drinking water ingestion is typically the more restrictive pathway, as dermal absorption is minimal for most pesticides used for aquatic nuisance control. Toxicology studies are used to determine the degree and significance of public health impact. There are no published human studies on the toxicity of pesticides used for aquatic nuisance control. The EPA creates labels which include any relevant restrictions on water use after treatment with pesticides. In some cases, Health recommends more stringent requirements in order to meet the criteria of negligible public health risk.

#### Sonar (Fluridone)

EPA identified the toxicological effect of fluridone as effects on the liver including increased alkaline phosphatase activity and increased incidence of hepatocellular hyperplasia. N-methyl formamide (NMF) is a breakdown product of fluridone and is a developmental toxicant in animal studies. Because of this concern, when fluridone was used to control aquatic nuisance species in Vermont, the Health recommended testing for fluridone and NMF following treatment. To meet the criteria for negligible risk to public health, water use was not recommended if fluridone was detected above 20 ppb or if NMF was detected above 2 ppb.

### Renovate (Triclopyr)

EPA identified the toxicological effect of triclopyr as effects on the kidney including degeneration of proximal renal tubules. In order to meet the criteria for negligible risk to public health, Health recommended that certain water use restrictions beyond the federal label requirements should be instituted in order to ensure protection of public health when waters are treated with triclopyr. Health recommended that the water should not be used if triclopyr was detected above 75 ppb.

### Procellacor (Florpyrauxifen-benzyl)

The EPA identified no adverse impacts in animals in required toxicology studies. The EPA label allows florpyrauxifen-benzyl to be used in water at a maximum concentration of roughly 50 ppb. The EPA label for Procellacor does not include any restrictions on use of the treated water for domestic (including drinking and cooking) or recreational use. Health derived a drinking water health advisory for florpyrauxifen-benzyl of 3,429 ppb, which is over 60 times greater than the highest use amount allowed on the EPA label.

### TFM (3-trifluoromethyl-4-nitrophenol)

In 2016, Health partnered with the US Fish and Wildlife to establish a TFM workgroup to provide input on an updated toxicology study for TFM. In 2019, Health received the final report on the 90-day oral toxicity study on TFM. This study was used to derive an updated drinking water health advisory of 100 ppb, as well as an updated recreational water value of 3.9 ppm for TFM. There were no adverse findings during the study, and no TFM-related changes in any endpoint. In other words, there was no toxicity observed at the highest achieved dose levels in male or female rats.

### Bayluscide (Niclosamide)

Niclosamide is an FDA-approved drug used to treat some infections in humans. When niclosamide was used in conjunction with TFM, Health recommended that treated waters be tested for niclosamide, and that water not be used if niclosamide was detected.

### Inert Compounds

Confidential statements of formulation (CSFs) for each proposed product are obtained by the AAFM and provided to the State Toxicologist for review. The State Toxicologist determines if human exposure to the inert ingredients in formulations will result in an increase in the level of concern for public health. In the time period requested, no inert ingredients were found to have the potential to increase the level of concern for public health.

## Recommended Legislative Changes to Title 10 Chapter 50

### Precautions for the Use of Pesticides

#### Precautions to Protect State Waters and Aquatic Biota

The use of pesticides, chemicals other than pesticides, and biological controls that are registered and regulated by the EPA and AAFM, are then further evaluated by ANR technical staff prior to the onset of their potential use. ANR considers what precautions are necessary in all ANC Permits to ensure the

protection of State waters, and to protect fish, reptiles, amphibians, and all other aquatic biota. These precautions are discussed at an agency level, and if deemed applicable, reliable, scientifically accurate, and integral to meet the level of precaution necessary, are included as permit conditions. Permit conditions are also in place for non-chemical controls for these same reasons, as each technique may have impacts on the nontarget environment or nontarget species. These precautions may be specific to a permit category, for example for an ANC Permit for Bottom Barriers, a permit condition is to check and remove any aquatic organisms, mussels, turtles, etc. prior to installation of the barrier. For an ANC Permit for Pesticide, it may have conditions that are specific to the specific waterbody or project type, such as the location, water depth, water chemistry, for example.

After an ANC Permit is approved, permittees are required to work with the AAFM to maintain compliance with pesticide use and application requirements, and during implementation of a project, an AAFM inspector is generally present at the time of pesticide application.

#### ANC Individual Permit Internal Review Procedure

DEC reviews permit applications under an ANC Individual Permit Internal Review Procedure, signed by the Commissioners of DEC, FWD, and Health in 2023, to ensure compliance with the permitting criteria listed in 10 V.S.A. § 1455. During an application review process, this internal review procedure allows for the input of technical experts in fields outside the scope of DEC. The roles and responsibilities of each division is as follows:

FWD – For a project proposing to control an aquatic animal or a project that may impact fish, wildlife, and/or their habitats, the Fish & Wildlife Department shall submit a comment on how the project may affect fishing as a public good use and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

FWD – For a project proposed to occur within waters known or suspected to have a rare, threatened, or endangered species, the Fish & Wildlife Department shall submit a comment on whether the project poses an acceptable risk to rare, threatened, or endangered species, whether a species inventory is warranted, whether a Threatened & Endangered Species Takings Permit is required, and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact (e.g., time of day restrictions – to be protective of musk turtles).

FWD – For a project proposed to occur in waters adjacent to a FWD Fishing Access Area, the FWD, Fish Division shall submit a comment on how the proposed project may affect the Fishing Access Area and the public that utilizes that resource, and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

DEC Wetlands Program – Wetlands Program shall submit a comment on how the project interacts with the Vermont Wetlands Rules, whether the project poses an acceptable risk to the Class I or II wetland or associated buffer, and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

DEC Rivers Program – For a project proposing to physically alter the beds or banks of a stream, or alter

the natural flow of a stream/river, the DEC Rivers Program shall submit a comment on whether the potential impact on the stream/river is acceptable and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

DEC Monitoring and Assessment Program (MAP) – For a project proposing to control an aquatic animal, the DEC MAP shall submit a comment on whether the project poses an acceptable risk to nontarget aquatic animals and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

DEC MAP – A project proposing the use of a pesticide or chemicals other than a pesticide, the DEC MAP shall submit a comment on whether the proposed use of a pesticide or chemical other than a pesticide poses an acceptable risk to the aquatic animals of that waterbody and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

DEC Drinking Water Groundwater Protection (DWGP) – For a project proposing the use of a pesticide or chemical other than a pesticide in a waterbody that is within a Groundwater Source Protection Area or a Surface Water Source Protection Area or for a project that may impact a potable or public drinking water supply, the DEC DWGP shall submit a comment on how the proposed project may affect the water resource and the public that utilizes that resource, and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

Health – For a project proposing the use of a pesticide or chemicals other than a pesticide, Health shall submit a comment on whether there is negligible risk to public health and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

Department of Forests, Parks and Recreation (FPR) – For a project proposing the use of a pesticide or chemical other than a pesticide in waters that may impact operations of a Vermont State Park, the FPR shall submit a comment on how the proposed project may affect the Vermont State Park and the public that utilizes that resource, and whether any mitigating actions can/should be taken to avoid and/or reduce the potential impact.

Once this internal review is complete, any comments received are then sent to the applicant for review. The applicant, DEC, and the internal review group then work together to create conditions within the permit that provide the proper protections. If DEC finds that a proposed project does not meet the permitting criteria in 10 V.S.A. § 1455, an application may be denied, the application may be withdrawn, or the Commissioner/Secretary may provide guidance. In instances of an approval or denial, the draft decision is sent to the ENB where the public may comment on it for 30 days and a public meeting may be held. Any comments received during this period are responded to, and a final decision is made.

#### ANC Permit for Pesticide Precautions

Within every Pesticide permit since 2019, the DEC has worked through the ANC Individual Permit Internal Review Procedure to implement a variety of permit conditions intended to protect state waters and aquatic biota. As of the most recent permit (3955-ANC), the following protections are in place:

1. Restriction on the pesticide used, days in which it could be used, species it may target, and pesticide registration.
2. Applicators must be certified by AAFM.
3. Applicators must notify AAFM of the treatment so that the Agency may coordinate inspection.
4. Permittees must have treatment locations approved every year by DEC by presenting a detailed map, description of species density, map of wetlands and rare, threatened, and endangered species, and a map of treatment concentration monitoring locations. NOTE: This is a proposal and may be denied or altered by the DEC as the DEC may work with other programs to review these proposals.
5. The overall area of control of aquatic vegetation may not exceed 40% of the body of water's littoral zone.
6. Permittees must comply with a treatment plan approved during the initial permit application.
7. Permittees must provide 30 days of public notice that a body of water is to be treated, both digitally and physical copies. NOTE: This notification must be approved by the DEC annually.
8. Water samples shall be collected and analyzed until the pesticide drops below approved levels.
9. DEC recommends no use of the body of water during the day of treatment. NOTE: This is a recommendation put in place to further protect public and environmental health as there is no documented risk for use during the day of treatment.
10. Potable water shall be provided to those who may be impacted on the day of treatment. NOTE: This is an extra precaution put in place.
11. An in-depth treatment report shall be submitted to DEC within one week of treatment.
12. A variety of aquatic species surveys shall be completed including, a quantitative survey in the year prior to treatment, a qualitative density survey the year of treatment, a post treatment quantitative survey the year of treatment, and a quantitative survey in the year following treatment.
13. An annual report shall be submitted detailing the full extent of the project.
14. The permittee is required to practice pesticide minimization measures as to reduce the amount of pesticide being used.
15. A report on the permittees pesticide minimization efforts shall be submitted.

#### Limitations on the Use of Pesticides

Any pesticide registered in the state may be proposed for use in an ANC permit application. However, since 2019, only the use of Procellacor, TFM (Lampricide), and Bayluscide (Lampricide) have been approved for use in bodies of water by the DEC based on the statutorily required review procedure for these projects. Other common pesticide applications such as Renovate, Sonar, 2,4-D, and Glyphosate, are approved herbicides for aquatic use but may have a higher risk to the nontarget environment or nontarget species than Procellacor.

Applications for the use of Procellacor have been denied in instances where there were non-chemical alternatives, the risk to nontargets was unacceptable, long range management plans were not acceptable, and the impact on the public good was unacceptable. As such, an application to use Procellacor for the management of aquatic plants in Vermont may still be denied if it fails to meet any one of the statutory requirements for an ANC permit. Eleven Procellacor projects have been approved,

and four Lampricide permits are currently active. The two denials (one is still in Draft form at the time of this report) for the use of Procellacor are as follows:

3642-ANC Lake Bomoseen (Draft Denial) – Not an acceptable risk to nontarget environments, long range management plan that includes pesticide minimization was not adequate, degree of public benefit does not outweigh adverse impacts on public good.

3930-ANC Private Pond – Non-chemical alternatives were present, and the application was therefore denied.

#### Recommendations for Additional Precautions

The committee found that the precautions that are outlined in the ANC Permit application review process with input from agency technical experts, and subsequent permit conditions are adequate in protecting State waters and in protecting fish, reptiles, amphibians, and all other aquatic biota. An internal procedure has been established for review of ANC permit applications by DEC, FWD and Health. Committee members felt that it would be helpful to also include AAFM in this internal review process for ANC permit application review, and also for broader review of new pesticide registrations by EPA or AAFM, and ongoing discussion of the uses and impacts of the pesticides registered for aquatic use in Vermont.

### **Establish Appropriate Standards for Approval of the Use of Pesticides**

As described above, AAFM and ANR have established standards for approval of the use of pesticides for aquatic nuisance control in place. A series of checks and balances from the AAFM, Health, and ANR result in an appropriate measure of approved standards that DEC follows when reviewing ANC Pesticide permits. DEC also continually studies and researches nontarget impacts and updates permit precautions and conditions, when necessary, with input from other divisions through the ANC Individual Permit Internal Review Procedure. The Committee agreed that the ANC Permit standards are being met appropriately but recommends developing definitions for terms that are noted in Title 10, Chapter 50, Section 1452 ([10 V.S.A. § 1452](#)) to improve clarity for how projects are considered.

#### Present Standards for Approval of the Use of Pesticides

The present standards for review and approval of the use of pesticides for aquatic nuisance control rely on a practical and measured internal review procedure that ensures the control technique is applicable, reliable, and meets the conditions for approval. Furthermore, the application review process takes into context the historical management of species within a body of water as well as how the population fits into the state's larger management goals. Eradication of a species is highly unlikely, however reducing the population to a manageable level may be possible through a multifaceted management approach.

If an application seeks to manage a population of a nuisance species that is new to that body of water, but has been found commonly throughout the state, the applicant must prove that non-chemical methods of control are not adequate in the management of the species. Eradication may be possible with this type of new population, although still unlikely.

If an application seeks to manage a population of nuisance species that has been present in that body of water for a considerable amount of time, the applicant must demonstrate that they have used non-chemical methods that have failed to maintain the population at a manageable level. Eradication is not expected to be an outcome of a project like this, but rather this is considered to be a part of a long-term maintenance plan.

If an application seeks to manage a novel species that is new to the state (such as Hydrilla) or only found in select sites, historical context within the state is sometimes not possible. As such, environmental risk factors based on external partners' experience with a species may be considered. If a species poses a risk to the state of Vermont, then eradication may be prioritized using pesticides if deemed necessary.

#### Additional Standards for Approval of the Use of Pesticides

Under the guidance of the ANR Secretary, DEC launched a pre-rulemaking process to support the implementation of the requirements of the ANC Program and ANC Permitting Process. DEC convened an [ANC Pre-Rulemaking Focus Group](#) consisting of representatives from environmental organizations, lake associations, angling groups, boating groups, municipalities, members of the legislature, lake management experts, aquatic invasive species experts, and state / federal agency representatives to provide input based on the varied perspectives to improve the ANC permitting program procedures. The group met monthly from January through May 2023 and discussed how to improve the definitions of the statutory terms used to guide permitting decisions, such as “acceptable, reasonable, negligible” and thereby better clarify and codify the requirements that must be met before certain types of ANC treatments are used. Additional outcomes were also expected; however, the group suspended their meetings due to the onset of the Act 57 ANC Study Committee.

The ANC Study Committee valued the work from this group and continued their same efforts, to consider improving the definitions of the statutory terms used to guide permitting decisions, such as “acceptable, reasonable, negligible”. The terms below are recommended to be considered in the ANC Statutes definitions.

1. “Reasonable” nonchemical alternative:  
A nonchemical control method that is available and capable of being implemented after consideration of cost, existing technology, logistics in light of the overall project purpose including the scope and scale of the treatment locations, and the potential health and environmental impacts.
2. “Acceptable risk” to nontarget environment:  
Acceptable risk is the degree of actual or potential impact that the Agency considers acceptable given existing statutory requirements, environmental conditions, sociocultural considerations, and whether adverse effects on the nontarget environment are outweighed by tangible benefits from carrying out the project.
3. “Negligible” risk to Public Health:  
It was agreed by the committee that the definitions for terms related to public health, including “public health hazard”, “public health risk”, and “significant public health risk” are defined in Title



18 Chapter 2 [[18 V.S.A. § 2 \(9\), \(10\), and \(12\)](#)] and an additional definition for “negligible” was not necessary.

4. “Public benefit” and “public good”:

The Secretary utilizes specific conditions to determine whether there is a “public benefit” or “public good” from the proposed control activity. When reviewing permit applications, to determine whether there is a public benefit from the proposed control activity, the Secretary considers the following:

1. Whether the control activity is excessive for its stated purpose. This includes:
  - A. An assessment of the targeted aquatic nuisance and how the targeted aquatic nuisance affects the recreational potential and aquatic habitat of the body of water.
  - B. An assessment of the proposed control activity (e.g., scale and scope of the project) and whether:
    - i. The control activity is a reasonable technical solution to address adverse impacts from the documented aquatic nuisance issue.
    - ii. The control activity is in response to a new introduction of a non-native aquatic invasive species.
    - iii. The control activity is a continuation of a previously implemented aquatic nuisance control management strategy.
    - iv. The control activity supports a broader aquatic nuisance management strategy for the body of water in question or a region of the state.
    - v. The public benefits from controlling the aquatic nuisance outweigh the adverse effect of the proposed control activity.
2. Whether there is a feasible alternative to achieve the stated purpose of the control activity that is less intrusive. This includes:
  - A. An assessment of aquatic nuisance management options, including 1) no action, 2) prevention, 3) mechanical or physical methods, 4) cultural methods, 5) biological control agents, and 6) pesticides.
3. Whether measures to reduce impacts on the body of water have been taken. This includes:
  - A. An assessment of how targeted the control activity is at controlling the aquatic nuisance.
  - B. An assessment of how the project has been designed to avoid and/or reduce potential immediate and cumulative impacts on the nontarget environment and public good uses (e.g., implementation of this project will be coordinated with other active aquatic nuisance management projects in the body of water, control locations are prioritized to areas of impacted public good uses or shoreline development, control locations will avoid known locations of rare, threatened, or endangered species).
4. What the degree of public benefit is. This includes consideration of:
  - A. The anticipated degree of short- and long-term effects on the recreational potential (i.e., public good uses) and aquatic habitat of the body of water should the proposed control activity be successfully implemented or if it did not occur.
  - B. The consistency with any federal, state, or municipal plan.

- C. Public accessibility to the body of water and the use of those waters by persons outside the municipality in which the waters are located.
  - D. The importance to commercial, agricultural, or other interests.
  - E. The degree of local interest, as manifested by municipal input or other contributions to the project.
  - F. Other considerations affecting feasibility, probability of achieving long-term control, and necessity or advantage of the proposed control activity.
  - G. The extent to which the control activity is a developmental rather than a maintenance program.
  - H. The extent to which the control activity may affect the public that utilizes those waters (i.e., impacts on the operation of public infrastructure or other encroachments, impacts on drinking water, and whether the control activity would result in water use restrictions).
  - I. Whether there are impacts on the recreational potential (i.e., public good uses) and aquatic habitat of waters beyond the project area.
5. The Secretary will make a cumulative assessment of the previous findings to determine whether the proposed control activity provides a public benefit that outweighs negative impacts. If the proposed control activity does not provide enough of a public benefit that outweighs negative impacts, this finding cannot be made, and the application will be denied.

The committee found that the ANC Permit for Pesticide review process to determine “public benefit” or “public good” from the proposed control activity was adequate as demonstrated using the conditions outlined. It was recommended by the committee for the Secretary to continue utilizing these application conditions as stated as they are sufficient for their intended purpose, and to develop educational and outreach materials (Fact Sheets and DEC webpages) for the public so that they are aware of the application review process. It was also suggested to include this information in notifications to landowners whose property abuts the control practice or treatment area (the waterbody and one-mile downstream).

## ANC Application, Permitting Process and Public Participation

### ANC Application, Permitting Process and Public Participation at Present

The ANC application and permit review process are outlined in Title 10, Chapter 170 Subchapter 2: Standard Procedures ([10 V.S.A. § 7701](#)) and Permit Procedures ([10 V.S.A. § 7711](#)) whose purpose and scope is to establish the public notice and comment requirements that the Department must follow when adopting general permits.

Section 7711 outlines the standard provisions for notification through the online Environmental Notice Bulletin (ENB). The ENB serves as a public-facing online system for members of the community to be informed of, and provide their input on, permit applications, drafts, and decisions. Per the statute, the ENB notifies each person requiring statutory notice of an application, the applicant, each person on an interested person list (those that have signed up to receive notifications of a particular type or within a geographic location, for example), each municipality in which the activity to be permitted is located, and

each person to whom this chapter directs that a particular notice be provided through the bulletin. For municipalities, the notifications are sent to town clerk office emails.

Currently, ANC permits are subject to Type 3 Procedures ([10 V.S.A. § 7714\(a\)\(2\)\(C\)\(i\)](#)).

The Type 3 Procedures require:

(b) Notice of application. The Secretary shall provide notice of an administratively complete application through the environmental notice bulletin

(c) Notice of draft decision; comment period. The Secretary shall provide notice of the draft decision through the environmental notice bulletin and shall post the draft decision to the bulletin. The Secretary shall provide a public comment period.

(d) Public meeting. The Secretary shall hold a public meeting whenever any person files a written request for such a meeting. The Secretary otherwise may hold a public meeting at his or her discretion.

(e) Notice of final decision. The Secretary shall provide notice of the final decision through the environmental notice bulletin and shall post the final decision to the bulletin. The Secretary shall provide a response to comments.

Based on feedback from division partners and the public, DEC adopted an additional notification requirement from Type 2 Procedures ([10 V.S.A. § 7713](#)) for ANC Permits for Pesticides. Type 2 Procedures require notice of the application to adjoining property owners. This was done through 10 V.S.A. § 7703 (b)(1):

The Secretary has discretion to require that additional opportunities for public notice and comment be provided, in addition to those directed by this chapter using any method reasonably calculated to give direct notice to persons potentially affected by a decision on the application.

The committee has concerns that a small percentage of community members who may be impacted by ANC Permits for Pesticides are not aware of, or are registered to receive, the ENB notifications. While the DEC has informally adopted Type 2 Procedures for the review of ANC permit applications, the committee recommends that applications for ANC permits be explicitly subject to the Type 2 notice requirements in 10 V.S.A. § 7713. As a Type 2 permit, notice of ANC permit applications would require notification of adjoining property owners, which would address concerns about all lakeshore property owners being notified. This can be changed by striking Section 7714 (a)(2)(C)(i) and adding this to Section 7713 ([10 V.S.A. § 7713](#)).

The committee also recommends the DEC improve how ENB notifications about permit applications, draft decisions, and final decisions are provided to local municipalities (and town health officers) and the public. The committee recommends the DEC improve access to and ease of use of the ENB, and to provide outreach on the ENB via DEC webpages and social media platforms (Facebook and Instagram). It is also recommended for applicants and permittees to post this information on their webpages and/or

social media platforms. This can be completed via a permit condition for an application and an approved permit.

Once a draft decision has been reached for a project, this decision and all accompanying materials are provided to the public for a 30-day period on the ENB. If comments are received during this period, statute requires that they must be reviewed and considered before a final decision can be made. Of note, comments made via email or phone call during the public comment period must also be considered.

#### ANC Permit for Pesticides – Public Notification Conditions

All approved ANC Permits for Pesticides include additional “Public Informational Notification” conditions. These notifications and plans are approved by the Secretary. These conditional requirements include:

- A condition that requires the permittee to notify the public of their intent to treat a body of water 30-days prior to the treatment date which includes a map of DEC approved treatment locations, scheduled treatment date, pesticide to be used, contact information of permittees, webpage, Water Use Advisories & Recommendations, potable water availability, and requirement that property owner is required to inform tenants that may be impacted.
- A condition that requires the permittee to create a webpage available for the public to review digital copy of the notification, this permit, the Approved Application, the SePRO ProcellaCOR® EC Specimen Label, the SePRO ProcellaCOR® EC Safety Data Sheet, and the status of the Water Use Advisories & Recommendations
- The permittee is also required to post physical and digital copies of a DEC approved application, plan, or approved permit to the Secretary, municipalities in which the waterbody resides, along roadways visible to traffic, public access points, to all adjoining property owners that abut the waterbody, and property owners one-mile downstream. These notifications must remain posted for no less than 30 days after treatment occurs.

#### Who Can Apply for an ANC Permit for Pesticides

Outlined in Chapter 50 § 1455 ([10 V.S.A. § 1455](#)) Aquatic Nuisance Control Permit outlines that “(a) A person shall not use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural barriers, structural controls, or powered mechanical devices in waters of the State to control nuisance aquatic plants, insects, or other aquatic nuisances, including lamprey, unless that person has been issued a permit by the Secretary.”

Under Title 10 ([10 V.S.A. § 8502](#)), a Person is defined as “any individual; partnership; company; corporation; association; joint venture; trust; municipality; the State of Vermont or any agency, department, or subdivision of the State; any federal agency; or any other legal or commercial entity.”

Under the current statute, any one person can apply for an ANC Permit for Pesticide use in Vermont waterbodies. Accordingly, any one landowner could apply to use pesticides in a waterbody even if all or most other landowners around a water opposed the use of pesticides. Technically, a person who does not own property around a water could apply to use pesticides in a public water.

The following are suggested recommendations to the Aquatic Nuisance Control (ANC) statute that would address the lack of side boards around who can be an applicant for an ANC permit:

- Continue allowing one person to apply for an ANC Permit for a Pesticide if the landowner is applying to use a pesticide on a pond located entirely on the landowner's property. This is consistent with the language of 10 V.S.A. § 1455(e), which states that a landowner applying to use a pesticide on a pond located entirely on the landowner's property is exempt from the permit review requirement of 10 V.S.A. § 1455(d)(4).
- The Committee recommends requiring that a municipality, state agency, or federal agency be included as the applicant OR co-applicant for the use of a pesticide in a public body of water.

#### Proposed ANC Application and Permitting Process Amendments

In summary, based on the information above, the Committee recommends the following ANC Application and Permitting Process Amendments:

1. Requiring that ANC Permits for Pesticides are subject to Type 2 Procedures requiring notice of the application to adjoining property owners which would address concerns about all lake property owners being notified. This can be changed by striking Section 7714 (a)(2)(C)(i) and adding this to Section 7713 ([10 V.S.A. § 7713](#)).
2. Improve how information about ENB notifications are provided to local municipalities (town health officers) potentially on webpage and social media sites (DEC, municipalities, and lake association) to improve awareness of ANC pesticides permit applications and treatments. This can also be completed via a permit condition for an application.
3. For the use of pesticides in public waters, the committee recommends requiring that a municipality, state agency, or federal agency be included as the applicant OR co-applicant for the use of a pesticide in a public body of water.
4. The committee recommends the Secretary create an Agency policy that establishes criteria for a Lake Association defined as a lake protection organization registered with the Secretary of Natural Resources on a form provided by the Secretary per [10 V.S.A. § 1452 \(17\)](#). This would account for situations where no formal lake associations exist but there is a significant number of community members who want to file an ANC permit application. The criteria may be similarly developed from Section 1458 ([10 V.S.A. § 1458](#)) Grant-in-aid to municipalities and agencies of the State, (a) A municipality or agency of the State that desires State assistance to control aquatic nuisances may apply in writing to the Agency of Natural Resources in a manner prescribed by the Agency of Natural Resources.

#### **Recommendations for Proposed Changes to Title 10 Chapter 50 Summary**

The Act 57 ANC Study Committee review and assessment of the environmental and public health effects of the use of pesticides, chemicals other than pesticides, and biological controls for aquatic nuisance control, their approved use, and why they were approved instead of nonchemical controls; their impacts

on the nontarget environment or nontarget species; and the precautions and standards for the application and permit process, found that Title 10 Chapter 50 statutes meet the requirements and obligations as codified. The Committee members review of the Secretary of ANR and the utilization of ANC Program's considerations to balance the policy to protect, regulate, and where necessary control under the authority of the State in the public interest to promote the general welfare and to protect public health and the environment, while preventing the infestation and proliferation of invasive species in the State that result in negative environmental impacts, including habitat loss and a reduction in native biodiversity along with adverse social and economic impacts and impacts to the public health and safety to be challenging and contentious. Based on their economic, social, and ecological impacts, aquatic nuisance species control and management, and the priority to reduce new aquatic nuisance species threat, or to consider the probability of a successful eradication efforts, is a formidable goal. The Secretary has instituted and established a sound methodology to consider the best use of situations when pesticides can be used effectively with precautions, standards, and protections that ensures the protection of State waters and is designed to protect fish, reptiles, amphibians, and all other aquatic biota, and to reduce the impacts to the nontarget environment or nontarget species.

The Committee members reviewed the history of pesticide use in Vermont from 2000-2023 and the responsibilities outlined in Title 10 Chapter 50 Sections 1451-1461, and specifically Section 1455, finding the Secretary's Aquatic Nuisance Control Permit review, application, and permit process relatively sound for pesticide treatments in Vermont. The methodology for pesticide use and approval includes reviews and input from a number of State agencies, divisions, and departments (AAF, ANR, Health, DEC, FWD, and FPR), an internal technical review through the ANC Individual Permit Review Procedure, a process for public input and participation on applications and permits through an Environmental Notice Bulletin, and scientifically accurate precautions and standards that are bounded by permit conditions.

The Committee found several improvements that can be made in Title 10 Chapter 50, in the application and permit conditions, in the education and outreach campaign that may improve the opportunity for interested parties to participate, and that may ensure full transparency in the permitting process.

A summary of the ANC Study Committee recommendations and proposed changes to Title 10 Chapter 50 are as follows:

1. Consider improving the definitions of the statutory terms used to guide permitting decisions, such as "reasonable" nonchemical alternative and "acceptable risk" to nontarget environment.
2. Requiring that ANC Permits for Pesticides are subject to Type 2 Procedures requiring notice of the application to adjoining property owners which would address concerns about all lake property owners being notified. This can be changed by striking Section 7714 (a)(2)(C)(i) and adding this to Section 7713 ([10 V.S.A. § 7713](#)).
3. For the use of pesticides in public waters, the committee recommends requiring that a municipality, state agency, or federal agency be included as the applicant OR co-applicant for the use of a pesticide in a public body of water.

Pesticide use for aquatic nuisance control is a contentious technique though it is used by all other States as a tool to effectively manage and control aquatic nuisance species, and can be applied more frequently, and with a variety of other pesticide types. While chemicals are used as a management tool for public drinking water supplies and are often effluent in public waters, the idea of chemicals used specifically within this application is communicated by some as an incongruous tool. Receiving many public comments during the study period, the Committee members reviewed these, and attempted to include and meet these comments and concerns within the report. However due to the short period to develop the report, the committee members were unable to respond to public comments, therefore they were compiled and linked to a public webpage made available by the Secretary.

## Other Changes

The committee found that the precautions and standards based on internal procedures and conditions and responsible by the Secretary, with input from agency, division, and departmental scientists, regulators, and technical experts, are adequate in protecting State waters and in protecting fish, reptiles, amphibians, and all other aquatic biota. An internal procedure has been established for review of ANC permit applications by DEC, FWD and Health. Committee members also recommend improving external communication to the public, municipalities, and interested parties of these precautions and standards. Other changes of the Committee member recommendations include:

1. Develop educational and outreach materials (Fact Sheets and DEC webpages) for the public and landowners whose property abuts the control practice or treatment area (the waterbody and one-mile downstream) that describes the ANC Permit for Pesticide review process to determine “public benefit” or “public good” from the proposed control activity.
2. Improve use of the ENB, and how ENB notifications are provided to local municipalities and town health officers and provide outreach on how to use the ENB, potentially on webpage and social media sites (DEC, municipalities, and lake association), to improve awareness of ANC pesticides permit applications and treatments. This can also be completed via a permit condition for an application.
3. The committee recommends the Secretary through the development of an Agency policy, establish criteria for a Lake Association as defined in Chapter 50 as a lake protection organization registered with the Secretary of Natural Resources on a form provided by the Secretary. 10 V.S.A. § 1452. This would account for situations where no formal lake associations exist but there is a significant number of community members who want to file an ANC permit application. The criteria may be similarly developed from Section 1458 ([10 V.S.A. § 1458](#)) Grant-in-aid to municipalities and agencies of the State, (a) A municipality or agency of the State that desires State assistance to control aquatic nuisances may apply in writing to the Agency of Natural Resources in a manner prescribed by the Agency of Natural Resources.

Public Comments – [Link to Public Comments Webpage](#)