

1 National Life Drive, Davis 2
Montpelier, VT 05620-3901



Julia S. Moore, P.E.
Agency Secretary

Tel: (802) 828-1294

Peter W. Walke
Deputy Secretary

www.anr.vermont.gov

State of Vermont
Agency of Natural Resources

To: Vermont House Committee on Natural Resources, Fish and Wildlife

From: Agency of Natural Resources Secretary Julia S. Moore, P.E.

Date: January 31, 2019

Re: Large-scale, Commercial Maple Production Operations

On March 13th, 2018, Rep. Paul Lefebvre and the House Committee on Natural Resources, Fish and Wildlife requested by letter that Secretary of Agriculture, Food and Markets, Anson Tebbetts, and Secretary of Natural Resources, Julie Moore, report findings of research on large-scale commercial maple production operations and any recommendations concerning regulatory or legislative action that the Agencies determine may be needed.

In response to this request, this memo has been prepared by the Agency of Natural Resources to report on the readily available and known information about maple sugaring operations in Vermont with regards to forestry and water quality considerations.

Current State of Sugaring in Vermont

Vermont has become the leading maple syrup producer in the United States producing an estimated 47% of the country's crop in 2018. Over the past several years, the number of taps, the acres of forestland sugared, the total production, and the value of the syrup produced has grown significantly. From 2004 to 2018, the number of taps reported by the National Agricultural Statistics Service has increased from 2,100,000 to 5,670,000, and syrup production from 500,000 to 1,940,000 gallons. The value of this production has also risen from \$14 million in 2004 to \$53.4 million in 2017. While these are the best available data, it is believed that the survey methodology used significantly underestimates the number of taps, production volume, and value. Industry growth can be attributed to a variety of factors including improvements in technologies and markets for maple syrup and flavoring worldwide, access to capital, and cultural trends.

Sugaring operations vary widely in their scale, ownership structure, land base, and management strategies. The scale of operations ranges from a few backyard-taps to several hundred thousand tap operations often across many large parcels. While maple syrup is the primary commodity derived from sap collection,

increasingly, sap is collected for beverage flavorings and other tree species are being tapped such as birch. While many producers collect sap from their own land, others own land under multiple names or names that differ from the business entity selling the sap or syrup. Producers also lease taps and have no ownership stake in the land that is tapped, while others buy sap, or utilize a combination of strategies. Because of this variability, analysis and characterization of the industry is complicated. However, several sources do provide some insight about sugaring in Vermont:

Industry Statistics

- **Maple Taps, 2018:** 5,670,000 (*National Agricultural Statistics Service, 2018*)
- **Tap Density:** Range from 40 to 100 taps per acre
- **Estimated Acres Tapped, 2018:** 56,700 to 142,000 - *Based on total taps divided by average tap density.*
- **Operations 2012:** 1,553 - up from 1,341 in 2007 (*US Agricultural Census, 2012*)

Organic Certification

Producers get a premium for sap that is certified as organic. To be certified, producers must meet and maintain standards which are verified by a USDA-accredited certifying agent. The Vermont Department of Forests, Parks and Recreation (FPR) partners with Vermont Organic Farmers (VOF) to evaluate and certify sugarbush plans to ensure that they meet VOF standards, and that VOF certification standards and Use Value Appraisal (UVA) standards for forest management plans closely align. VOF provided the following data for Vermont's upcoming 2019 season:

- **Total acreage of VOF certified sugarbushes:** 59,000
- **Number of VOF certified producers:** 209
- **Forest Management Plans on file with VOF** (parcels leased by a certified producer): 407
- **Third Party Certifiers** (*Source: Organic Certification Database*). Total parcels and acreage not available.
 - Ecocert ICO, LLC: 38 certified producers
 - Baystate Organic Certifiers: 5 certified producers

Use Value Appraisal (UVA)

Sugarbushes can be enrolled in the forestland or agricultural category of UVA. Sugarbushes enrolled in the forestland category must be described in a forest management plan and be managed according to the Minimum Management Standards. To complement these standards, in 2014 FPR developed [Sugarbush Management Standards and Tapping Guidelines](#) that set requirements and guidelines for management and

tapping of trees in sugarbushes based, in part, on research out of Proctor Maple Research Center and the University of Vermont. Data on sugarbush enrollment in the forestland category exists in hard copy management plans, making program-wide analysis difficult. However, in Franklin County, where sugaring operations have grown significantly, FPR's Franklin County Forester mapped parcels with sugarbushes enrolled in UVA. The findings of the analysis are summarized here: *

- **UVA Forestland:** 130,000 acres on nearly 1,100 parcels.
- **Sugarbushes in UVA:** 455 parcels, totaling 39,960 acres.
 - Forestland: 379 parcels enrolled, totaling 34,684 acres.
 - Agricultural land: 77 parcels enrolled, totaling 5,276 acres.

**Equivalent data have not been compiled for other counties and to do so would require individual evaluation and mapping of 14,000 management plans and their associated stands. Based on experience, we believe that a higher percentage of Franklin County is managed for sap production than other counties, and therefore the data for Franklin County is not representative of the rest of the state.*

In 2018, a new Forest Management Activity Report (FMAR) was developed by FPR and now requires reporting on the total number of taps by parcel on UVA enrolled forestland under a management plan. Over time, this reporting tool will provide the best available information about enrolled parcels and areas tapped for sap production; vastly improving the reliability of data on sugaring operations in Vermont and the ability to track it over time.

State Lands

Under conditions established by Act 21 of the 2009 legislative session, state land may be licensed for sugaring. Current summary of sugaring licenses on state lands:

- **Number of Licenses:** 7, statewide
- **Taps:** 27,000
- **Acres:** 668.5 acres (average 40 taps/acre)
- **Revenue:** \$18,376 generated annually in tapping fees

Forest health monitoring plots are established, and measured and [reported on](#) annually.

Recreation and Maple Sugaring on State Owned Lands & State Held Conservation Easements

Maple sugaring is as ubiquitous in Vermont as outdoor recreation, and these endeavors are often closely linked both in location and culture. Very little, if any, research can be found on the interface between sugaring and forest-based recreation. On state-owned lands and state-held easement lands, public pedestrian access is the baseline requirement; therefore, some of this public access co-exists with sugaring operations. Out of the approximately 350,000 acres of state-owned lands, 668.5 acres or 0.1% contain sugaring licenses. While most of these acres are trail-less, there are a few areas where tubing crosses access roads and trails. State lands staff are monitoring these areas for potential impacts to public access and will work with licensees to make any necessary modifications. Several thousand acres of state-held easement lands are managed for maple sugaring. These are privately-owned lands with conservation easements that provide for dispersed pedestrian recreation by the public as part of the easement rights. Management of these lands is carefully evaluated by FPR through the Forest Stewardship Plan process and annual easement monitoring to ensure that recreational access is adequately maintained.

Maple Sugaring and Water Quality Protection

Sugarbush managers must build and maintain access trails and manage the wastes from sap processing in ways that protect both ground and surface water quality. The [Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont](#) (AMPs) provide an excellent framework for designing and maintaining trails, roads, and stream crossings that are stable and resist erosion. Because of the semi-continuous nature of activity in sugarbushes, (compared to logging activity which may occur once per decade or more), sugarbush operators must manage roads and trails for more frequent use, requiring thoughtful design of the access roads and trails to accommodate year-round use including minimizing stream crossings, and where crossings are necessary, use of more permanent crossings. Because the equipment used in sugarbush maintenance is smaller and lighter than log transport equipment used in harvesting operations, the load-bearing capacity of road design and crossing structures is often less. However, the access infrastructure for sugaring and harvest operations often overlap and will need to accommodate both uses.

Liquid maple production wastes must also be properly managed including permeate from reverse osmosis technology; wash water from the cleaning of reverse osmosis technology, evaporators, and related piping and bottling equipment; and spoiled maple sap batches. The acceptable strategies for managing these wastes in environmentally responsible ways is better understood and less nuanced than the forest health effects of sugarbush management across tens or thousands of acres of varied terrain. For this reason, ANR's approach with these wastes can be more clearly defined.

Practices to Manage Liquid Maple Production Wastes

The Agency of Agriculture, Food, and Markets (AAFM) and the Department of Environmental Conservation (DEC) cooperate on the development of practices that serve to protect water quality in instances where

maple wastes that are land applied, regardless of whether regulatory jurisdiction rests with AAFM (majority of instances) or DEC. As necessary, DEC assists AAFM in conducting outreach regarding these practices.

The primary authority to regulate liquid maple production wastes rests with AAFM. For regulated facilities, the Required Agricultural Practices (RAP) and related guidance provide the requirements and approaches to address liquid maple wastes. DEC's engagement in the management of maple wastes is limited to those scenarios where:

1. A maple production farm is unable to comply with the RAPs preclusion of discharge of any maple production waste to surface waters; and
2. The maple production facility that land-applies liquid maple wastes does not meet the statutory definition of a farm and/or does not meet the minimum threshold criteria for applicability of the RAP rule.

Maple Waste Management Options:

- ***Land Application or In-ground Treatment for Non-Farm Maple Producers:*** There presently exist some maple sugaring operations that do not fall under the statutory definition of a farm. For these facilities, DEC, after consultation with AAFM, can assume jurisdiction and assist producers by authorizing a wastewater system or indirect discharge under the authority of §10 V.S.A. 1973. This approach is suitable for all types of liquid maple production wastes. At present, one major production facility is managing maple production wastes using in-ground disposal, and another is developing an application to support treatment and land application under an indirect discharge permit.
- ***Direct Discharges:*** While the preferred alternative is that AAFM exercise regulatory jurisdiction over maple production facilities, and secondarily that liquid wastes be land applied as described above, there are rare instances where direct discharge may be unavoidable given the scale of operation. An example may be a facility that produces daily permeate volumes more than the available capacity to land applied locally to transport for land application elsewhere on the farm or to otherwise comply with the RAPs. In this instance, will DEC assist producers in the authorization of a direct discharge for maple permeate under the authority of §10 V.S.A 1263
- ***Land Application for Non-Farm Maple Producers:*** There presently exist some maple sugaring operations that do not fall under the statutory definition of a farm. For these facilities, DEC, after consultation with AAFM, can assume jurisdiction and assist producers by authorizing an indirect discharge under the authority of §10 V.S.A. 1973. An indirect discharge authorization is suitable for all types of liquid maple production wastes.

DEC will continue to engage with AAFM and will provide technical assistance for producers that fall into the above scenarios.

Maple Sugaring Scientific Research and Future Needs

[Written testimony](#) on H. 631 from Proctor Maple Research Center dated February 6, 2018, provides a useful outline of the state of the research on the impacts of sugaring on tree and forest health. The following testimony statements offer valuable insights:

- “Recent data suggests that if healthy codominant or dominant trees growing on good quality sites are tapped using “conservative” tapping guidelines the long-term prospects for sustainability are good.”
- “It has been well documented in the literature as well as through years of observation that the use of vacuum sap extraction results in significantly more sap being collected. Unfortunately, the science is far less settled as to how increased sap extraction influences tree health.”
- “...higher vacuum does not result in greater amounts of nonconductive wood in maple stems.”
- “After 10 years of detailed study over a large geographic area, the results [of the North American Maple Project] suggest that sugar maple mortality is similar in stands managed for maple production compared to stands not managed for maple production.”
- “The results of work carried out by the University of Vermont Entomology lab suggests that maple stands which include at least 25% non-sugar maple species have a lower incidence of maple specific insect pests.”
- “Although concerns have been raised about how maple tubing systems might affect wildlife, there is no clear understanding in the literature on the subject.”

FPR has been conducting sugar maple health surveys since the 1970s, including annual monitoring since 1988. Findings are reported annually in the [Forest Health Highlights](#). Research on tree health in sugarbushes and the effects of maple tapping has been helpful in shaping best management practices, and continued research will improve confidence in the sustainability of tapping practices. Conditions and functions that could be considered when developing a methodology for evaluating sugarbushes and enhancing recommended management strategies include but are not limited to:

- Species diversity
- Structural diversity
- Tree health and growth
- Regeneration
- Habitat value
- Habitat connectivity
- Softwood habitat availability
- Water quality
- Carbon sequestration
- Carbon storage

Research of this scale would require significant resources, capacity, time, and collaboration, but would be fundamental to improve our understanding and support and promote the sustainability of sugaring across Vermont.

Conclusion

The Agency of Natural Resources promotes scientifically sound management strategies that conserve ecological functions and environmental services while providing economic and social benefits. The expansion of the maple sugaring industry has accelerated in a relatively short period and gives rise to important questions regarding the effects of these activities on forest ecology, wildlife, water quality, forest-based recreation, local and regional economies, and more. The impact of any management on the environment is shaped by variables unique to the land being managed and how forest management practices are applied. Because sugaring has expanded at a fast pace and scientific research has not kept up, the effects of sugarbush management on the forest (both positive and negative) are not thoroughly studied or understood and warrant investigation. In this regard, funding and leadership within the science community are essential in the short-term. Collaboration among sugarmakers, state and federal agencies, non-profit partners, and research organizations like the University of Vermont are helping to frame the questions and explore ways to expand capacity and funding for research. The types of questions we need to answer include but are not limited to: “Does sugaring impact valued ecological and cultural resources? If so, how? How might positive impacts be supported, and negative impacts minimized?” These seemingly simple questions are, in fact, quite complicated to answer. As answers emerge, strategies will need to be developed and refined to maintain and promote the sustainability of sugaring in Vermont and the health of Vermont’s forests and forest economy.