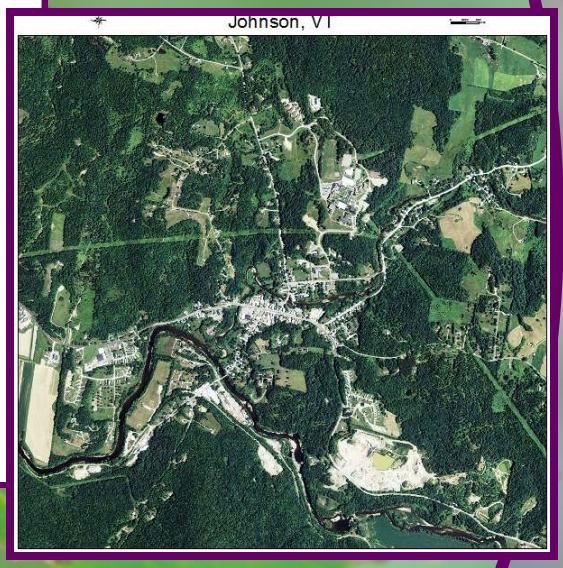

EMERALD ASH BORER PREPAREDNESS PLAN
JOHNSON, VERMONT
APRIL, 2014

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Introduction

The emerald ash borer (EAB), a beetle that has devastated ash trees in the Mid-West costing communities millions of dollars, has now been detected in several states surrounding Vermont, including New York, Massachusetts, and New Hampshire, as well as in Canada. This destructive insect has been steadily working its way toward Vermont, and it will kill all of the ash trees in the region when it arrives. Our communities will be faced with severe risk from a sudden wave of hazard trees if no action is taken.

EAB has been responsible for the destruction of 100 million trees in the United States. Johnson alone has more than two thousand ash trees just in town right of ways, and all are at risk from EAB. Recent research papers have reported that the potential costs to municipalities from EAB could exceed $12 billion over the next 10 years.

Although Johnson has not yet been infested with the EAB, an infestation is inevitable. Ash trees can be found throughout our area, along community streets, in public parks, and in natural areas. Infested trees rapidly decline and die within 2-4 years. The dead ash trees are prone to drop large limbs and pose a significant public safety and personal property hazard.

This plan outlines the efforts that have already been made in Johnson, as well as addresses the Johnson Ash Street Tree Inventory. In addition, this plan describes several management actions the Town of Johnson can take.

The purpose of this plan is to provide information and guidance as the EAB infestation arrives and intensifies. This plan reinforces the urgency to take action and promote proactive planning and management for EAB. The plan recommends management of the ash trees in Johnson in order to achieve the following goals:

1. The reduction of the public health and property hazards associated with EAB.

2. The mitigation of the economic and social costs associated with control efforts and damage.

3. The prevention of further unintended human caused spread of EAB.

It is important for Johnson to take a proactive approach and plan for the impact EAB will have on its community and municipality. Identifying the potential impacts and developing a plan and management strategy are the most effective ways to minimize the costs and mitigate the negative impacts of EAB.

What is EAB?

EAB is an invasive insect that kills all species of ash (Fraxinus) trees. Originating from Asia, the small metallic wood-boring beetle (family Buprestidae) is named for the brilliant emerald/green color of the adult.

The first North American populations were confirmed in the summer of 2002 in southeast Michigan and in Windsor, Ontario. Experts believe the beetle was introduced to the area in the early to mid-1990's, judging by the size of the infestations and the stage of damage to the infested trees. It is likely that the beetle was introduced into North America in ash wood used for shipping pallets and packing materials in cargo ships or shipping containers.

Since its introduction into North America, EAB has spread into 21 states (Colorado, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and Wisconsin) and two Canadian provinces (Ontario and Quebec). EAB has not yet been detected in Vermont, but as there are infestations on all sides it is only a matter of time before an infestation occurs in Vermont.

In Asia, EAB populations are kept in check by predators and pathogens and by the fact that Asian ash trees, the Manchurian Ash, have developed co-evolutionary resistance to EAB attacks. In North America, on the other hand, the EAB has few predators and ash trees have no natural resistance. While North American woodpeckers and other insectivores have been observed eating EAB larvae, this predation has not had a significant impact on EAB populations. Left to its own devices, a single EAB can travel a half mile per year, with the potential to expand the range of an infestation up to several miles per year during the adult beetles' June to August flight period. **Human activities, however, have led to the spread of the EAB over much greater distances.** Shipments of infested nursery stock and firewood have been inadvertently responsible for the majority of new EAB introductions.

Life Cycle

Adults emerge around late-May to feed on leaves and mate. Females begin laying eggs on cracks in the bark about 1 to 2 weeks after emergence thru August. Eggs hatch

in 7 to10 days as larvae, which have a distinguishing, nested bell shape. Larvae tunnel through the bark into the cambium where they feed on the phloem. Phloem is the tissue that transports food and water from the leaves to the rest of the tree. The larvae feed throughout the growing season creating characteristic S-shaped galleries, that immature larvae over-winter in. Mature larvae will overwinter as in pupil cells, pupate in spring and emerge as adults. A tiny D-shaped exit hole is created as the adult chews through the bark ready to repeat the cycle and infect more trees.

Signs and Symptoms

EAB infestations are very difficult to detect in the early stages and at low densities. The upper parts of the tree are infested first; making the entrance cracks and exit holes in the bark nearly impossible to see early on. The best indicator of EAB is evidence of woodpecker foraging, which can be visible from long distances. It is important to remember that once woodpecker damage is visible the infestation is usually well-established. When the tree begins to decline rapidly signs may include bark splitting, canopy thinning, and epicormic sprouting (water sprouts), although these symptoms can also be caused by other problems, including the common disease ash yellows.

Unfortunately it has been typical that by the time symptoms of the EAB are recognized the infestation is usually well under way and often even a few years old. For example, in the city of Concord, NH, when the signs of the EAB were noticed it has been estimated that the infestation was already over four years old. Up until that point it was assumed that there was no EAB in New Hampshire at all. At this time many Vermont officials believe that EAB is already present here, but has yet to be detected.

Most of the distinguishing indicators are also the least visible. Because the upper parts of the tree are infested first, all of the early indicators are very difficult to see from the ground. When the larva feeds on the cambium (the nutrient transport tissue below the bark), it kills the bark on top. The next year, as the new bark is formed under the old, the old is pushed out, and where it is dead, it cracks.

Detection

Purple Traps

USDA APHIS (the United States Department of Agriculture Animal and Plant Health Inspection Service), in cooperation with state natural resources agencies and others, has instituted an EAB survey to identify the leading edge of known infestations and to locate new or outlying populations. The survey detection tool is a 3-sided, 24 inch (60 cm) long corrugated purple plastic prism-shaped trap that is coated with non-toxic glue on all three sides and is baited with a lure that mimics essential oils of sick or dying ash trees to attract the adult beetles.

Purple Prism Traps (PPT's) are for detection or monitoring purposes only. They are placed in areas where EAB has not been found to determine if it is present. They are not used to control EAB populations. PPT's cannot be purchased; they are part of the United States Department of Agriculture surveying program, which is set to end in 2014.

Trap Trees

This trapping technique exploits the attraction EAB has to the chemicals released by stressed ash trees. Trap trees are created by artificially stressing trees through manual girdling (stripping a section of bark around the entire circumference of the tree). Girdled trees are removed at the end of the season and the bark is carefully peeled to determine if there is EAB present. EAB is often found in trap trees, even when it was not caught on traps placed in the trees.

Vermont Department of Forest Parks and Recreation runs the trap tree program in Vermont. Two traps trees are created annually in each county, and are placed in the areas assessed to be at highest risk for EAB infestation. In 2013 one such trap tree was located in Johnson (behind Manchester's Mill) and another in Morrisville (behind Guy's Farm and Yard).

Biological Control

The Emerald Ash Borer does not have any natural enemies in North America, therefore comprehensive biological control studies and trials are being conducted to determine if there are suitable agents that can be used in the fight against EAB.

Insects being evaluated include egg and larvae parasitoids (stingless wasps), *Spathius agrili*, *Tetrastichus planipennisi*, and *Oobius agril*. They are insects who lay their eggs in EAB eggs or larvae and whose young consume the EAB when they hatch. Microbes are also being considered for EAB control.

Current Efforts and Partners

Regional Invasive Insect Preparedness Team (RIIPT)

The Regional Invasive Insect Preparedness Team represents a planning effort spanning much of Lamoille County and beyond. With representatives from five towns, four in Lamoille County and one in Franklin County, this team has begun the arduous task of inventorying ash trees throughout the region, as well as the beginning stages of the preparedness planning process. The purpose of a regional preparedness team is to exploit advantages afforded to these communities through collaborative planning efforts and potential cost-sharing opportunities.

A list of the RIIPT Team Contributors can be found in the resources section.

Many of the efforts of the RIIPT have been made possible through partnerships with the following organizations:

Johnson Conservation Commission
Vermont Department of Forest, Parks, and Recreation
UVM Extension
The Urban and Community Forestry Council
APHIS – Animal Plant Health Inspection Sciences
US Department of Agriculture

Impact of EAB on Johnson

The Town of Johnson is known as a destination in the Vermont arts community, and is home to both Johnson State College and The Vermont Studio Center. A small but vigorous downtown is home to a number of unique shops and local restaurants and cafes. Due to its close proximity to two of Vermont's largest ski destinations, Jeffersonville and Stowe, Johnson has a thriving tourism market.

Located in the heart of the Green Mountains, Johnson maintains miles of heavily frequented public trails including a system of VAST trails, a section of the extensive rail trail, and a portion of Vermont's famous backpacking trail, the Long Trail. Trails also exist on the Gomo, Prindle, and Talc Mill properties in Johnson.

The arrival of EAB and the sudden death of the town's ash trees could have a variety of adverse impacts on Johnson. The foremost adverse impact of an EAB infestation would be the public health hazard posed by the dead ash trees. EAB kills all the ash trees in an infested area at once, and relatively quickly. The dead trees rapidly begin falling apart and pose a significant threat to Johnson's residents and numerous tourists. An EAB infestation will dramatically increase the risk of personal injury and property damage, and consequently the resulting liability suits. The upper branches of the ash trees will die and can fall first, meaning live trees can still pose significant threat. The simultaneous death of multiple trees also compounds the problem if no preemptive actions are taken to identify, remove, and/or treat ash trees. In addition, the presence of so many dead and dying trees will be aesthetically damaging to a town known for the beauty of its wooded hills.

The Johnson Ash Tree Inventory

The purpose of the inventory was to locate trees within the town right of way in order to enumerate the population of ash trees in Johnson and therefor estimate the economic impacts of the impending infestation on the town. The inventory provides baseline information to guide management actions and priorities.

The Johnson Ash Tree Inventory was completed by volunteers from March to May of 2013. With the help of these volunteers, all town-maintained roads in Johnson were completely inventoried for ash trees. Data obtained on the trees included their location, DBH, condition, distance to the street, and presence of electrical wire.

A total of 2470 single, community ash trees were recorded within town right of ways. Stands of multiple ash trees were also noted, as were trees on private property within 75 feet of the centerline of the road. The maps in attachment A depict the quantity of trees found within each assigned diameter (at breast height, DBH) class. This information will be most important for assessing costs determined by the diameter of the tree.

Johnson's tree inventory included only town maintained roads and public properties, state maintained roads and Johnson State College were not included in this inventory effort, and will be the responsibility of the State. However it is encouraged that Johnson have a plan in place in the event that other infested areas deemed higher priority than Johnson state roads create a situation in which the state is unable to respond to our hazard trees in a timely manner. It has been announced that no state or federal monies will be made available for municipalities dealing with EAB.

EAB Management Options

There are three management options to respond to EAB:

1. Response – Remove trees as they die
2. Pre-emptive Removal – Planned tree removal on predetermined time frames and specifications
3. Treatment – Insecticide Injection or Basal Trunk Applications

Each of these strategies is discussed below.

Response

Johnson could wait for the EAB to arrive and remove the trees as they begin to die. Once portions of Johnson are infested, it has clearly been the experience of all other infested towns that all of the trees inventoried will very quickly begin to decline. In addition, this strategy puts the town at a high liability risk for damages and could result in the need for the vast majority of the 2400 inventoried trees to be removed at once.

Pre-Emptive Tree Removal

The pre-emptive removal strategy employs removing all of the ash trees in the right-of-way over a pre-determined project duration prior to the arrival of an EAB infestation in Johnson. This strategy provides time for project planning, as well as an opportunity to

distribute costs. This also allows the town to remove live trees, which are cheaper and easier to remove and fall in a more predictable and safer manner, and will produce viable wood of more interest to homeowners.

Johnson could implement this strategy for the inventoried trees over an extended period beginning now with the pre-emptive removal of an economically viable number of trees annually. Tree removals could be prioritized based on the location and condition ratings assigned in the inventory. Prioritizing the trees in the poorest condition may also serve to inhibit the spread of EAB.

According to State of Vermont estimate, the removal of a live ash tree of average size costs approximately $400.00. This strategy would allow the town to distribute the total tree removal costs, of approximately $960,000, over the course of several years, as opposed to facing the costs over a much shorter period dictated by the speed of the infestation.

In determining which trees to pre-emptively remove Johnson can rely on the Regional Invasive Insect Preparedness Team, the Tree Board, and Tree Warden.

Preventative Treatment

There are insecticidal treatments available that have proven effective in protecting ash trees from EAB. The town of Johnson has no specimen ash trees in municipal areas worth the cost and effort of these types of treatment. This strategy is not applicable to Johnson.

Potential Cost Sharing

The Regional Invasive Insect Preparedness Team is currently exploring opportunities for cost-sharing with neighboring municipalities and county-wide collaboration in an effort to save money.

Some of the major costs associated with EAB preparedness efforts have to do with dealing with the produced wood, which will become especially costly after a quarantine has been enacted. A number of options exist, each with their own associated costs. Collaborating with surrounding communities may allow Johnson to decrease their fiscal responsibility.

Probable Major Expenses:

- Adherence to Federal and State Quarantine Laws
- Tub Grinder
- Maintenance Yard and/or Disposal Area

Lessons learned from the Mid-West

As the infestations of EAB spread steadily, many towns have faced the same dilemmas Johnson faces right now. Through careful research and planning, Johnson can avoid many of the costly mistakes made by other towns, but preparation needs to begin now. The moment the EAB arrives in Vermont the timeline is immediately fast-tracked, and reaction, rather than preparation, will become the focus.

From the trenches:

- Prepare early; DO NOT be blindsided
- Learn from the costly mistakes of others
- Prioritize tree removal, plan for public safety
- Protect environmental assets

Recommended Management Actions

The immediate first step in managing for EAB is for the town to learn as much as possible about it, and to make sure the tax –payers understand the ramifications of an infestation.

Appropriate departments and staff should be informed about the insect and the potential hazards. Highway and buildings & grounds departments should be aware of the signs and symptoms of an EAB infestation and educated in ash tree identification. The town already has a trained EAB First Detector, a Tree Warden, and an active core group of volunteers who serve on the Regional Invasive Insect Preparedness Team. This plan and the inventory report are also important resources that should be carefully reviewed by the Select Board and town staff.

Johnson can proactively prepare for EAB by maintaining the inventory of ash trees and hazard trees on public property and in the town right of way. Collaboration with the various groups maintaining Johnson's extensive network of trails, including both the Long Trail Association and the Vermont Association of Snow Travelers, to ensure that these groups are prepared to deal with the hazards presented by a full scale infestation. A tree inventory on Johnson's trails may become necessary. The ash trees identified should be tagged with specialized tags containing information about EAB providing an additional opportunity to raise public awareness. Johnson's Old Mill Park, Gomo Town Forest, Prindle lot, and Talc Mill trails are also highly trafficked areas with potential for hazard trees and opportunity for public outreach.

Pre-emptive tree removals are the best options for the publicly owned trees identified in the Johnson ash tree inventory. Managing the inventoried trees using these strategies could be implemented immediately utilizing the information in this plan and the inventory data. Departments responsible for tree removals should review the inventory data and develop a list of trees to be prioritized for removal or treatment. Ash trees near wires with the lowest condition rating and the shortest distance from the road can be considered the most hazardous. The list of the most hazardous can then be divided into

manageable sets of trees that can be scheduled for removal on a monthly or yearly basis. The town should also publicize tree removals on its website and educate homeowners on how to take their own responsible actions.

Summary of Recommended Actions

- Promote public awareness and education
- Educate appropriate staff and continue involvement in Regional Invasive Insect Preparedness Team
- Prioritize and schedule removal/treatment of inventoried street trees
- Inventory trees on various trail systems passing through town
- Publicize tree removals/treatment on the town website

Closing

The information contained in this plan, sponsored by RIIPT, is intended to be a useful resource as Johnson manages for EAB. Unfortunately, the Town of Johnson must face the social and economic costs associated with EAB. Although there is not much time to prepare, the negative impacts of EAB can still be minimized. Lessons learned from the hard hit Midwest have shown planning and proactive management actions can help alleviate the burden EAB brings to communities. An EAB infestation in the area is inevitable and will have a profound impact on the community. The urgency for Johnson to take action is very real.

Acceptance of this plan will also provide a framework on which Johnson can base any future preparedness planning for forests pests, such as the possible arrival of the Asian Longhorn Beetle, which attacks and eventually kills most hardwoods including maple trees.

The EAB is on the prowl and looking for love in a town near you!

References and Resources

Regional Invasive Insect Preparedness Team (RIIPT)
Coordinators of the Lamoille County Invasive Forest Pest Preparedness Efforts
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Taylar Foster of Lamoille Co. Planning Commission
Meghan Rhodier of Lamoille Co. Planning Commission
Phil Wilson of VT Cartography

www.vtinvasives.org
University of Vermont Extension (UVM EXT)
Coordinators the VT Forest Pest First Detector Program.
Contact: Caitlin Cusack, VT Forest Pest First Detector Program Volunteer Coordinator
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Vermont Department of Forests, Parks and Recreation
Provided technical expertise on tree pests, assisted in delivery of Forest Pest First Detector Program
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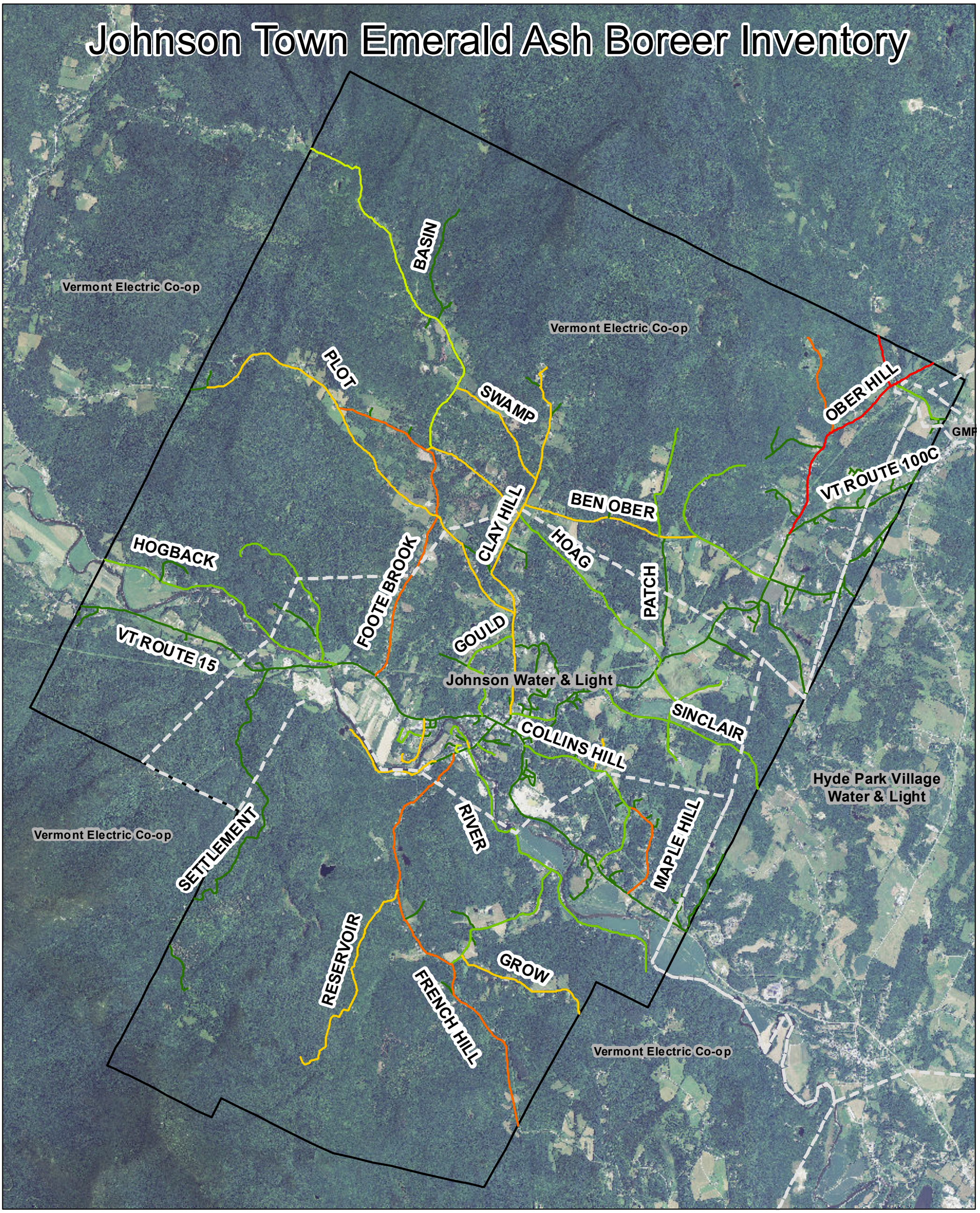
Johnson Conservation Commission
Vermont Agency of Agriculture
USDA APHIS – Plant Protection & Quarantine
VT Department of Environmental Conservation

Johnson Town Emerald Ash Boreer Inventory



Ash Tree Density
Per Mile of Right of Way

- 0
- 1 - 25
- 25 - 50
- 50 - 75
- 75 - 100
- 100 - 125
- Lamoille County Utilitiy Providers
- Johnson Town

Total Ash Tree Number: 2,470

For more detailed ash tree data
contact Sue Lovering at loveringsuened@yahoo.com

Data Courtesy of the Johnson Conservation Commission
and the Vermont Center for Geographic Information
Date: 11/23/2013

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W E
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1 inch = 1 mile