



# Tree Work Ahead

An analysis of current and potential strategies to  
manage and utilize community and commercial tree  
debris in Hampshire County

Prepared by Pioneer Valley Planning Commission  
on behalf of the  
Massachusetts Executive Office of Energy and Environmental  
Affairs  
June 2020

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# EXECUTIVE SUMMARY

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In Hampshire County, Massachusetts, woody material from tree trimming and removal (tree debris) is a regularly generated resource that can be expected to increase in volume in the near future. The effects of climate change (such as an increase in pest- and weather-related tree damage and mortality) and the related proactive resiliency work (such as the removal of trees and limbs from around power lines) will continue to provide influxes and irregular spikes of supply in addition to the regular volume of tree debris currently generated.

It is not currently clear if the tree debris generated from these activities and events is utilized to its highest market or community value, raising concerns over potential missed revenues from sales, avoidable costs of disposal, and questions regarding the best uses of tree debris from a social and/or environmental viewpoint. This is especially true for low-grade wood that must be processed into wood chips instead of higher-value products such as lumber or firewood, and so is generated in greater volume and has less resale value. Community tree debris (generated by the municipal tree warden) and tree debris generated under the purview of private tree care companies may be processed differently and often follow different pathways on their way to end uses. Municipal tree wardens do not process wood for profit and most Hampshire County tree wardens are able to distribute the bulk of routine volumes of tree debris to residents for reuse. Tree care companies, operating for profit, manage a larger volume of tree debris and may have trouble placing their products in the local market, which is often saturated.

## Key Findings

Predicated on the results of interviews with, and an electronic survey of, Hampshire County tree wardens and supplementary interviews with regional private tree care companies, this report illustrates existing strategies for processing and utilizing tree debris within the region and highlights opportunities and constraints for expanding those strategies. Key findings include:

- Most municipalities process tree debris into wood chips, fire wood, or save tree debris for distribution to specialty users, depending on the quality of wood, the location of the tree or limb taken down, and available equipment. When it is an option due to geographic location, many municipalities prefer to leave wood chips and/or hardwood logs in place to decompose or be gathered by neighboring residents to save on storage space and staff time.
- Most municipalities have trouble processing butt logs (what remains of the tree after all of its co-dominant stems have been removed) due to the need for specialty equipment. Instead, most municipalities hire contractors at least annually to remove, split, or grind stockpiles of butt logs. PVPC learned that several communities spend around \$2,000 each annually to process and haul butt logs.
- Tree care companies follow the same strategies, but when the wood is good enough quality, they may also process trees into saw logs or lumber for sale. Some companies may process and

sell wood chips for landscaping use or biomass, while others prefer to leave in place if possible due to low market value and/or market saturation.

- After die-off or extreme weather events, municipalities deal with sudden influxes of tree debris on an ad hoc basis and need help planning for strategies to process and manage that material. Private tree care companies also struggle with utilizing tree debris from large storm events due to market saturation.
- Municipal forestry programs tend to be under-budgeted and lacking in staff time and resources, and therefore do not plan for advanced strategies for wood reclamation and enhanced processing of tree debris.
- There is an opportunity to improve or formalize existing systems for the use of hardwood tree debris as firewood. While only 5% of Hampshire County households report using wood as their primary heating fuel, many more use wood for secondary heating fuels to supplement expensive fossil fuels. Low-Income Home Energy Assistance Program (LIHEAP) program participants must declare a single, primary fuel type in order to be eligible to participate in the program, resulting in under-reporting of wood heating. Amongst LIHEAP program participants in western Massachusetts, there is great interest in participating in state and federal wood stove change-out programs. There is also some interest from Hampshire County communities in starting wood bank programs for low-income residents. However, many communities feel they lack the budget and staff time necessary to coordinate the volunteers needed to run such a program.
- No recent estimate of the volume of annually generated tree debris exists for either Hampshire County or the State as a whole. Without at least a rough estimate of the quantity of this resource, it is difficult to understand the feasibility of developing a strong market for local high- and low-grade wood products.

### Recommendations to Improve Tree Debris Utilization

The report also offers recommendations for advancing tree debris utilization within Hampshire County. These recommendations are tailored toward municipal, and regional and state stakeholders, and are formulated to provide suggestions for both short-term actions municipalities can take to increase the use of their tree debris, and longer-term strategies that regional and state stakeholders can undertake to develop partnerships, create and/or secure funding sources, and study the potential for a strong formal wood processing economy within the county.

The five recommendations for municipalities are:

1. **Develop and Maintain up-to-date Tree Inventories and Community Tree Management Plans:** Whether reclaiming tree debris for resale or not, tree inventories and community tree management plans are foundational tools for any municipal tree warden. In addition to providing a basis for budget planning and maintenance schedules and for setting priorities for pruning and removal work, the tree survey could include information in the tree inventory relevant to individual specimens' suitability for recovery and best utilization options.



2. **Consider the Viability of Establishing a Formal Tree Debris Recovery Program:** As part of exploring whether to invest in establishing a program, municipal tree wardens should perform an internal capacity evaluation. This evaluation should include considerations such as:
  - a. Current staffing capacity and staff expertise
  - b. Potential to train staff for removal and recovery processes
  - c. Access to equipment and/or cost of renting or purchasing or possibly sharing with other municipalities
  - d. Collection, sorting, and storage capability
  - e. Calculation of avoided costs in addition to potential income

To ensure the best market use of community tree debris, tree wardens may develop formal policies governing the assessment of trees and tree limbs for various potential uses. Formally adopted plans and policies ensure that systematic protocols are followed, can facilitate stakeholder buy-in, and can increase access to funding opportunities. A tree debris management plan can supplement a public tree management plan by identifying efficient and cost-effective methods of disposing of or reusing the debris from the routine tree maintenance that the public tree management plan outlines. The tree crew could also be trained in how to properly handle and cut trees to ensure the wood's usefulness for its intended purpose beyond chips or firewood, such as for lumber. Lastly, properly handled and processed wood should be brought to a well-organized storage area or town yard in order to facilitate reclamation for the wood's best use.

3. **Define Program Goals, Plan Accordingly, and Develop Partnerships:** Unless a community has access to a steady volume of high quality whole logs, establishing a municipal tree debris recovery and processing program may not save money—especially if the municipality hasn't already invested in specialty equipment. Non-financial motivations may be more enticing, such as if the municipality had already established commitments to goals such as waste reduction and material reuse, carbon sequestration, public service and/or educational and training opportunities, etc. Identifying and communicating such goals could facilitate partnerships with community organizations or education institutions, thus relieving demand on municipal staff time or budget.
4. **Explore Inter-Municipal Collaboration:** Cross municipal partnerships through shared regional services could help enhance viability of a tree debris recovery program. Equipment, staff, and/or administration might all be shared across communities if properly planned and implemented. Through District Local Technical Assistance from the State of Massachusetts, the Pioneer Valley Planning Commission is funded annually to provide technical assistance to explore municipal partnerships and regional collaborations. Such an exploration—initiated by municipalities through a request to PVPC—may be an important way to assess whether establishing a tree debris recovery and processing program in partnership with others makes sense.
5. **Be Aware of Potential Markets:** Awareness of markets is a key part of establishing a wood reclamation program. Current possibilities include the sale of saw logs to sawmills and the sale

of lumber to architects, contractors, and/or other builders. Municipalities could also target specialty wood products by working with artisans, craftspeople, and/or builders who have special interest in local wood to determine what wood products are needed in the area.

The five recommendations for state and regional partners are:

1. **Provide Technical Assistance to Communities for Developing Public Tree Inventories and Public Tree Management Plans:** the majority of communities in Hampshire County have neither public tree inventories nor public tree management plans. Without these building blocks of community forestry planning, it will be difficult for any municipality to establish a more robust tree debris utilization program. DCR should investigate actual and perceived barriers to participating in the Urban and Community Forestry grant programs, and continue to promote these and the Community Wood Bank program via outreach, communication, and the development of case studies.
2. **Develop a Regional Community Tree Debris Utilization Plan:** While it is up to individual municipalities to implement any of the practices outlined in Section IV A below, each community should not have to invest the time and resources to reinvent the wheel. It is also probable that local buyers would be more likely to look to municipal sources for wood products if there were a steady supply of volume—meaning it could make sense for municipalities to band their supply together in order to make sales. As budget, and specifically limitations in staff and equipment, were cited as the primary barriers to expanding tree debris utilization strategies, the State’s professional forestry staff and PVPC could act as conveners and facilitators toward establishing a regional tree debris utilization plan. This plan could:
  - a. Identify efficient strategies for the processing of material and training of staff and determine whether capacity building might include joint purchase and sharing of equipment, a technical circuit rider, etc.
  - b. Conduct more in-depth analysis to determine volume of high and low quality tree debris generated within Hampshire County and the region. An advisory group may be helpful in developing a methodology for estimating the amount of accessible tree debris generated annually, with adequate representation from private tree companies and utilities as they handle the bulk of tree debris.
  - c. More fully engage with utility companies and perhaps Department of Public Utilities to understand volume of material generated in their operations, as well as planned resiliency actions for coming years. Engagement with utility companies might also include an exploration of potential collaborations, including sponsorship of a multi-community wood bank program to provide heating fuel for those families most in need.
  - d. Identify potential market outlets for various wood products, and delineate economic development strategies to strengthen local markets, and/or create a unified branding effort.

- e. Develop and facilitate grants for regional partnerships, including shared staff positions, equipment purchases, or programs such as a multi-municipal wood bank
3. **Provide Technical Assistance and Funding for a Regional Debris Management Plan:** Fourteen of the 20 Hampshire County municipalities' hazard mitigation plans have identified a need for a regional debris management plan. Tree debris can be a substantial and separate component of debris clean-up after a natural disaster or severe weather event. If the State provides technical assistance and funding for such a plan in the future, it should include specific strategies for storing, processing, transporting, and salvaging such tree debris as possible and securing the necessary agreements.
4. **Develop Grant Program(s) for Regional Wood Utilization Programming:** As identified in PVPC's interviews and electronic survey for this report, staff time and budgetary limitations restrict the scope of most of Hampshire County's tree debris processing and utilization strategies. Regional cooperation may make strategies such as the purchasing of new equipment or the development of new partnerships more attractive and more likely. Massachusetts Executive Office of Energy and Environmental Affairs (EEA) could dedicate funding to supporting regional collaborations on strategies such as:
- a. Purchasing heavy equipment, including portable sawmills, butt log screws, and tub grinders, for shared use and the development of memorandums of agreement for that shared use.
  - b. Developing and funding shared staff positions for two or more municipalities, with a focus on developing and implementing wood utilization programming.
  - c. Developing and implementing model strategies for municipal partnerships with local and regional technical schools. Such partnerships could include the municipality preserving wood quality and usability during tree takedowns and delivering the debris to technical schools for use in carpentry, woodworking, and construction courses. Two ideas for the products of these courses include installing them in public spaces, such as handmade benches in municipal parks, or perhaps the school could sell students' work with the profit funding a portion of the municipal forestry programming.
5. **Explore and Facilitate Markets for Tree Debris Material:** As interviews and survey results for this study demonstrate, there is a steady supply of tree debris from the region. This can mean market-saturation for low-grade wood products such as biomass and landscape chips or mulch after a severe weather event. An audience for high-grade markets, such as for local lumber, may need to be cultivated, as low-volume, local wood may have higher processing costs than imported lumber. Direct legislative support and state programming can foster the economic development strategies needed to bolster these markets, such as:
- a. Consulting with some of the private tree care companies that actively work in repurposing tree debris to understand whether there is strategic assistance or relatively

small investment that could be made to activate far more productive and useful markets for tree debris.

- b. Following through on a New England Forestry Foundation idea that would bring value to low-value wood resources by providing state technical and financial support to enable willing municipalities to transition their public-school buildings to wood-based heat. This idea could be piloted in Hampshire County, beginning with some analysis of what such transitions might entail and then determining level of interest among municipalities.
- c. Developing a marketing campaign to promote Massachusetts grown wood, modeled on local food campaigns. Consider partnering with existing organizations, such as Western Mass Wood (a program of Mass Woodland Institute that promotes the use of wood harvested from Berkshire, Franklin, Hampshire, Hampden, and Worcester Counties) or Center for EcoTechnology (a nonprofit developing solutions to reduce greenhouse gas emissions while enhancing the local economy and environment)
- d. Exploring the viability of specific manufacturing processes that could make use of tree debris. Examples of products made from such manufacturing processes include wood fiber insulation, low-density fiberboard, high-protein pellets for aquaculture operations, and organic chemicals produced from low-grade wood that can be used in the production of plastics, pharmaceuticals, etc. Specific issues to explore might include the volumes of supply needed to make such processing economically viable, current and future demand for specific products, and necessary facility infrastructure, such as 3 phase power, broad band, etc.
- e. Identifying potential locations to facilitate industry clusters. Industry clusters are geographic concentrations of businesses and organizations that have developed mutually beneficial and cooperative links with one another. For local wood markets, clusters could include producers of wood (municipal forestry programs, tree care companies, for example), users of wood (architects and construction contractors, residential developers, artisans and craftspeople, laypeople), and intermediaries (sawmills and sawyers, artisans and craftspeople).

# I. INTRODUCTION

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## Highlights

*Tree debris is a regularly generated resource that currently may not be exploited to its fullest capacity. Due to the effects of climate change and related resiliency work, Hampshire County can expect influxes and irregular spikes of supply in addition to the regular volume of tree debris currently generated.*

*Community tree debris, generated by the municipal tree warden, and tree debris generated under the purview of private tree care companies may be processed differently and often follow different pathways on their way to end uses. Municipalities consider community tree debris to be a public resource, whereas private tree care companies need to earn a profit from this material.*

*It is difficult to understand the total volume of tree debris generated annually in Hampshire County because neither tree wardens nor private companies are tracking their supply.*

When downed or damaged trees and their limbs are removed from roadsides or public and private properties, the resulting woody residue creates a potential resource. The fate of this material in Massachusetts, however, is not clearly understood. There may be significant opportunities to improve upon the current rate of reclamation and use of tree debris in Massachusetts for both high grade markets, such as for lumber, and low-grade markets, such as for biomass.

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) contracted with the Pioneer Valley Planning Commission (PVPC) to pilot an analysis in Hampshire County, MA to understand the customary fate of this material. This report is an exploration of:

- current practices surrounding the disposal and/or reuse of felled or fallen trees and tree residues in Hampshire County,
- the pathways this debris takes to its ultimate destination, and potential policies, and
- next steps to facilitate or incentivize the reclamation of tree residues for the local market for high- and low-grade wood products.

This report will use the term “tree debris” to differentiate this debris or residue generated from felled or fallen trees and tree limbs from other “urban wood” debris, which often includes demolition byproducts, and from the explicit cutting of trees for lumber and wood products. The term “community tree debris,” as a sub-section of tree debris generally, refers specifically to tree debris generated by publicly-held tree stock. It is important to note that the tree debris this report studies has not been selectively cut for its use in commercial markets, but rather is the byproduct of land clearing for development or redevelopment, the necessary and routine trimming of public trees and the removal of hazard trees for public safety, and/or the result of damage by natural events such as weather or infestation. Therefore, this report examines the potential to improve opportunities for the reclamation for market sale of tree debris that is already fated for removal and does not seek to identify opportunities for the cutting of trees for purely commercial purposes.



## A. A Resource of Increasing Supply

Steady supplies of tree debris are generated by routine tree maintenance and pruning. According to the United States Forest Service in a 2012 article, reclaimed wood from all dead and diseased community trees could amount to nearly 4 billion board feet, or nearly 30% of annual hardwood consumption in the US.<sup>1</sup> This figure accounts only for community trees—those trees growing within parks, public properties, and public street rights-of-way, maintained by local municipalities—and does not consider tree debris generated on private residential or commercial property. Therefore, the total summation of all reclaimed wood could be expected to be much higher.

While downed trees and tree limbs in a natural setting can provide habitat value, leaving this debris to decompose in place in a residential, suburban, or urban setting, or in a public works yard, is a waste of a potentially valuable and regularly available resource. Treating this material as refuse can lead to loss of potential revenues, lost opportunities to sequester the wood's innate carbon stores (leading to increased greenhouse gas [GHG] emissions), and wasted time and effort on behalf of municipal or tree care companies' staff.

While tree debris is already a readily available resource, the supply can be reasonably assumed to increase in the future. The effects of climate change are increasing the need for more aggressive and frequent maintenance of public trees and trees within rights-of-way, leading to sporadic influxes of tree debris supply above the normal amount. Additionally, the extreme weather events spurred by climate change can generate heavier yields of tree debris at any given point in time, and impacts from storms are exacerbated by increasingly weakened forest and tree health due to influxes of harmful pests. Unhealthy trees and their limbs are more likely to be brought down onto power lines by the weight of snow, ice, or water and under the force of wind.

Hampshire County communities generally lack debris management plans to direct emergency response and resources to the removal and organization of this material. The effects of climate change, to be



CLEARING TREE DEBRIS AFTER A STORM IN LONGMEADOW, MA

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<sup>1</sup> Falk and McKeever, 'Generation and Recovery of Solid Wood Waste in the U.S.', Biocycle, August 2012

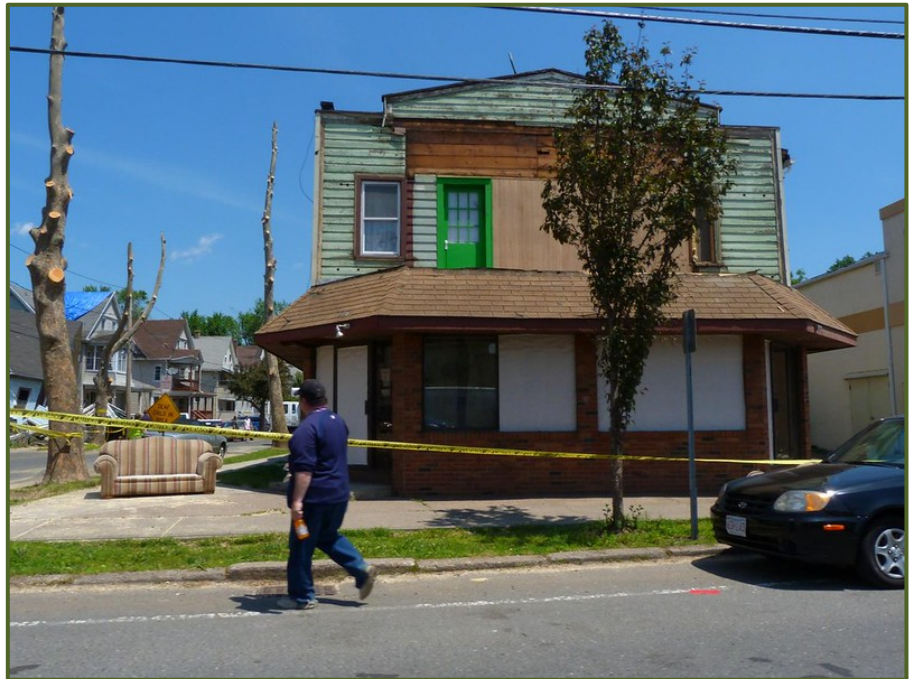


experienced with increasing frequency and intensity as we near mid-century, will undoubtedly continue to produce huge and sporadic amounts of fresh tree debris from both public and private stock.

## 1. Changing Weather Patterns

Communities in Hampshire County have experienced myriad extreme weather events resulting in downed trees and tree limbs within the past 15 years. The After Action Report and Improvement Plans (AAR-IPs) generated by the Western Massachusetts Regional Homeland Security Advisory Council (WMRHSAC) do not quantify the amount of tree debris generated in any of these events, and municipal tree wardens and public works departments have

not kept specific records on this topic. However, each of the events described below—which constitute just a sampling of local weather events causing downed trees and limbs—resulted in enough community and private tree debris to be disruptive to business-as-usual for residents and municipal staff. These events required alternative disposal methods for the communities they affected. Several of these events occurred in neighboring Franklin and Hampden Counties, but are exemplary of the types of extreme weather events affecting the greater Pioneer Valley.



**A 2011 TORNADO CAUSED EXTENSIVE DAMAGE TO TREES AND INFRASTRUCTURE IN WEST SPRINGFIELD (ABOVE) AND 9 OTHER MASSACHUSETTS COMMUNITIES. SOURCE: FLICKR USER RUSTY CLARK**

- Snow and ice storms: A December 2008 ice storm caused widespread damage to electrical infrastructure, buildings, and other personal property due to falling trees and tree limbs in the hilltown area of Hampshire and Franklin Counties. Many parts of the hilltown area were out of power for a week, and some residences were out for up to 10 days. In 2011, an unseasonable October storm (so-called “Snowtober”) caused large amounts of wet snow to accumulate on trees still holding their leaves. The combined weight of the snow with the leaves caused trees and their limbs to crack and fall, inducing widespread power outages and damage to public and private property and infrastructure in the same hilltown region. This same storm manifested as an ice storm in the valley towns of Hampshire County, to similar results of downed trees and limbs.

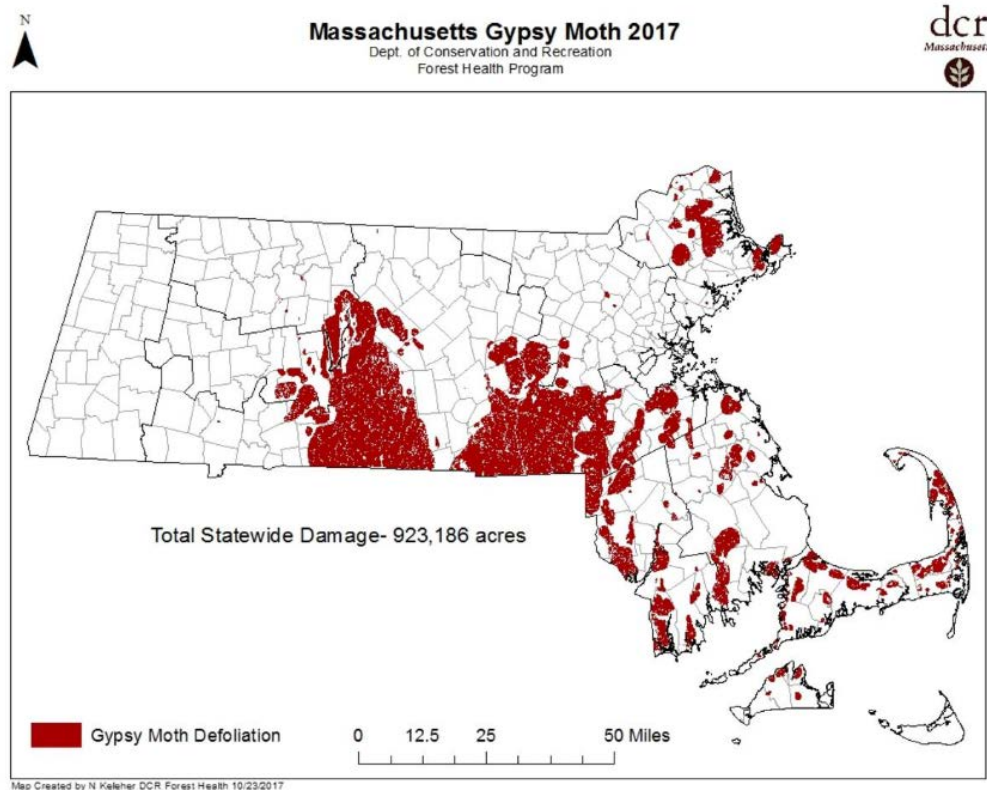
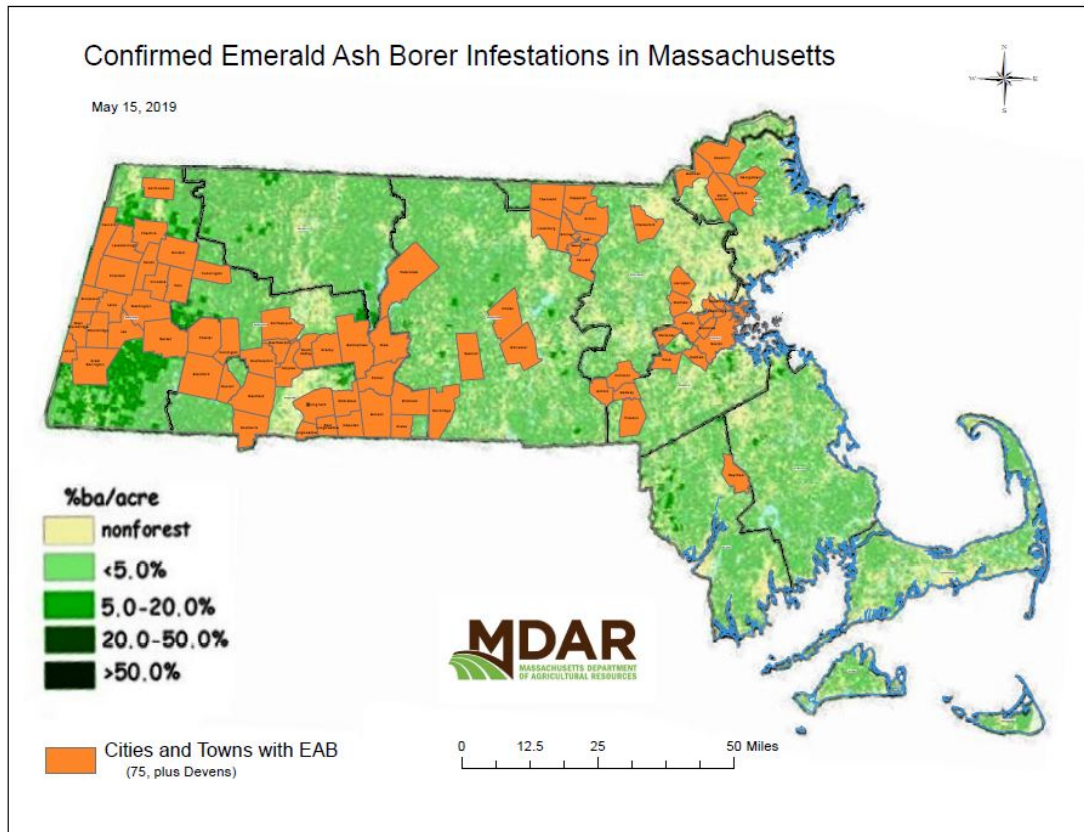
- Tornadoes: On June 1, 2011, an F3 tornado, a weather event with wind speeds between 150 and 200 miles per hour that was previously unheard of in this part of the country, raked through the Hampden County municipalities of Westfield, West Springfield, Springfield, Monson, Hampden, Wilbraham, and Brimfield through to the Worcester County municipalities of Sturbridge, Southbridge, and Charlton. In 2017, another, smaller tornado touched down in the Hampshire County Town of Goshen before moving to the neighboring Town of Conway (Franklin County). The tornado caused significant tree damage on Pine Road in Goshen, leaving two homes damaged and roadways littered with woody debris. Local emergency and highway crews cleared municipal roadways and worked with the Massachusetts Department of Transportation (MDOT) to clear MA Route 9.
- Microbursts: in 2014, a microburst caused extensive damage to the wooded area on the Easthampton side of Mt. Tom. Hundreds of trees were uprooted, snapped, or otherwise downed over Christopher Clark Road, within Mt. Tom State Forest, and impeded vehicular passage on Mountain Road (MA Route 141). Another, smaller microburst hit the Hampden County Town of Longmeadow in 2019. According to the records kept by the Longmeadow Tree Warden, the Town lost an estimated 50 full sized community and privately-owned trees, and the equivalent of another 10 full sized trees in the form of large branches, due to the microburst. Eversource then identified 45 other trees within the public right-of-way that warranted full removal due to hazard concerns.

## 2. Invasive Species

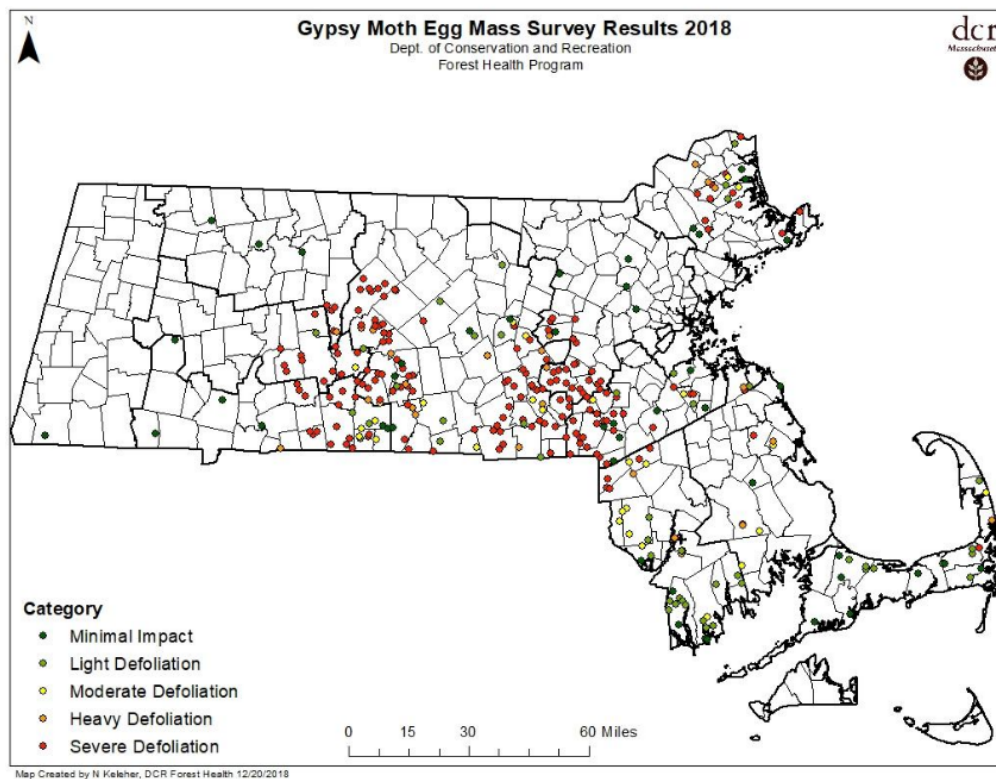
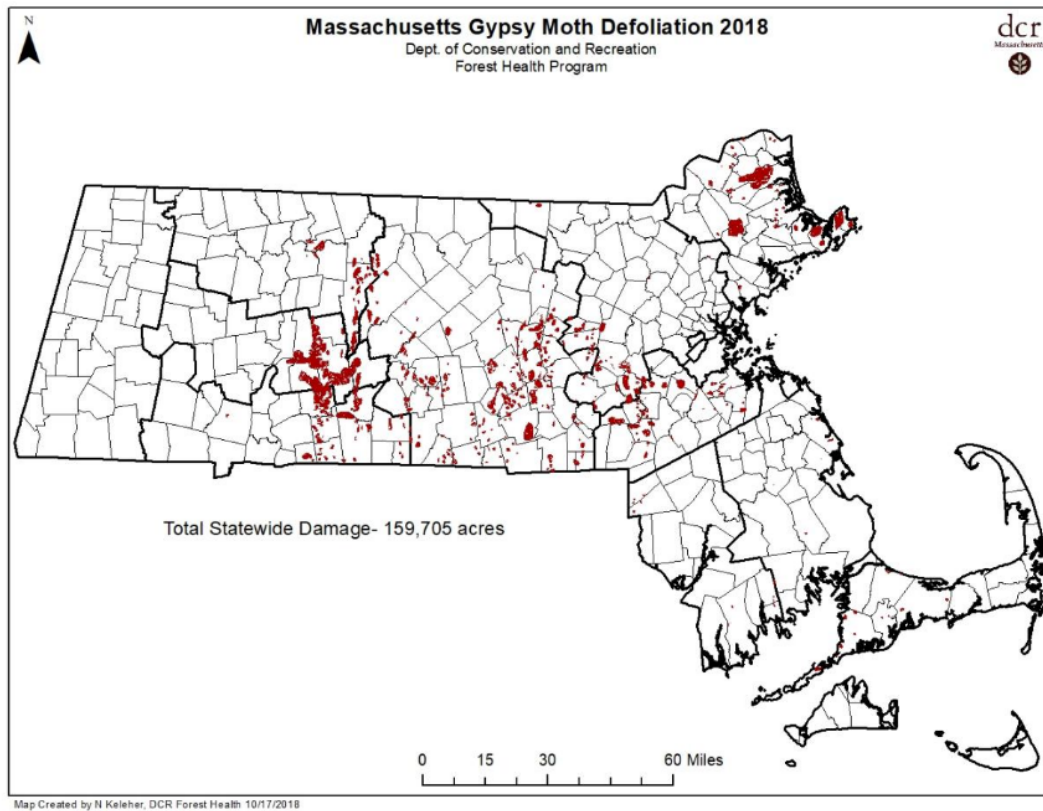
As described, these extreme weather events are rendered more destructive due to the influx of insect infestations already weakening local trees. As traditional habitats shift due to changing climate and accidental or purposeful relocation of species from one area of the country or world to another cause invasion of local ecosystems, Massachusetts can expect pressure from invasive species to grow.

Examples of invasive infestations already affecting local tree populations include:

- Emerald ash borer (*Agrilus planipennis* Fairmaire) (EAB): As of March 3, 2020, EAB has been detected in 116 communities in Massachusetts (about 1/3 of all communities), including 12 Hampshire County communities. While the adult beetles cause little damage, the larvae feed on the inner bark of ash trees and disrupt the trees' ability to transport water and nutrients, thus weakening or killing the tree and its limbs. Since its discovery in 2002, EAB has killed hundreds of millions of ash trees in North America.
- Gypsy moth (*Lymantria dispar*): The gypsy moth has been a costly and persistent problem in Massachusetts since its introduction in 1869. This invasive pest causes tree defoliation through its spring feeding in the caterpillar life stage. White oak is the preferred host, but most other oak species are also highly susceptible, as well as many other deciduous species, such as maple, birch, poplar, willow, apple, and hawthorn. Drought conditions in recent years limited the effectiveness of a soil-borne parasitic fungus, *Entomophaga maimaiga*, that has helped keep in check gypsy moth populations since the fungus' introduction in the 1980s from Japan. A recent gypsy moth outbreak began in 2015 and peaked in 2017 with 923,000 acres of defoliation across







Massachusetts. Changing weather and precipitation patterns could impact the future effectiveness of *E. maimaiga*, causing gypsy moth outbreaks to be of continued concern statewide. The widespread damage from this invasive insect has caused decline and mortality in oaks in Hampshire County, particularly along the east of the Connecticut River and surrounding the Quabbin Reservoir.

### 3. Resiliency Efforts

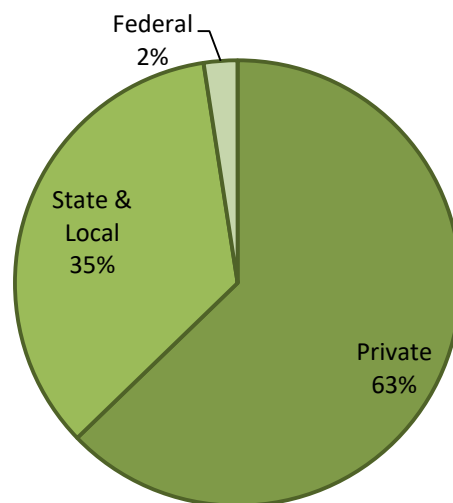
Many communities across Massachusetts are undertaking efforts to become more resilient, alleviating the impacts of such climate hazards and infestations. These efforts include a wide arc of projects that can include strategies to mitigate GHG, such as the installation of solar fields to increase the percentage of renewable energy within our electrical grid, and strategies to mitigate the damage caused by extreme weather events, such as by aggressively trimming or removing trees growing under or near utility lines and other hazard trees. Where these projects include the clearing or trimming of singular trees and wooded areas, resiliency efforts can also cause spikes in the amount of tree debris available for reuse within a municipality's purview. Out of the 14 Hampshire County communities to have undertaken EEA's Municipal Vulnerability Preparedness (MVP) planning process at the time of this report, 12 identified needing to increase proactive community tree trimming and community tree management planning in order to better prepare for the impacts of climate change.

## B. The Lay of the Land

### 1. Managing Tree Debris in the Commonwealth

Massachusetts is the eighth-most forested state in the country, with 57% forest cover, or the equivalent of over 3,000,000 acres. At the same time, Massachusetts is the third-most densely populated state, suggesting a high level of interaction between residents and private and public property with trees.<sup>2</sup> It is at the interface of human land use and wooded areas—such as vegetated rural rights-of-ways, more formal tree belts along roadways, or in landscaped areas—that tree debris is often generated and reclaimed.

Statewide in 2018, approximately one-third of forested land was owned by the state or local municipalities, 2.5% by federal agencies, and



**MASSACHUSETTS FORESTLAND OWNERSHIP IN 2018 (USDA)**

<sup>2</sup> USDA Forest Service. 2019. Forests of Massachusetts, 2018. Resource Update FS-208. Madison, WI: U.S. Department of Agriculture, Forest Service. 2p. <https://doi.org/10.2737/FS-RU-208>

two-thirds were privately owned.<sup>3</sup> This pattern holds true within Hampshire County, where the state or local governments owned about 36% of all forestland and 64% of forestland was privately held as of 2017.<sup>4</sup> While this ratio may change dramatically from within urban communities where the municipality is likely to control a larger share of trees, to rural communities where private landowners may control many hundreds of acres of forest, this data indicates that the largest amount of tree debris is generated on privately held property. Unless processing tree debris themselves, commercial and residential clients work with private tree care companies to trim and/or remove trees and the resulting material from their properties. Municipalities controlling public tree stock may also contract with a local tree care company for support in tree maintenance, or may rely partially or fully on their own staff for this work. Therefore, in order to understand the fate of tree debris in Hampshire County, it is important to understand how public and private stock may be processed differently.

Since 1899, Massachusetts General Law has mandated that all cities and towns in the Commonwealth have a tree warden who is responsible for trees on public property (Massachusetts General Laws, Chapter 41, Section 1 and Section 106). These public trees include street and shade trees located within street rights-of-way, and can include trees located in parks, on municipal properties such as the lots of town halls or other municipal facilities, on schoolyards, and in town forests and conservation areas. Tree wardens are tasked with protecting these trees from threats such as insect and disease infestations or vandalism, and also with protecting the public from harm or damage by falling hazard trees and tree limbs. At the local level, it is the tree warden who maintains jurisdiction over how community-owned tree debris is disposed of or reused.

## 2. Regulations Governing the Disposal of Tree Debris

There are three state regulatory elements that have bearing on tree debris management as defined in this report.

In 2006, Massachusetts banned wood from the solid waste disposal stream under 310 CMR 19.017. The definition of *wood* here includes treated and untreated wood, and clean wood (trees, stumps, and brush, including, but not limited to sawdust, chips, shavings and bark).<sup>5</sup> Wood may, however, be disposed of at combustion facilities. No Hampshire County communities, at the time of this analysis, reported disposing of tree debris at such facilities.

At the same time, handling of clean wood is exempt from site assignment review and approval by Massachusetts Department of Environmental Protection (DEP) under 310 CMR 16.03. “Clean wood” is

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<sup>3</sup> Ibid.

<sup>4</sup> Butler, Brett J. 2018. Forests of Massachusetts, 2017. Resource Update FS-161. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 3p. <https://doi.org/10.2737/FS-RU-161>

<sup>5</sup> As defined in 2017 MassDEP flyer entitled, “Your Municipality and Waste Ban Compliance.” The waste ban also includes “yard waste,” defined as grass clippings, weeds, garden materials, shrub trimmings, and brush 1" or less in diameter (but not diseased plants).



defined as discarded material consisting of trees, stumps and brush including, but not limited to, sawdust, chips, shavings, bark, and new or used lumber. It does not include: (a) wood from commingled construction and demolition waste; (b) engineered wood products; and (c) wood containing or likely to contain: asbestos; chemical preservatives such as, but not limited to, chromated copper arsenate (CCA), creosote or pentachlorophenol; or paints, stains or other coatings, or adhesives.<sup>6</sup>

To avert problems with mulch, which is easily combustible, the state fire code has several requirements related to storage. This code limits the size of mulch piles and requires a distance of 30-feet between piles and 25-feet from lot lines. In addition, wherever more than 300 cubic yards of mulch is produced or stored, a local fire department permit is required (527 CMR 1.00).

Together, these legal provisions have the combined effect of reducing the amount of recoverable and useful material going into solid waste streams and protecting public safety, while enabling municipalities to determine best local strategies for managing tree debris/clean wood.

Documents from MassDEP provide guidance to municipalities on: locating and stockpiling tree debris; use of shredded brush; and disposal of tree debris from specific natural disasters.<sup>7</sup> In addition to a list of considerations for use when locating stockpiles, specific recommendations in this guidance include:

- Recycle tree debris for production of lumber, wood pellets, wood chips, and mulch
- Open burning should be an approach of last resort (with restrictions in certain communities given air quality issues and during certain times of year across the Commonwealth)
- Wood that cannot be cut or chipped immediately should be stored in a suitable central location and then chipped when a machine is available
- Piles of shredded brush awaiting end use should be stored in piles or windrows that do not exceed 10 feet in height due to potential for spontaneous combustion
- Shredded brush can be used as mulch in landscaping, and as an ingredient in composting and sludge composting operations.

### **C. Estimating an Annual Volume of Tree Debris**

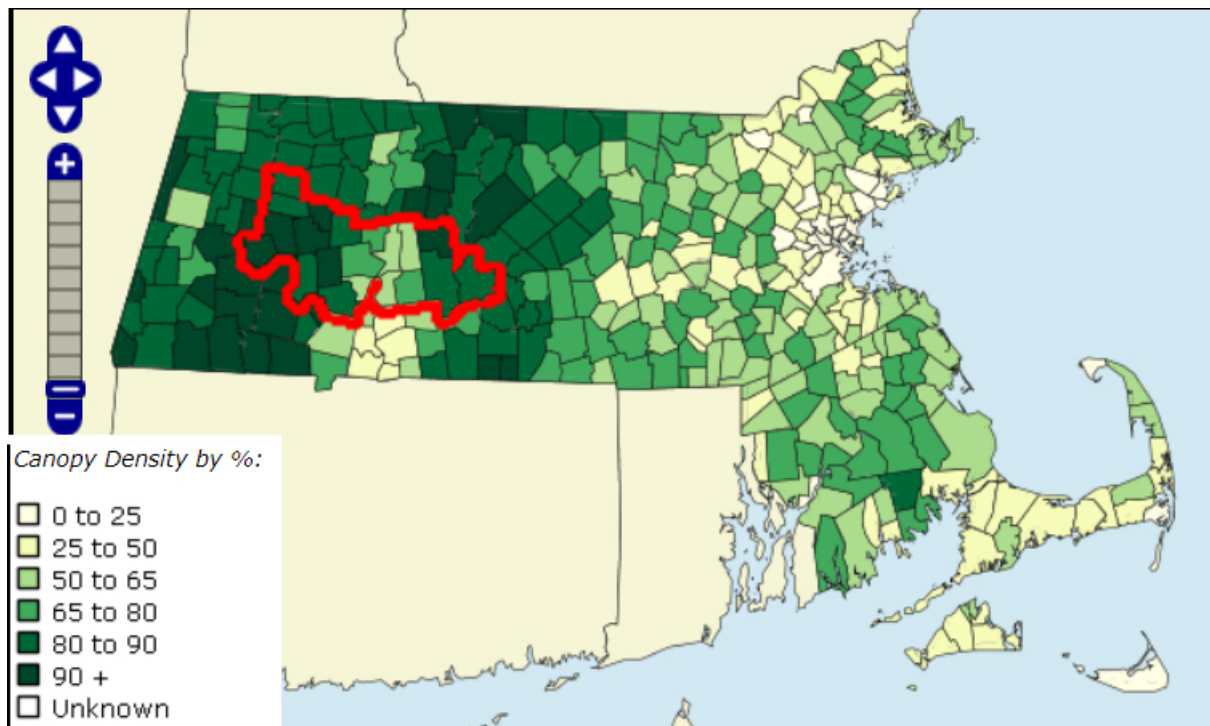
Many of Massachusetts' communities with the highest percentages of canopy density are located in the western portion of the state, with all 20 communities in Hampshire County measuring at least 50% canopy density, and 13 of 20 measuring at 80% or higher according to the most recent statewide data from 2006.<sup>8</sup>

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<sup>6</sup> MassDEP is currently updating regulations and has indicated that there will likely be requirement that stockpiles of wood must be processed or reused within certain time frames.

<sup>7</sup> These guidance documents are included at: <https://www.mass.gov/lists/massdep-solid-waste-policies-guidance-fact-sheets#managing-specific-solid-wastes->

<sup>8</sup> Massachusetts Urban & Community Forestry Information. (n.d.). Retrieved April 1, 2020, from <http://maps.massgis.state.ma.us/dcr/forestry/forestry23.html>



MASSACHUSETTS COMMUNITIES BY PERCENT CANOPY DENSITY/CANOPY COVER. HAMPSHIRE COUNTY IS OUTLINED IN RED. SOURCE: MASSACHUSETTS URBAN & COMMUNITY FORESTRY INFORMATION

From interviews and survey responses (see “Report Methodology” on page 17), PVPC learned that neither regional tree care companies nor Hampshire County tree wardens keep records of the volume of tree debris they respectively generate, reclaim, or process. As a result, up-to-date and accurate estimates of annual tree debris volumes are difficult to establish. In the tree debris survey circulated to Hampshire County tree wardens, PVPC prompted respondents to provide some estimate of the total volume of cubic yards of chipped wood they recover in a typical year. Having learned from previous conversations and interviews that many tree wardens are not actively tracking these volumes, PVPC included a suggestion to think of dump truck volumes to help in providing estimates. Ten communities that responded to this particular survey question estimated the following combined totals:

- 10,150 cubic yards of chip generated per year from community tree debris alone, an estimated equivalent of 4,060 tons;<sup>9</sup> and
- 5,830 cubic yards of unchipped tree debris recovered annually

However, it should be noted that these estimates are based on the rough approximations of the ten tree wardens who ventured to respond to that particular question—three other communities responding to the survey indicated that they were unable to hazard a guess.

<sup>9</sup> <https://www.gravelshop.com/shop/calculate-cubic-yard-feet-ton.asp?groupid=29&productid=545>

The most detailed statewide estimate of woody biomass to date, published in 2002, was commissioned by the Massachusetts Division of Energy Resources and Department of Environmental Management, Bureau of Forestry, and conducted by Fallon and Breger. That report generated volume estimates of woody biomass materials from five sources (municipal



**REGIONAL TREE CARE COMPANY, ASPLUNDH TREE EXPERTS, PERFORMS UTILITY LINE RESILIENCE WORK ALONG A RIGHT-OF-WAY**

solid waste, construction and demolition debris, primary wood manufacturers, secondary wood manufacturers, and urban tree debris<sup>10</sup> based on a literature review of previous studies. The report's definition of "urban tree debris"<sup>10</sup> is the only category that limits itself to felled or fallen tree debris as opposed to including construction/demolition and/or manufacturing debris and residue.

The 2002 study generated several estimates related to the category of urban tree debris for the entire state:

- a total of 1,049,200 tons generated annually
- an overall recovery rate of 72% across the state

Of the amount recovered, 56% of urban tree debris is managed at the point of generation. The remainder was estimated to be sold (12%), sent to recyclers (3%), burned for energy (3%), and open burned, stockpiled, incinerated, or managed in other ways (9%). The study also estimated that 17% of urban tree debris were landfilled.<sup>11</sup>

<sup>10</sup> The inputs for the 2002 study's "urban tree debris" include public sources: municipal/county park and recreation departments, municipal tree care divisions, county tree care divisions, electric utility power line maintenance firms; and private sources: commercial tree care firms, orchards, nurseries, landscapers and landscaping maintenance firms, excavators and land clearing firms.

<sup>11</sup> Fallon, M., & Breger, D. (2002). The Woody Biomass Supply in Massachusetts: A Literature-Based Estimate. Amherst, MA: Massachusetts Division of Energy Resources and Department of Environmental Management, Bureau of Forestry.

While it is beyond the scope of this study to develop an estimate of volume of tree debris in Hampshire County, understanding the annual volume will be important in establishing or facilitating any sort of formal economy around tree debris reclamation. Finalizing a methodology to do so would take an in-depth conversation with appropriate experts in the forestry field.

## **D. Report Methodology**

In beginning the analysis for this report, PVPC first conducted a literature review of best practices for the management and reclamation of community tree debris, including industry reports, municipal case studies from across the nation, and community guides to establishing various tree debris programs. This literature review informed PVPC's conversations with local professionals and framed the context of the report.

Following the initial literature review, PVPC conducted in-person and email-based interviews with local professionals to understand existing regional goals and strategies for, and barriers to, processing and reclaiming tree debris. PVPC interviewed:

- five tree wardens of Hampshire County communities (Amherst, Belchertown, Goshen, Granby, Northampton);
- two tree wardens from Hampden County communities (Longmeadow and East Longmeadow); and
- representatives from state agencies including MDOT, the Department of Conservation and Recreation (DCR), and DEP.

PVPC further developed three of the Hampshire County interviews into case studies of rural, suburban, and urban communities. The two Hampden County community interviews were conducted to understand how the tree wardens in Longmeadow and East Longmeadow had dealt with recent severe weather events which resulted in a large volume of community tree debris.

From these conversations, PVPC extrapolated a basic understanding of how community tree debris is currently managed in Hampshire County and if the regular volume of community tree debris is burdensome to tree wardens and their staff. To confirm the trends identified in the interviews, PVPC developed an electronic survey hosted on Survey Gizmo which was extended to all 20 tree wardens in Hampshire County via email invitation. A full copy of the survey can be found in Appendix B. The survey was intended to gauge rates of municipal reclamation and re-use of tree debris, routine methods of processing and storing any tree debris, and any concerns local tree wardens may have around current and future management of tree debris. The survey received 13 responses, a 65% response rate for the 20 communities in Hampshire County.

Finally, PVPC conducted separate phone interviews with two private tree care companies, Wagner Wood (based in Amherst, MA) and Northern Tree Company (based in Palmer, MA). The purpose of these interviews was to understand the differences between public and commercial processing and reclamation strategies and end uses, and to better characterize the local and regional markets for products produced from tree debris.

## II. MANAGING TREE DEBRIS IN HAMPSHIRE COUNTY

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### Highlights

*Municipal tree wardens do not process wood for profit and most Hampshire County tree wardens are able to distribute the bulk of routine volumes of tree debris to residents for reuse. Tree care companies, operating for profit, manage a larger volume of tree debris and may have trouble placing their products in the local market, which is often saturated.*

*While municipal tree wardens and private tree care companies may process wood into some similar products, private tree companies have a wider suite of outputs, including more high-market products such as lumber.*

*Municipalities deal with sudden influxes of tree debris on an ad hoc basis and need help planning for strategies to process and manage that material.*

*Municipal forestry programs tend to be under-budgeted and lacking in resources and planning for wood reclamation and enhanced processing of tree debris.*

- 31% said their needs were “somewhat” met by routine strategies;
- 15% indicated their needs were met “a little”; and
- only one respondent (8% of results) said their needs were met “not at all.”

Of those who felt their needs could be better met with different tree debris strategies, available budget was cited as the number one barrier. Funding is intrinsic to a tree warden’s ability to obtain both proper staffing and equipment for operations.

### 1. Routine Strategies

The Hampshire County communities that responded to the survey and/or were interviewed were asked to describe their methods of processing and disposing of tree debris as part of normal routine activities

### A. Current Processing and Reuse Strategies by Municipalities in Hampshire County

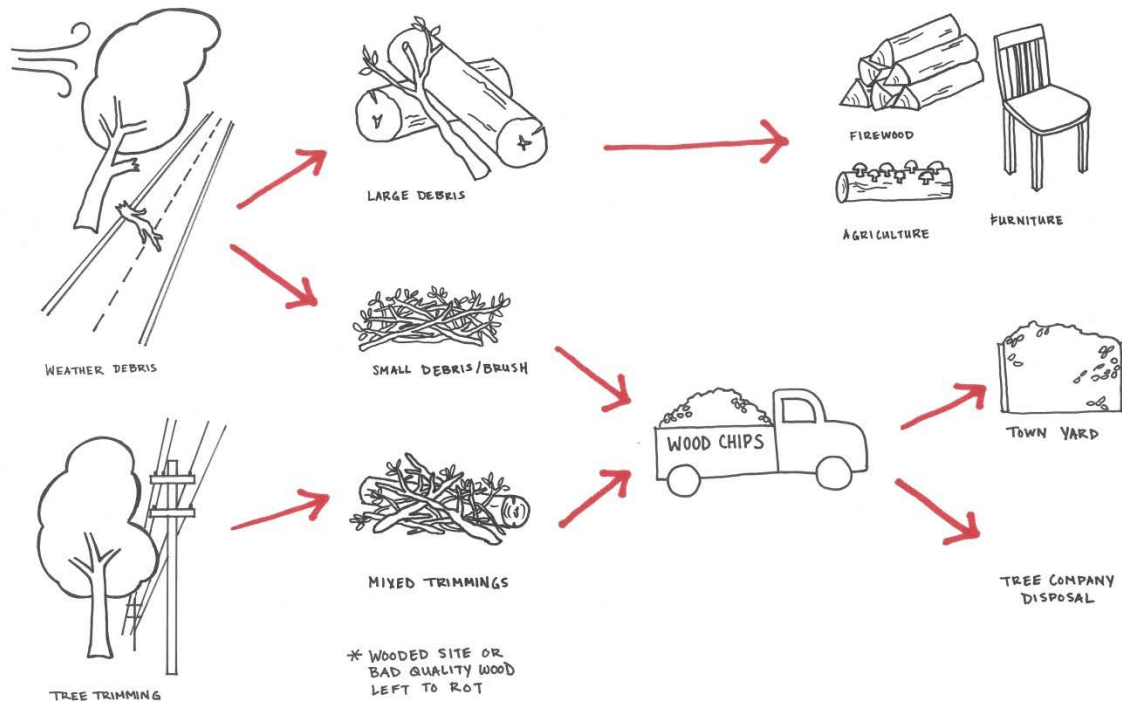
The survey results and PVPC’s interviews with Hampshire County tree wardens supported the estimate in the Fallon and Breger 2002 study that most community tree debris is recovered and reused locally. While none of the Hampshire County tree wardens with whom PVPC engaged keep records of volume generated, they were able to estimate the percentage of tree debris they recover as opposed to discarding at the location of generation, such as by leaving chips or hardwood logs in place. Almost 40% of community respondents estimate a recovery rate of 76-100%, while another 31% estimate a recovery rate of over 50%.

Generally, the Hampshire County tree wardens PVPC interviewed feel able to properly manage the routine quantity of community tree debris produced in their communities:

- 46% of tree wardens responding to the survey said their current strategies for managing tree debris met their municipality’s needs “quite a bit” to “completely”;



(and not storm event related). The community tree debris generated in these municipalities is generally processed into wood chips, firewood, or distributed for specialty uses. While this reuse happens in both a formal and informal capacity, each tree warden interviewed stressed that any reclamation of community tree debris by residents is free of charge. Community tree debris, whether in the form of wood chips, firewood, or specialty cut, circulates throughout Hampshire County municipalities via an informal economy that benefits residents and provides tree wardens with inexpensive alternatives to hiring contractors to haul tree debris away.



**THE SIZE, QUALITY, AND SOURCE OF COMMUNITY DEBRIS DETERMINE HOW IT IS PROCESSED AND USED. DIAGRAM BY JILL DeCOURSEY**

### *Wood Chips*

Because most municipal tree care involves pruning of branches, as opposed to the cutting of limbs and downing of whole trees, chipping appears to be the most common method of processing community tree debris for each of the communities interviewed. The diameter of branches able to be chipped depends on the size of the community's equipment, but most communities interviewed were able to chip branches that are between 14" and 18" in diameter. Each interviewed community reported chipping to one-inch dimensions to eliminate the risk of transporting EAB larvae.

The electronic survey responses also indicated the following related to wood chips:

- 77% of municipal survey respondents indicated that they routinely spread chip into the woods (if the location isn't immediately abutting a wetland area, drainage way, or landscaped property) to save space in the truck or at the town yard;



- 69% of respondents also reported that they sometimes or always brought chipped debris back to their town yards to use in landscaping or agricultural operations (municipal use and/or free to the public);
- All of the five Hampshire County communities interviewed made their wood chips freely available to municipal residents for residential use such as home landscaping or livestock bedding, and three of the five indicated that their public works staff also made use of the chips for municipal projects such as landscape mulch, slope stabilization, and municipal tree nurseries.
- None of the communities PVPC interviewed and surveyed tracked the size of their chip piles;
- 54% percent of surveyed communities reported allowing private tree companies contracted by either the town or utilities to use their municipal yards to dump chips from routine public tree maintenance or cutting under electrical wires.

Of the five communities interviewed, two reported not being able to keep enough wood chips in stock to supply all of their municipal and residential demand, and only one community was concerned about its ability to use or distribute its wood chips within a reasonable amount of time. This community brings any excess chips at the end of that time period to the Amherst facilities of Wagner Wood, a local tree care company. Fifty-four percent of survey respondents also use excess wood chips to fuel municipal compost operations, and 15% bring wood chips to private compost operations.

*“[Giving away mulch and firewood] is not a revenue generator, but returns public property—community trees—to the public. To me, it’s important to keep wood chips and firewood free because it’s a public product. In essence, when you hire a contractor to haul that material away, you’re paying them to deal with surplus property. You could take the same woody debris and tree debris and give it to residents for their own use so that there’s public benefit.” –Rich Parasiliti, Jr., Tree Warden for the City of Northampton*

#### *Firewood*

All five of the communities interviewed and a majority of the communities responding to the electronic survey make community tree debris available for firewood or as pre-cut firewood on both a formal and an informal basis. Firewood is generated from branches, limbs, and co-dominant stems that are too big to chip. In large-lot suburban and rural settings, 62% of surveyed tree wardens noted that they often leave these pieces uncut on the sides of roads for residents to claim and cut on their own after the tree crew is gone. Some of the tree wardens are especially agreeable to this method as it reduces the amount of wood municipal staff need to transport and store. Many communities allow private tree companies with municipal or utility contracts for tree removal and maintenance to leave logs and stumps in public rights-of-way, with 54% of municipal survey respondents maintaining responsibility for

retrieving these logs and stumps and coordinating their disposal, and 54% also allowing residents to access this debris. Good quality hardwood is especially popular, and residents often beat out municipal crews in retrieving this material.

In more densely populated communities or where local residents are not likely to reclaim wood, the communities bring logs, branches, stems, and butt logs back to municipal yards for storage before bulk processing or grinding. Two of the five interviewed tree wardens welcome residents to take what they would like of accumulated community tree debris, but do not have the staff capacity to cut wood themselves. As of now, only two (15%) of the communities responding to the electronic survey formally operate a wood bank, but several others are considering establishing a wood bank program. For more information on wood banks, see page 34.

Processing butt logs presents the greatest difficulty for tree wardens and their crews. While butt logs can be cut into firewood, they are often over two feet in diameter and difficult to process without specialty equipment due to their size and density.

None of the five municipalities own equipment that is able to split butt logs to a size appropriate for cutting into firewood, so the communities bring these logs back to their yards for stockpiling. Four of the five communities pay contractors to haul and dispose of butt logs either annually or as the pile gets too big for their yard, the cost of which varies by the amount of wood the community has accumulated. Northampton is stockpiling these butt logs with the plan to eventually hire a contractor with a hydraulic butt screw to split them to a size where they can be cut into firewood for a future wood bank.

Because each community deals with butt logs as they run out of space, and not in regular cycles, it is difficult to compare disposal costs from one community to another. However, the Town of Amherst did report paying approximately \$20,000 for a contractor to dispose of nearly nine years' accumulation of butt logs and other large stems, while the Town of Granby reported spending \$1,800 on hauling and

### *What is a Butt Log?*

*A "butt log" is what remains of the tree after all of its co-dominant stems have been removed. They are gnarly, hard to split, and not easily managed without specialty equipment. Butt logs from urban or street trees are often loaded with nails or screws, or old street signs. Before the 1950s, it was common for arborists and laypeople to fill tree cavities with concrete or bricks, adding to the challenge of safely splitting a butt log.*



disposing of butt logs in State Fiscal Year 2019 alone. Wagner Wood has the capability of chipping butt logs, and they use the chips in their chip sale operation. It currently costs between \$400-500 per truckload to hire Wagner Wood for this process.

### *Specialty Uses*

Tree wardens noted that they receive requests for butt logs, burls, or other cuts of wood from local artisans or businesspeople. These exchanges tend to happen informally, with requests for wood coming in on an as-needed basis. While only one respondent to the electronic survey indicated making tree debris available for special use, all five tree wardens interviewed for this report stated that this was a common strategy for them. This would indicate that the electronic survey respondents either do not consider this a formal strategy and so didn't report it, or else don't consider it to be a strategy that is applicable to the majority of tree debris and so didn't report it. The tree wardens interviewed and their staff tend to be familiar with repeat customers, and if they are in possession of a piece of wood that is likely to be of interest to a known user, the staff may take the initiative to inform that user of its availability.

Two examples of this type of informal exchange come from the Town of Amherst. Alan Snow, Amherst's tree warden, often works with Spencer

Peterman of Peterman's Boards and Bowls, a locally-based specialty woodturning business. Peterman owns his own log loader and will come to the town yard to select the biggest, oldest, and most decayed butt logs that the town has laying around. Peterman prizes wood disfigured by the beginnings of decomposition—called “ambrosia” or “spalting,” depending on whether the markings come from beetles or fungus. He sources nearly all of his material from locally fallen trees in Western Massachusetts, such as maple, cherry or black walnut. Peterman also works with other municipal and private tree services to secure material for his products, and the Town of Amherst has other woodworkers scouring their yard for unusual cuts as well.



**RICHARD PARASILITI, JR., NORTHAMPTON TREE WARDEN, DEMONSTRATES A BURL CUT FROM A FELLED MAPLE TREE. BURLS ARE OFTEN CLAIMED BY LOCAL ARTISANS AS THE SOURCE MATERIAL FOR SPECIALTY PRODUCTS.**



Other customers of the Town of Amherst's tree yard are local mushroom farmers. Mushroom growers are mostly interested in smaller cuts as much of the wood is too large for them to manage. These growers are often in search of a specific type of wood suitable from growing specific mushrooms, and Alan's staff tries to let the mushroom farmers know when the Town is cutting specific trees of interest.

In all, these specialty uses do not draw enough of any community's local wood supply to constitute a significant source of reuse or disposal. However, each of the tree wardens interviewed noted that the symbiotic relationship between the tree warden's supply and local artisans and businesspeople was a source of interest and pride.

## 2. Other Disposal and Reuse Options Not Used by Hampshire County Municipalities

In a 2014 national survey of municipal forestry programs regarding tree care and management strategies, municipal respondents nationwide indicated that their community tree program routinely salvages tree debris via the following methods unmentioned by Hampshire County communities:

- Processing into lumber (14% of nationwide respondents)
- Processing into biofuel for energy (including biomass) (12%)
- Sale of round wood (e.g., sawlogs, pulp, or veneer) (6% noted this as a preferred strategy when applicable).<sup>12</sup>

These strategies can be attractive in that they can generate revenue from what may otherwise be considered a waste product to supplement the tree warden's annual budget. Municipalities considering the environmental effects of their tree debris processing strategies may become interested in salvaging high quality tree debris from tree removals for long-lived products, high value products to reduce associated carbon emissions. However, many Hampshire County tree wardens face barriers in adopting strategies such as these. These barriers are explored in subsection "Technical Capacity" on page 27.

### *The Carbon Value of Forest Products*

*"Urban hardwood products, such as furniture, flooring, and lumber held in inventory, will sequester carbon that would otherwise be released immediately when the wood is burned as fuel or in a very short time when used as mulch. Unlike fuel and mulch, urban hardwood products are long-term carbon sinks. As such, they can contribute to the mitigation of rising levels of atmospheric CO<sub>2</sub>, a major greenhouse gas that drives climate change and global warming." (Hauer and Peterson, 2016)*

<sup>12</sup> Hauer R. J. and Peterson W. D. 2016. Municipal Tree Care and Management in the United States: A 2014 Urban & Community Forestry Census of Tree Activities. Special Publication 16-1, College of Natural Resources, University of Wisconsin – Stevens Point. 71 pp.

### 3. Coping with Influxes of Community Tree Debris

The tree wardens in all five Hampshire County and two Hampden Community communities who PVPC interviewed reported needing help in processing and disposing of community tree debris during and after extreme weather or die-off events. As discussed in the section above called “A Resource of Increasing Supply,” climate change is increasing the variety and severity of weather events across the state, and warming seasonal averages are increasing the survival rates of invasive tree pests. These two climate impacts are causing unpredictable spikes in the regular supply of community tree debris, and local tree wardens and their crews (or public works crews, if the tree warden has no designated staff as is the case in many rural communities) respond to these influxes on an ad-hoc basis. The tree wardens PVPC interviewed acknowledged the inefficiency and stress of ad-hoc response, but feel there is no capacity in time or budget to allow for planning for future events.

One difficulty in planning for community tree debris management is that there are very few, if any, estimates of even routine quantities of community tree debris, let alone the quantities generated by extreme events. As with routine quantities generated from annual maintenance, Hampshire County tree wardens aren’t keeping track of the amount of wood downed or cut after emergency events. Emergency response agencies don’t



**LONGMEADOW, MA HAS EXPERIENCED AT LEAST THREE SEPARATE STORM EVENTS WITHIN THE PAST DECADE (TOP TO BOTTOM: 2012, 2011, 2019) THAT CREATED LARGE INFLUXES OF TREE DEBRIS. PHOTO CREDITS: LONGMEADOW FIRE CHIEF JOHN DEARBORN**

keep estimates either—the joint AAR-IP for Hurricane Irene and the October 30, 2011 snowstorm (WMRHSAC, 2012) and the AAR-IP for the June 1, 2011 tornado (WMRHSAC and Central Region Homeland Security Advisory Council, 2012) do not separate quantities and/or removal costs of vegetative debris from other types of debris, such as construction material. This makes it difficult to quantify spikes in community tree debris from recent weather events.

In their responses to the electronic survey, municipal tree wardens indicated concern regarding predictions of increased tree debris to climate-related effects, such as insect infestations and greater frequency of larger storms, for the following reasons:

- lack of appropriate equipment to move and process tree debris
- cost of obtaining and/or renting that equipment, or the cost of hiring a private tree care company to remove the debris
- lack of storage space to hold an increased supply of tree debris
- lack of staff capacity to process and transport an increased supply of tree debris.

### *Debris Management Plans*

The inefficiency of ad-hoc responses to influxes of community tree debris could be alleviated by the formulation and implementation of debris management plans with a specific section on the management of vegetative debris (including tree debris). This section would be in addition to addressing other debris that may result from an extreme event, including construction and demolition (C&D)/building material, infrastructural debris from structures such as bridges and utility poles, appliances and electronics, and soft bulky waste like carpets and furniture. None of the communities in Hampshire County have adopted local debris management plans, and 14 of the 20 municipalities in the county have identified the need for a regional debris management plan in their respective most recent Hazard Mitigation Plan updates.

Many local communities look to the “Franklin County Regional Debris Management Plan” (Franklin Regional Council of Governments, 2014) as a precedent, but that plan has not yet been put into action and, as one regional emergency manager contended, would be ineffectual in that the managers of the locations identified for regional debris storage have not agreed to take any debris from outside of their own municipalities. Additionally, the Franklin County plan does not include special considerations for tree debris and potential reuse, as opposed to any other type of non-reclaimable debris.

Therefore, if Hampshire County and its region were to secure funding to undertake a debris management plan, there two important takeaways:

- Project stakeholders need to ensure permissions for regional debris storage are granted before finalizing the plan
- A separate chapter with strategies for storing, processing, and reclaiming tree debris, along with potential outlets and specifications for tree debris products is essential.



#### 4. Technical Capacity

##### *Lack of Resources*

A combination of shrinking municipal budgets and a series of acts, enabling municipalities to combine the tree warden position with several other positions, has unfortunately resulted in a trend of shifting resources away from public tree management.<sup>13</sup> Because the position of tree warden may be combined with another arduous and time-consuming position, such as that of Highway Department/Public Works Superintendent, a community's tree warden may or may not have the DCR-approved certifications to be considered a "professional" tree warden.

DCR considers a community to have "professional staff" when it retains a salaried, contract, or volunteer tree warden, city arborist, city forester or other individual who is "regularly and routinely involved with the planting, protection and maintenance of urban and community trees having one or more of the following, degrees or certifications:

- Massachusetts Certified Arborist (MCA)
- International Society of Arboriculture Certified Arborist (ISA)
- Completion of a professional degree (associate, baccalaureate, master, doctorate) from an accredited university or college in a natural resources-related field (e.g. urban forestry, forestry, arboriculture, horticulture, park management, landscape design);
- For communities with populations of 10,000 or fewer residents, completion of a professional development series course e.g. Massachusetts Arborist Association's Tree School, UMass Extension's Green School, Massachusetts Tree Warden and Forester's Association Professional Development Series (PDS) courses.
- Other Certification/Qualification from another state may qualify - based on DCR/FS approval."

According to 2019 Community Accomplishment Reporting System data from DCR, only half of Hampshire County communities meet the standard for professional staff. This may imply a lack of resources available to invest in the tree warden's training, if not a lack of resources available to dedicate to the care and maintenance of public trees generally. Without having professional education in forestry or arboriculture, it may be difficult for tree wardens and their staff to understand and plan for a downed tree's potential reuse options.

##### *Lack of Up-to-Date Tree Inventories and Management Plans based on Inventories*

One of the ways in which a tree warden can begin the process of systematically caring for public trees and planning for community tree debris reclamation and reuse is to develop a public tree inventory. At their most basic, these inventories should include for each street tree: a location, species identification, size, condition evaluation and description, as well as any notes about possible risks and hazards the tree may pose to adjacent infrastructure or private or public property. In right-of-way locations where the vegetation is relatively dense, the inventory could be limited to significant and hazard trees only. While inventories themselves are useful records of trees within the warden's care, they ideally form the basis of a public tree management plan that prioritizes trees for immediate, short, and long-term monitoring,

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<sup>13</sup> About Qualifications. (n.d.). Retrieved from <https://masstreewardens.org/qualifications/>

maintenance, or removal, and identifies locations for future plantings. Additionally, a tree inventory could involve notes and recommendations for a public tree's best use when it becomes time for its removal.

In PVPC's electronic survey, 4 tree wardens (31%) responded that their communities have tree surveys, while the remaining 9 communities reported having no tree inventory. Of those communities that did report having a tree inventory, half had either updated or created their inventories in 2020, while the other two were completed or updated in 2012 and 2016. The best practice for maintaining a community tree inventory is to conduct an annual evaluation on a rotational schedule, so that a portion of the community is re-inventoried every two to three years, resulting in a total inventory update every five to ten years.<sup>14</sup> None of the communities maintaining tree inventories include information regarding the quality of wood, and/or potential reuse options for individual trees. According to 2019 data from DCR, only five of the twenty Hampshire County communities self-report as having a public tree management plan based on a tree inventory.<sup>15</sup> Further, only 38% of PVPC's electronic survey respondents indicated that their communities had well-established procedures governing reclamation/reuse of tree debris, with three tree wardens reporting that their communities had written procedures and two tree wardens reporting their procedures were verbally communicated. This suggests that most communities in Hampshire County are dealing with tree maintenance on an ad-hoc or emergency basis as their budgets allow, without long-term planning.

### General Guidelines to Assess End Uses for Trees

Product	Hardwood	Softwood	High Quality	Low Quality	Size
Value-Added Lumber Products	x		x		≥12" DBH (Diameter at Breast Height)
Firewood	x		x	x	≤12" DBH
Biomass	x	x		x	Twiggy ("clean")
Mulch, Chips	x	x		x	Twiggy ("dirty")

*Wood Utilization Best Management Practices. Delta Institute, p. 3*

## B. Current Processing and Reuse Strategies by State Agencies

DCR manages more than 450,000 acres of land across Massachusetts, and MassDOT owns over 9,500 lane miles of roadway throughout the Commonwealth. As such, these two state agencies are often in

<sup>14</sup> Elmendorf, William. "Conducting a Community Tree Inventory." Penn State Extension, 5 May 2020, [extension.psu.edu/conducting-a-community-tree-inventory](https://extension.psu.edu/conducting-a-community-tree-inventory).

<sup>15</sup> 2019 Community Accomplishment Reporting System data, DCR.

the position of managing the removal of tree debris from project sites. However, these agencies hardly, if ever, control the final use or destination of the tree debris they generate.

## 1. Department of Conservation and Recreation

DCR manages three categories of properties: reserves, woodlands, and parklands.<sup>16</sup> Management strategies, and therefore tree debris management, vary across property types. Reserves are natural areas that DCR manages largely for safety management alone. If trees fall in a reserve, DCR tends to leave them as they lie. Woodlands, managed according to sustainable forestland management strategies, produce timber products. DCR usually attempts to salvage any valuable tree debris that might fall in a woodland. If a storm event causes a substantial supply of tree debris, DCR may consider conducting a timber sale with any worthwhile salvageable debris.

Parklands are managed for recreation and downed trees and tree limbs are processed to varying degrees, depending on where they fall. After the 2014 microburst at Mt. Tom State Reservation, DCR worked with the Town of Easthampton to conduct hazard tree clearing along the Route 141 right-of-way, and then held a salvage timber sale on Park Road within the State Forest. Peter Church, Director of Forest Stewardship for DCR, was unable to provide particular details, such as the quantity, type, or value of lumber, for this sale. Because of the steep slopes in the forested area adjacent to the road, any debris that fell outside of the right-of-way was considered impractical to reclaim and left to decompose.

For salvage timber sales, DCR's forest health staff and management forester usually visit a site and try to identify the species and quality of downed wood before bidding the project out to a land clearing contractor or a licensed logger. In responses to bids, DCR is interested in lowest cost vendors and does not follow the chain of custody for the wood. Church notes that severe weather events affect all species, valuable or not, and it can be difficult to separate quality debris from junk and differentiate what may be worthwhile. Sometimes it's best for wood resulting from a storm to be left as is.<sup>17</sup>

## 2. Massachusetts Department of Transportation

While municipalities are responsible for clearing tree debris along municipal roads, MassDOT is responsible for tree maintenance and tree debris clearing along state highways. Most tree debris clearing



**TREE DEBRIS PILED AT THE SITE OF MASSDOT WORK FOR THE ROUTE 9/I-91/DAMON ROAD INTERSECTION IN NORTHAMPTON**

<sup>16</sup> *Landscape Designations for DCR Parks & Forests: Selection Criteria and Management Guidelines*. Massachusetts Department of Conservation and Recreation. 2012.

<sup>17</sup> Conversation with Peter Church, DCR Director of Forest Stewardship. April 22, 2019.

occurs after a major weather event, during routine maintenance of vegetation along state rights-of-way, and during projects to widen existing or pave new roadways. MassDOT makes routine use of both its own crews and private tree care companies to conduct this work. When contracting with a private contractor, MassDOT specifies that tree debris removal and disposal is the responsibility of the contractor. The language is specific to ensure the contractor uses best management practices to prevent the spread of invasive pests such as the Asian long-horned beetle and other insects. When using its own crews, MassDOT brings some debris to its regional depots and then hires a contractor to remove this wood.

## **C. Current Processing and Reuse Strategies by Hampshire County Tree Companies**

As previously stated, approximately two-thirds of forested land in the state of Massachusetts is privately held. Because tree wardens generally only control trees located within the rights-of-way of public streets and on municipally-owned properties, the amount of community tree debris generated per year is likely far less than the amount of privately-controlled tree debris generated per year. While a municipality may or may not contract with a private tree company, depending on the size of the project and the tree warden's budget and staff, nearly all private landowners make use of the local and regional tree companies whenever they need a tree removed or trimmed. This indicates that private tree companies ultimately control the bulk of tree debris in Hampshire County.

To understand how commercial tree debris management and processing might differ from municipal practices, PVPC interviewed Wagner Wood and Northern Tree Company, both locally-based private tree care companies with regional service areas. These two companies differ in their approaches to salvaging and monetizing tree debris, partly due to different decisions around the efficiency and cost-effectiveness of processing and transporting materials.

Wagner Wood, an Amherst-based land clearing and tree maintenance operation that works with residential and commercial clients, local electrical utilities, and municipalities in the New England region, has found it to be economically worthwhile to invest in staff and equipment to process much of the high- and low-quality tree debris themselves into value-added products such as lumber or dyed landscape mulch which they distribute throughout New England.

Northern Tree Company, based in Palmer, works all around the country and finds that the time, space, and capital required to transport, store, process, and staff a value-added program would not yield worthwhile returns.

### **1. Supply and Markets**

Between tree maintenance and utility resilience work, the region's private tree care companies generate a constant supply of tree debris annually. This supply spikes after severe weather events and tree mortality events, such as pest infestations, when there is higher demand from private and commercial clients, from municipalities seeking assistance with clearing trees from public property and rights-of-way, and from utilities needing to clear tree debris from overhead wires. Private tree care companies may also generate surpluses of tree debris from temporary projects, such as:

- habitat management or woodland thinning for land trusts and state or federal conservation and land management agencies; and
- land clearing for development (e.g. residential, commercial, or for solar fields), when hired by electric companies or private developers.

These types of projects ebb and flow based on many economic factors so do not provide a steady source of supply, but can yield large spurts of additional tree debris during their lifetimes.

Between routine amounts of tree debris and the unpredictable spikes in volume that can occur, local markets are often saturated with supply. According to Buzzee Wagner, co-owner of Wagner Wood, the company spends a lot of time trying to figure out what to do with the material they are generating on an annual basis—and they get calls from other local companies trying to move their own product as well. Wagner reports that while Wagner Wood has a strong ethos to keep the wood supply local, other companies send their product all around the northeast in search of clients with demand. One common location for sending wood chips is to the Androscoggin Paper Mill in Jay, Maine. The paper mill buys mixed chips generated from sawmill debris, from chipping crooked or low-quality hardwood, and from softwood unfit for lumber or firewood. This ten-hour round trip excursion is an expensive use of time and money, but there is not enough of a regional demand for low grade wood products to keep all of the biomass generated in Hampshire County local.

## 2. Routine Strategies

Like municipal tree programs, private tree care companies process much of their tree debris into mulch and firewood. However, depending on the quality of wood, these companies also use tree debris for specialty products such as lumber, biomass, and refined landscape products. Once processed, Wagner Wood sells its products, such as rough sawn lumber, biomass for fuel and paper pulp, bark mulch, wood chips, and firewood to the entire New England region. Northern Tree sells firewood and lumber to sawmills, but otherwise has a difficult time monetizing lower quality products, such as chips.

### *Lumber and Firewood*

When called to take down or clear a whole tree or large limb, the Wagner Wood staff cuts the logs into standard sizes (typically 20-foot lengths) and hauls these logs to their yard in Amherst. Once at the yard, the wood is processed into rough sawn lumber or cut into firewood. Lumber presents the highest value for resale, but can only be processed from straight, high quality hardwood. While Wagner Wood has its own sawmill and firewood processing operation, they do sell some saw logs to other specialty operations that can cut more dense lumber efficiently. Northern Tree, which does not have its own sawmill, typically only reclaims tree debris for lumber or firewood when conducting land clearing operations. Logs from large, good condition trees are sold to sawmills, while tall, straight, and relatively thin trees (what Northern Tree General Manager Don Lockwood calls “telephone pole wood”) are processed for cordwood and sold locally. The tops of these trees are chipped.

Depending on the state of the market, low-grade hardwood logs may be worth more as firewood than as lumber. Currently, the local market for lumber is saturated due to a combination of a large supply of hardwood created by the recent gypsy moth infestation and a halt in the export lumber market due to the economic downturn caused by the COVID-19 epidemic.



### *Biomass*

If the wood cannot be salvaged for lumber or firewood, the next highest value for private tree companies entails chipping it into biomass for fuel. Many facilities that rely on biomass specifically seek out “clean” biomass (free from non-woody debris) for fuel. Cooley Dickinson Hospital in Northampton currently purchases an average 300 tons of Wagner Wood’s clean biomass for their combined heat and power plant (CHP) a week, an amount that increases to about 450 tons during times of extreme heat or cold. Wagner Wood’s supply meets all of Cooley Dickinson’s biomass needs. Wagner Wood also sends biomass to the Seaman Paper Company in Templeton, which purchases approximately 120 to 150 tons a week to power their CHP.

Northern Tree used to process biomass to sell to the paper mill market in Maine, which bought much of the region’s chip, according to Lockwood. However, these mills have gradually closed as the paper industry moved overseas, and there is no longer enough of a market to justify transportation costs to and from Maine. Northern Tree does sell clean biomass to Grower Direct Farms in Somers, CT, which buys biomass by the 100-cubic-yard truckload to burn to heat their greenhouses.

### *Wood Chips, Mulch, and Landscape Products*

Yard waste and brush piles are typically considered “dirty” biomass (containing non-woody debris, such as mud or dirt, plastic, metal, etc.) and may contain other debris such as pieces of fence, metal wiring, or hardware, etc. This dirty supply isn’t desirable for biomass fuel, and therefore is much less valuable than clean biomass. Dirty biomass is often left in place, sold, or given away as wood chips, or ground into mulch for compost or landscaping.

Wagner Wood processes their own excess chip into value-added landscape products on their site in Amherst, where they sell compost, dyed landscape mulch, aged mulch, species-specific mulches (such as hemlock and cedar), raw wood chips, and playground wood chips (which are more uniform in size than raw wood chips). From Amherst, the company delivers products around the New England region.

Northern Tree’s preference is to chip and spread in place. Lockwood of Northern Tree notes that most of the work his company fulfills for municipal or utility contracts, such as right-of-way trimming and the removal of branches, yields “junk wood,” and that the “more you handle it, the more it costs you.” If they must remove the chips, they keep a list of residents in different parts of their service area who have previously expressed interest in acquiring wood chips for landscaping or outdoor woodchip burning stoves. If the job site is more than half-an-hour from their headquarters in Palmer, Northern Tree will not bring any chip back for storage. It is more efficient to get rid of woodchips locally so that the crew can start work again with an empty truck. The retail value of landscape mulch does not cover the cost of maintaining union staff to process the product.

If a crew of Northern Tree staff do not have access to one of the company’s chipping trucks, they fill log trucks with low quality debris to drop off at Connecticut Mulch in Enfield, CT. Connecticut Mulch does not pay Northern Tree for this material, since it is unprocessed, but it saves Northern Tree from dedicating storage space to what is for them a useless product. Connecticut Mulch grinds the debris into dyed landscape mulch or material for their composting operation.

### III. WOOD- AND BIOMASS-FUELED HEAT AND ENERGY IN HAMPSHIRE COUNTY

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#### *Highlights*

*While only 5% of Hampshire County households report using wood as their primary heating fuel, many more use wood for secondary heating fuels to supplement expensive fossil fuels.*

*Among Low-Income Home Energy Assistance Program (LIHEAP) program participants in western Massachusetts, there is great interest in participating in state and federal wood stove change-out programs.*

*There is some interest from Hampshire County communities in starting wood bank programs for low-income residents. However, many communities feel they lack the budget and staff time necessary to coordinate the volunteers needed to run such a program.*

*Several facilities in western Massachusetts use biomass for CHP.*

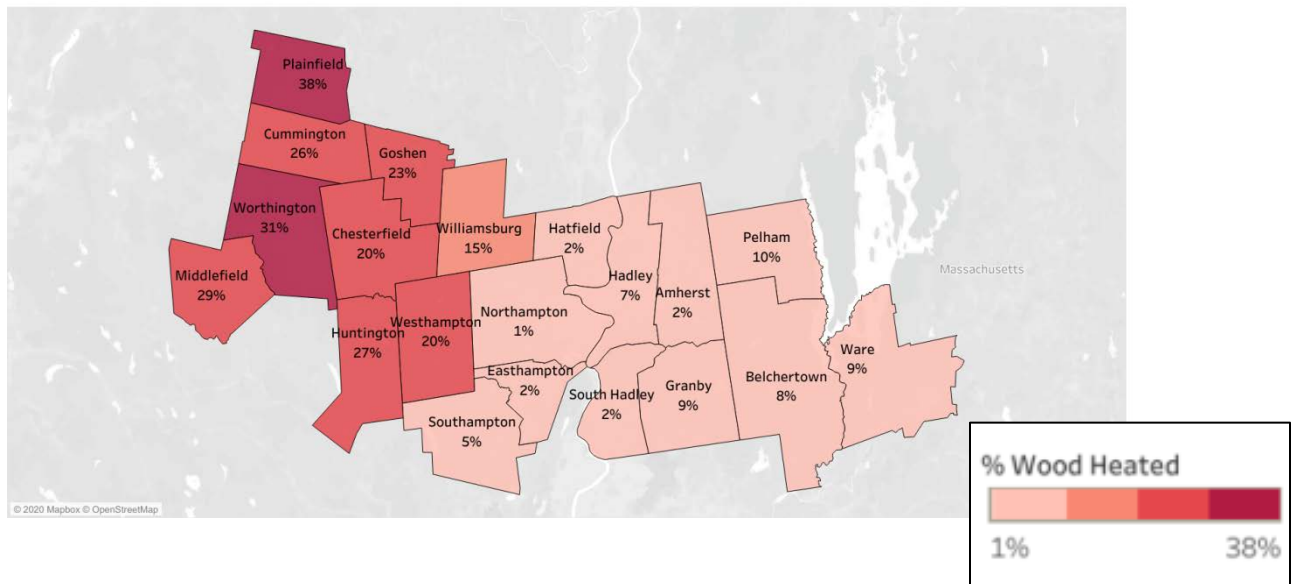
Understanding the current use of and interest in wood and wood products as sources of heat and energy fuel across Hampshire County and the Commonwealth provides some insight as to current and future local market demand for various wood products that can be generated from tree debris. As explored in previous sections, some Hampshire County municipalities and private tree care companies are already finding local outlets for tree debris products in the form of firewood and biomass.

#### **A. Residential Use of Wood Fuel**

Just over 5% of households across Hampshire County report using wood as their primary heating fuel; however, the percentages of total households reliant on wood heat in the county's rural communities is dramatically higher than those in the more suburban and urban municipalities. The three Hampshire County communities that are the most reliant on wood heating are also ranked within the county's four least-populous communities: 28.7% of households in Middlefield, which has 530 residents; 37.5% of households in Plainfield, with 664 residents; and in 30.8% in Worthington, with 1,187 residents.

These communities are also among Hampshire County's most rural by land use and most heavily canopied municipalities. By contrast, Hampshire County's most populous communities with the most urban land use, including Amherst (population: 39,503), Northampton (28,726), and Easthampton (15,987), rank among the top five lowest users of heat as a primary fuel source, with 2.5%, 1.2%, and 1.7% of households reliant on wood heating.

Many homes in Hampshire County have secondary heating systems to supplement their primary fuel consumption. In 2013, the New England Forestry Foundation and Community Action Pioneer Valley (formerly the Community Action of the Franklin, Hampshire, and North Quabbin Regions) conducted a survey of the latter agency's client population to understand how often wood was used as a non-primary heat source by low-income households. Participants of the federally-funded Low-Income Home Energy Assistance Program (LIHEAP) program are required to declare a single, primary fuel type, resulting in under-reporting of wood heating amongst program participants. Of the 8,000 LIHEAP



**WOOD HEATED HOMES IN HAMPSHIRE AND HAMPDEN COUNTIES/SOURCE: US CENSUS BUREAU, AMERICAN COMMUNITY SURVEY, 5-YEAR DATA, 2013-2018. TABLE B25040**

households comprising Community Action Pioneer Valley’s service area, 498 were selected randomly as a representative population to receive the survey. The survey results indicate that:

- Nearly 20% of LIHEAP households in the Franklin, Hampshire, and North Quabbin region use wood heat to some extent
- Households that reported using wood as a secondary heating fuel overwhelmingly used expensive fuels as their primary heating fuel
- Half of all respondents who reported using wood indicated that they use it every day that they heat their homes, while roughly a quarter of respondents use wood once-in-a-while and another quarter rarely use wood
- Of households which do not currently use wood for heating, 18% indicated “a lot” of interest and 12% indicated “some” interest in using wood as a supplemental heating fuel source. This interest was especially strong amongst households that rely on oil for their primary heat source
- Of all the households that use wood, 55% use a wood stove, 27% have a pellet stove, and 21% use a fireplace. At least 22% of the reported wood stoves were non-EPA compliant (built prior to 1988)
- Among all wood-heat households, the average amount of wood pellets consumed per year was 2.4 tons, and the average amount of firewood consumed was 2.4 cords<sup>18</sup>

### Wood Bank Programming

According to DCR’s Bureau of Forestry, 13,000 rural households in Massachusetts experience heat insecurity. Across the northeast United States, communities with an excess of tree debris generated from hazard tree removal and gleaned from working woodlands have met this public health need with

<sup>18</sup> *Survey of Wood Fuel Use among LIHEAP Clients in Western Massachusetts.* New England Forestry Foundation. 2013.

firewood processed by volunteers and local organizations. In Massachusetts, DCR's Bureau of Forestry Community Wood Bank Program assists rural communities with recycling their surplus tree debris into firewood to combat heat insecurity. Between the program's inception in 2015 through 2019, wood banks in communities across the Commonwealth, and the volunteers that run them, have provided 67 cords of firewood to heat insecure residents and over 800 hours of volunteer service.

DCR lists four established wood banks on the Community Wood Bank Program website, one of which belongs to the Town of Goshen. While this may be the only DCR-supported wood bank in Hampshire County, PVPC learned about ongoing municipally-sanctioned, informal firewood exchanges, and heard from several communities considering starting their own formal wood bank program (see the section entitled "Current Processing and Reuse Strategies by Hampshire County Municipalities," and the Municipal Case Studies in Appendix A). Anecdotally, PVPC learned that some municipalities perceive a lack of available volunteers and/or lack of professional capacity to manage volunteers as an impediment to starting a formal wood bank program.

The Community Wood Bank Program offers technical assistance for communities who are interested in establishing a wood bank, but who need help with programmatic elements such as identifying funding sources, recruiting and training volunteers, identifying and communicating with heat insecure residents, sourcing hardwood logs, identifying and establishing processing and distribution sites, securing heavy equipment, and developing partnerships with local social aid organizations to help manage the program. Interested communities should [visit DCR's Community Wood Bank Program website](#), or contact [Sean Mahoney](#), Markets and Utilization Forestry Program Director.

## **B. Incentives for Residential and/or Commercial Use of Wood Fuel**

There are several statewide programs in Massachusetts that offer financial incentives for residential and/or commercial customers to transition to or upgrade existing wood burning technologies. These incentives are generally in the form of rebates or zero interest loans, and the programs operate with the purpose of reducing reliance on fossil fuels and increasing use of local wood-based fuel, which the state recognizes as renewable and a cleaner source of energy. These programs encourage the installation of modern, efficient wood-burning units over the continued use of outdated wood-burning technology or other heating systems reliant on hydrocarbon fuels.

Depending on popularity of these incentives, they could increase market demand for firewood and low-quality wood for processing into pellets. In the 2013 New England Forestry Foundation/Community Action Pioneer Valley survey of LIHEAP households in the Franklin, Hampshire, and North Quabbin regions, 66% of respondents who reported using wood heat indicated that they would be interested in participating in wood stove change-out programs, while 32% overall (including those who did not report using wood heat) were interested in change-out programs. However, 77% of respondents did not have any previous knowledge about the change-out programs then offered by Massachusetts Department of Energy Resources (DOER) and the Massachusetts Clean Energy Center (MassCEC).<sup>19</sup> It is unknown how

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<sup>19</sup> Ibid.

many of the surveyed households have since taken advantage of any of the incentives and change out programs described below.

#### *Commonwealth Woodstove Change-Out Program*

The Commonwealth Woodstove Change-Out Program, a partnership between MassCEC, Massachusetts Department of Environmental Protection (DEP), and DOER, offers rebates to assist state residents in replacing non-EPA-certified wood stoves with cleaner, more efficient EPA-certified wood or pellet stoves. The standard rebate range is from \$500 to \$1,750 per change out, with a higher range of \$2,000 to \$3,250 available for low income residents. In 2019, all available rebates had been allocated, indicating that this is a well-used program.

#### *Modern Wood Heating Rebates*

MassCEC promotes several incentives for residential and commercial customers to install modern wood heating systems at their properties.

#### *MassCEC Residential Rebate*

Residential rebates through MassCEC are available for new or existing single-family homes and apartment or condominium units. Project sites must receive electrical service from National Grid, Eversource, Unitil, or participating municipal utilities. Recipients with area median income can receive up to \$12,000 in rebates, whereas low-income participants can receive up to \$16,500.

#### *Mass Save HEAT Loan*

Funded by the utility sponsors of Mass Save, Massachusetts residents can qualify for a zero percent interest loan of up to \$25,000 toward qualified energy efficient home improvements with terms up to seven years, depending on the utility sponsor and loan provider. This program covers high-efficiency wood pellet boilers.

#### *Alternative Energy Portfolio Standard*

The Alternative Energy Portfolio Standard (APS) provides an incentive to Massachusetts homeowners and businesses to install eligible alternative energy systems that lower GHG emissions and increase energy efficiency across the Commonwealth. The APS is a market-based program that requires a portion of the electric load in Massachusetts to be met via eligible technologies. Generation Unit owners receive an incentive by selling Alternative Energy Certificates (AECs), which they accrue based on their energy generation, to entities in the state with a compliance obligation. Both large and intermediate sized woody biomass systems are eligible, as dried wood chips are among the renewable thermal technologies included in the state's APS regulations, in effect since 2009.

### **C. Commercial and Institutional Facilities Using Biomass for Fuel**

According to data from Massachusetts Forest Alliance's Modern Wood Heat data portal, there are 32 commercial and institutional facilities in Massachusetts burning wood biomass for heat.<sup>20</sup> All of these facilities are located west of I-495, and include:

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<sup>20</sup> <https://www.massforestalliance.net/modern-wood-heat/case-studies/>



- Eight burning wood chips for fuel (three schools, one public agency, and three private institutions)
- Two burning cordwood (one school and one private institution)
- Twenty-three burning pellets (two private institutions, five public agencies, twelve schools, and four private businesses)

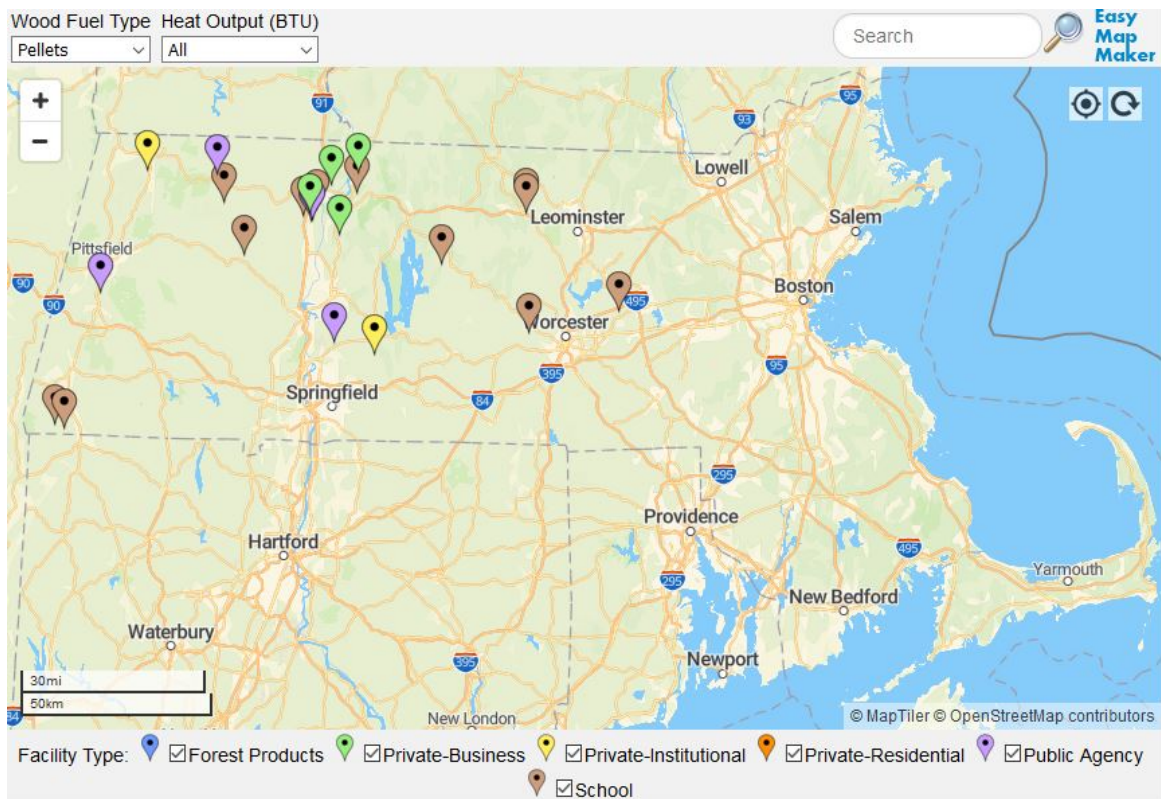
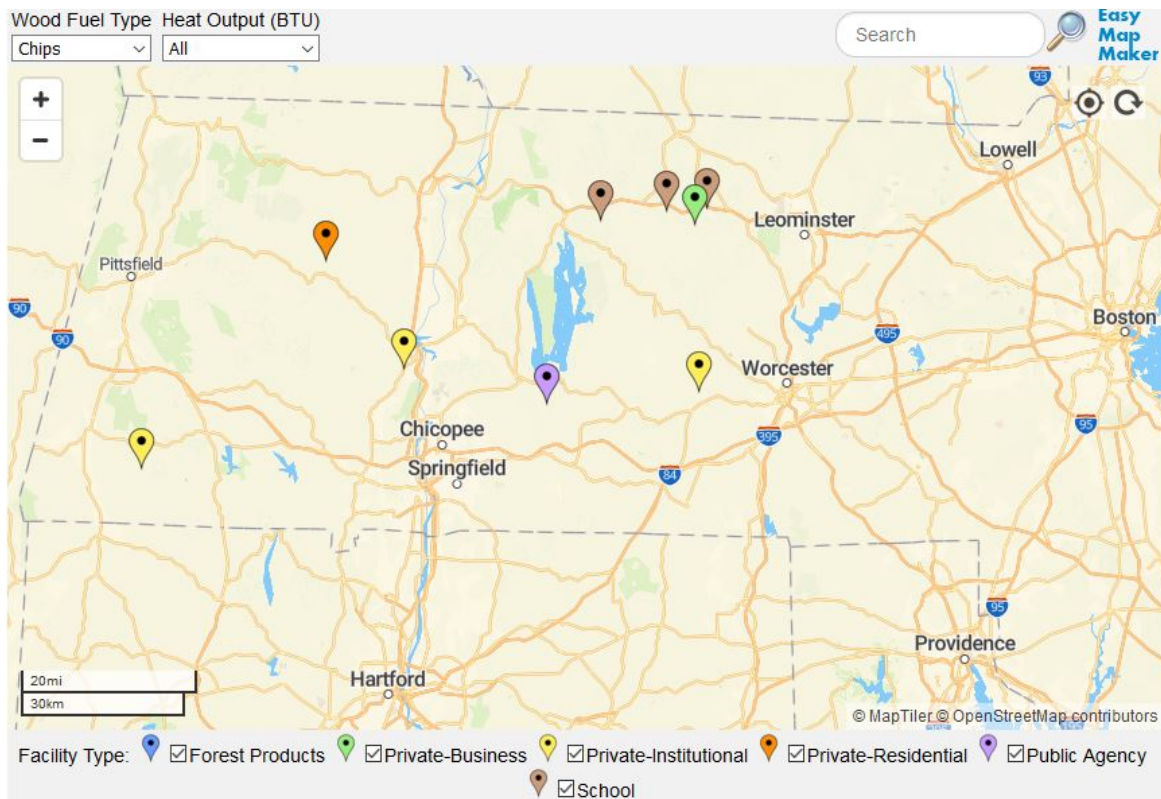
As of April 2019, a new biomass processing facility proposed by Palmer Renewable Energy was under site plan review in the Hampden County City of Springfield, with planned groundbreaking in the later spring. However, it is currently unclear as to the status of that project as no groundbreaking has begun. The project faced serious opposition on environmental justice and environmental grounds, as the burning of biomass as a “renewable and clean” resource is hotly contested.

### Heating with Biomass at Cooley Dickinson Hospital

Located in Northampton, Cooley Dickinson Hospital is a 600,000 square-foot nonprofit community hospital with 140 in-patient beds that has been in operation for 135 years. The facility operates a combined heat and power plant (CHP) including a Zurn - 550 HP biomass boiler and an AFS - 600 HP Water/Fire Tube high pressure wood chip boiler to provide electricity, heat, and cooling for the hospital campus. The hospital facility has a 12-month consistent need for heating, “absorption chilled” water, food preparation, and centralized sterilization. Running on virgin wood chips supplied by Amherst-based Wagner Wood, the CHP displaces loads previously supplied by the local utility, National Grid. Cooley Dickinson was the 2011 Recipient of VHA Leadership Sustainability Excellence Award for best in class program in energy management with a Cogeneration Plant.

The wood burning process involves:

- Large amounts of space for storage and handling equipment
- Access for tractor trailers (1-2 loads per day, average load of 10 loads per week)
- Labor to manage plant operations
- Noise control
- A well-wooded geographic location for fuel supply



**THE MASS FOREST ALLIANCE HAS COMPILED CASE STUDIES OF EXISTING MODERN WOOD HEAT INSTALLATIONS ACROSS THE STATE. ABOVE: INSTALLATIONS HEATING WITH WOOD CHIPS; BELOW: INSTALLATIONS HEATING WITH PELLETS. SOURCE: THE MASS FOREST ALLIANCE**

## *IV. OPPORTUNITIES TO ENCOURAGE BEST PRACTICES FOR TREE DEBRIS UTILIZATION*

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As described in the section “Managing Tree Debris in Hampshire County,” the reclamation of tree debris for highest-value market sale (i.e., high-market value-added products) may not always be the most suitable end product for municipalities or tree care companies. Depending on a municipality’s budget, which impinges on staffing and equipment for operations, the most cost-effective option may be to leave wood in place as often as possible, or to process as little as possible while making the material available to local residents for free. However, if the municipal tree program’s primary goal is not to minimize budget expenditures, but rather to generate revenue to supplement an annual budget, reduce GHG emissions, or provide firewood to those most in need of heat security—as three examples—the tree warden may wish to invest in a community wood salvage program. A stronger local market for high- and low-quality wood products would make such programming more attractive and viable for both municipal and commercial programs.

Based on electronic survey results and interviews with municipal tree wardens and private tree companies, the following strategies may be the most helpful in promoting the recapture and marketing of municipal tree debris, and supporting a strong local market for both high- and low-quality tree debris.

### **A. Municipal Policies and Strategies to Promote Best Utilization Practices**

#### **1. Develop and Maintain up-to-date Tree Inventories and Community Tree Management Plans**

Whether reclaiming tree debris for resale or not, tree inventories and community tree management plans are foundational tools for any municipal tree warden. In addition to providing a basis for budget planning and maintenance schedules and for setting priorities for pruning and removal work, the tree survey could include information in the tree inventory relevant to individual specimens’ suitability for recovery and best utilization options. For instance, such considerations for any specimen could include:

- Diameter at breast-height (DBH)
- Distance from the ground to first branches
- Life cycle stage
- Quarantine status (i.e. for EAB)
- General condition
- Historical or community significance
- Any complicating factors that may affect removal or reuse.



In addition to the regular planning for maintenance and hazard removals, community tree management plans can include a chapter on decision-making around the reclamation and processing of various specimens, given the above considerations.

## 2. Consider the Viability of Establishing a Formal Tree Debris Recovery Program

As part of exploring whether to invest in establishing a program, municipal tree wardens should perform an internal capacity evaluation. This evaluation should include considerations such as:

- Current staffing capacity and staff expertise
- Potential to train staff for removal and recovery processes
- Access to equipment and/or cost of renting or purchasing or possibly sharing with other municipalities
- Collection, sorting, and storage capability
- Calculation of avoided costs in addition to potential income

For a more detailed description of municipal capacity evaluations, see “Wood Utilization Best Management Practices” (Delta Institute).

To ensure the best market use of community tree debris, tree wardens may develop formal policies governing the assessment of trees and tree limbs for various potential uses. Formally adopted plans and policies ensure that systematic protocols are followed, can facilitate stakeholder buy-in, and can increase access to funding opportunities. A tree debris management plan can supplement a public tree management plan by identifying efficient and cost-effective methods of disposing of or reusing the debris from the routine tree maintenance that the public tree management plan outlines. A tree debris management plan might also include uses for the yard waste generated by private residents, which is often disposed of at a municipality’s transfer station and hauled away by a private company at the community’s expense.

The tree crew could also be trained in how to properly handle and cut trees to ensure the wood’s usefulness for its intended purpose beyond chips or firewood, such as for lumber. As stated above, the quality of and best use for individual community trees can be noted in a



**RELATIVELY STRAIGHT, HIGH QUALITY LOGS, SUCH AS THESE IN WESTHAMPTON, COULD BE CUT AND SORTED TO PRESERVE THEIR USEFULNESS AS SAW LOGS**

municipality's tree inventory, and the tree warden could develop a basic set of specifications for various types of wood products. These specifications should be developed in conversation with end users, which would also allow the tree warden to develop an understanding of the local market demand.

Lastly, properly handled and processed wood should be brought to a well-organized storage area or town yard in order to facilitate reclamation for the wood's best use.

### 3. Define Program Goals, Plan Accordingly, and Develop Partnerships

Unless a community has access to a steady volume of high quality whole logs, establishing a municipal tree debris recovery and processing program may not save money—especially if the municipality hasn't already invested in specialty equipment. Non-financial motivations may be more enticing, such as if the municipality had already established commitments to goals such as waste reduction and material reuse, carbon sequestration, public service and/or educational and training opportunities, etc. Identifying and communicating such goals could facilitate partnerships with community organizations or education institutions, thus relieving demand on municipal staff time or budget. Some examples of successful and sustainable municipal-community partnerships include:

- The Town of Greenwich, CT partners with Greenwich High School to ensure that all timber-quality public tree removals are offered for use to the school's technology and art classes. For more information, see "The Use of Wood from Urban and Municipal Trees" (CT DEEP Division of Forestry, 2014).
- The City of Baltimore's Recreation and Park's Forestry Division partnered with Humanim (a Baltimore-based non-profit), Quantified Ventures (a Washington, DC-based social enterprise), SaveATree (certified arborists), and the USDA Forest Service to create workforce development opportunities targeted at a prison population in pre-release, using wood to solve social, economic, and environmental problems in some of Baltimore's most blighted neighborhoods. For more information, see "Fresh Cut: The Business Viability of Processing Freshly Cut Urban Wood in Baltimore City" (Quantified Ventures, 2019).

It is also important to develop buy-in from the community. Especially for programs with altruistic or community-oriented goals (such as wood banks or job skills development programs), it helps to have an enthusiastic individual to champion the effort and to rely on enthusiastic volunteers for implementation.

### 4. Explore Inter-Municipal Collaboration

Cross municipal partnerships through shared regional services could help enhance viability of a tree debris recovery program. Equipment, staff, and/or administration might all be shared across communities if properly planned and implemented. Through District Local Technical Assistance from the State of Massachusetts, the Pioneer Valley Planning Commission is funded annually to provide technical assistance to explore municipal partnerships and regional collaborations. Such an exploration—initiated by municipalities through a request to PVPC—may be an important way to assess whether establishing a tree debris recovery and processing program in partnership with others makes sense. More information is available at: <http://www.pvpc.org/dlta>



## 5. Be Aware of Potential Markets

Awareness of markets is a key part of establishing a wood reclamation program. Current possibilities include the sale of saw logs to sawmills and the sale of lumber to architects, contractors, and/or other builders. Municipalities could also target specialty wood products by working with artisans, craftspeople, and/or builders who have special interest in local wood to determine what wood products are needed in the area. Recycle Ann Arbor is an example of a successful municipal wood retail operation. For more information, see <http://urbanwood.org/about/> and <https://recycleannarbor.org/divisions/reuse-center/urbanwood>

## B. Recommendations for Regional and State Assistance

### 1. Provide Technical Assistance to Communities for Developing Public Tree Inventories and Public Tree Management Plans

As evidenced by interviews and the electronic survey results, the majority of communities in Hampshire County have neither public tree inventories nor public tree management plans. Without these building blocks of community forestry planning, it will be difficult for any municipality to establish a more robust tree debris utilization program. DCR should investigate actual and perceived barriers to participating in the Urban and Community Forestry grant programs, and continue to promote these and the Community Wood Bank program via outreach, communication, and the development of case studies.

### 2. Develop a Regional Community Tree Debris Utilization Plan

While it is up to individual municipalities to implement any of the practices outlined in Section IV A above, each community should not have to invest the time and resources to reinvent the wheel. It is also probable that local buyers would be more likely to look to municipal sources for wood products if there were a steady supply of volume—meaning it could make sense for municipalities to band their supply together in order to make sales. As budget, and specifically limitations in staff and equipment, were cited as the primary barriers to expanding tree debris utilization strategies, the State’s professional forestry staff and PVPC could act as conveners and facilitators toward establishing a regional tree debris utilization plan.<sup>21</sup> This plan could:

- Identify efficient strategies for the processing of material and training of staff and determine whether capacity building might include joint purchase and sharing of equipment, a technical circuit rider, etc.
- Conduct more in-depth analysis to determine volume of high and low quality tree debris generated within Hampshire County and the region. An advisory group may be helpful in developing a methodology for estimating the amount of accessible tree debris generated annually, with adequate representation from private tree companies and utilities as they handle the bulk of tree debris.
- More fully engage with utility companies and perhaps Department of Public Utilities to understand volume of material generated, as well as resiliency planning actions for coming

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<sup>21</sup> PVPC’s participation in such a project would require dedicated funding.

years. Engagement with utility companies might also include an exploration of potential collaborations, including sponsorship of a multi-community wood bank program to provide heating fuel for those families most in need.

- Identify potential market outlets for various wood products, and delineate economic development strategies to strengthen local markets, and/or create a unified branding effort.

### 3. Provide Technical Assistance and Funding for a Regional Debris Management Plan

As described in the section “Managing Tree Debris in Hampshire County,” 14 of the 20 Hampshire County municipalities’ hazard mitigation plans have identified a need for a regional debris management plan. Tree debris can be a substantial and separate component of debris clean-up after a natural disaster or severe weather event. If the State provides technical assistance and funding for such a plan in the future, it should include specific strategies for storing, processing, transporting, and salvaging such tree debris as possible and securing the necessary agreements.

### 4. Develop Grant Program(s) for Regional Wood Utilization Programming

As reported in PVPC’s interviews and electronic survey, staff time and budgetary limitations restrict the scope of most of Hampshire County’s tree debris processing and utilization strategies. Regional cooperation may make strategies such as the purchasing of new equipment or the development of new partnerships more attractive and more likely. Massachusetts Executive Office of Energy and Environmental Affairs (EEA) could dedicate funding to supporting regional collaborations on strategies such as:

- Purchasing heavy equipment, including portable sawmills, butt log screws, and tub grinders, for shared use and the development of memorandums of agreement for that shared use.
- Developing and funding shared staff positions for two or more municipalities, with a focus on developing and implementing wood utilization programming.
- Developing and implementing model strategies for municipal partnerships with local and regional technical schools. Such partnerships could include the municipality preserving wood quality and usability during tree takedowns and delivering the debris to technical schools for use in carpentry, woodworking, and construction courses. Two ideas for the products of these courses include installing them in public spaces, such as handmade benches in municipal parks, or perhaps the school could sell students’ work with the profit funding a portion of the municipal forestry programming.

### 5. Explore and Facilitate Markets for Tree Debris Material

As interviews and survey results demonstrate, there is a steady supply of tree debris from the region. This can mean market-saturation for low-grade wood products such as biomass and landscape chips or mulch after a severe weather event. An audience for high-grade markets, such as for local lumber, may need to be cultivated, as low-volume, local wood may have higher processing costs than imported

lumber. Direct legislative support and state programming can foster the economic development strategies needed to bolster these markets, such as:

- Consulting with some of the private tree care companies that actively work in repurposing tree debris to understand whether there is strategic assistance or relatively small investment that could be made to activate far more productive and useful markets for tree debris.
- Following through on a New England Forestry Foundation idea that would bring value to low-value wood resources by providing state technical and financial support to enable willing municipalities to transition their public-school buildings to wood-based heat.<sup>22</sup> This idea could be piloted in Hampshire County, beginning with some analysis of what such transitions might entail and then determining level of interest among municipalities.
- Developing a marketing campaign to promote Massachusetts grown wood, modeled on local food campaigns. Consider partnering with existing organizations, such as [Western Mass Wood](#) (a program of Mass Woodland Institute that promotes the use of wood harvested from Berkshire, Franklin, Hampshire, Hampden, and Worcester Counties) or [Center for EcoTechnology](#) (a nonprofit developing solutions to reduce GHG while enhancing the local economy and environment). For a robust example of a statewide marketing campaign for local wood, see [Vermont Wood Works](#), a trade association that was formed in 1996 which represents primary and secondary woodworking companies and related businesses in Vermont.
- Exploring the viability of specific manufacturing processes that could make use of tree debris. Examples of products made from such manufacturing processes include wood fiber insulation, low-density fiberboard, high-protein pellets for aquaculture operations, and organic chemicals produced from low-grade wood that can be used in the production of plastics, pharmaceuticals, etc.<sup>23</sup> Specific issues to explore might include the volumes of supply needed to make such processing economically viable, current and future demand for specific products, and necessary facility infrastructure, such as 3 phase power, broad band, etc.
- Identifying potential locations to facilitate industry clusters. Industry clusters are geographic concentrations of businesses and organizations that have developed mutually beneficial and cooperative links with one another. For local wood markets, clusters could include producers of wood (municipal forestry programs, tree care companies, for example), users of wood (architects and construction contractors, residential developers, artisans and craftspeople, laypeople), and intermediaries (sawmills and sawyers, artisans and craftspeople). For an example of a successful local wood utilization industrial cluster facilitated by state action, see

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<sup>22</sup> This idea was submitted by New England Forest Foundation in a 2019 request to Lt. Governor Karyn Polito to support a new Community Compact-based initiative. While this suggestion did not take root at the time and funding through the Community Compact Cabinet program was not administered in 2020, the Commonwealth could re-examine the merit of this idea.

<sup>23</sup> Kingsley, E., (2018, December 4). What's Next for Wood? Opportunities and Challenges Abound for Low- and High-Grade Products. Retrieved January 8, 2020, from <https://www.linkedin.com/pulse/whats-next-wood-opportunities-challenges-abound-low-eric-kingsley-1e/>

“Using Industrial Clusters to Build an Urban Wood Utilization Program: A Twin Cities Case Study”  
(Dovetail Partners, Inc., 2010)

## *RESOURCES FOR MUNICIPALITIES*

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### **A. Literature, Case Studies, and Guides**

*“A Community Guide to Starting and Running a Wood Bank,” prepared by the University of Maine (March 2015):* This guide focuses solely on the reclamation of tree debris for use in a community wood bank. The document defines the concept of a wood bank and briefly identifies various wood bank typologies before outlining the process of building partnerships, recruiting volunteers, and establishing a working and sustainable system.

*“Wood Utilization Best Management Practices,” prepared by the Delta Institute:* This paper identifies the various key players in any wood utilization market, and catalogs six case studies of successful municipal wood utilization from around the Great Lakes Region.

*“The Urban Wood Toolkit” by the Urban Wood Network:* This toolkit provides worksheets and guidelines for communities interested in starting or developing existing wood recovery programs. It is a step-by-step approach to identifying municipal assets, determining programmatic feasibility, and developing key relationships with local and regional partners and consumers.

*“Using Industrial Clusters to Build an Urban Wood Utilization Program: A Twin Cities Case Study,” prepared by Dovetail Partners, Inc. (June 2010):* This publication identifies the ingredients of wood utilization industry clusters and outlines methods to determine the feasibility of developing a cluster in any community or region. Additionally, the publication includes case studies of successful wood utilization projects and partnerships from the Twin City region of Minnesota.

### **B. Funding Opportunities**

#### *DCR’s Urban and Community Forestry Challenge Grants*

DCR’s Urban and Community Forestry program provides annual grant opportunities that fund the development of tree inventories and management plans, in addition to other activities related to community tree programs, such as:

- Tree and Forest Ordinances and Policies
- Strong and Effective Citizen Advocacy and Action Organizations
- More Highly Trained Professional Staff
- Strategic Community Tree Plantings
- Appropriate “Heritage” Tree Care Projects
- Community Wood Bank Special Grant Opportunity

Depending on their utility provider, communities should apply to either the Eversource or National Grid Partnership Challenge Grant (each requiring 25% cash or in-kind match), or, if they maintain their own

municipal utility, to the standard Challenge Grant (requiring 50% cash or in-kind match, or 25% for work within an Environmental Justice area). For more information, contact Julie Coop, DCR Urban and Community Forestry Coordinator.

*Executive of Energy and Environmental Affairs' Municipal Vulnerability Preparedness (MVP) Action Grants*

EEA offers annual competitive Action Grants to municipalities that have completed the MVP-certification process (which is funded via the separate MVP Planning Grant). The certification process includes the completion of the Community Resilience Building (CRB) workshop, which convenes municipal staff, elected officials, board members and commissioners, residents, business owners, and other local stakeholders to identify the community's assets and vulnerabilities to the impacts of climate change, and establishes a mandate to develop priority strategies to increase the community's resilience to those impacts. The MVP program prioritizes "nature-based solutions," or those that mimic or restore natural ecosystem services to facilitate the community's adaptation to the effects of climate change. As trees and canopy cover are both vital tools in mitigating the effects of climate change and are also themselves extremely vulnerable to those effects, project proposals that emphasize developing or enhancing a sustainable forestry program are eligible. It should be noted that the Action Grant proposals must be routed in the strategies identified at the CRB. At the time of this report, MVP Action Grants are available to individual MVP-certified communities or to regional partnerships of two or more MVP-certified communities. This grant requires are 20% cash or in-kind match.



## *APPENDIX A: CASE STUDIES OF MUNICIPAL TREE DEBRIS UTILIZATION STRATEGIES*

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# Municipal Tree Debris Profile: Town of Granby

## About the Community

Incorporated in 1768, Granby is an agricultural and residential community of 6,200 people. With 27.8 square miles in land area, the town has a 78% canopy density<sup>24</sup> and identifies as a community of working farms, open spaces, and a traditional, rural New England town center. The town is governed by a three-person Select Board, which appoints the DPW Director who also serves as the Tree Warden.

## About Granby's Tree Program

Granby's public works crew, led by DPW Director Dave Derosiers, engages in proactive tree trimming and hazard tree removal. They complete small trimming in-house, but if there is an exceptionally large volume of work, they sometimes hire a bucket truck and operator to assist them. Occasionally, they hire Northern Tree Company when there are trees that need attention and the DPW staff is occupied with other work.



**CUT LOGS PILED AT GRANBY'S DPW YARD. PHOTO CREDIT: DAVE DEROSIERS**

Granby is generally successful in redistributing tree debris as firewood and wood chips to the community and this is the primary end destination for Granby's woody debris. However, there are two issues that Granby does have to deal with: the disposal of "butt logs" and an impending need to process much higher quantities of wood due to pests.

## Debris Processing

Granby's chipper has the capacity to chip wood that is up to 15 inches in diameter, but if the wood is of good quality, they will use any good quality softwood or hardwood between 8 inches and 2 feet in diameter as firewood. The firewood is left on the side of the road free for the taking, and if it is still there after a few days, the DPW crew will come retrieve it to bring to the DPW yard and pile it there, where it remains available for public pick-up.

Wood chips are almost always brought back to the DPW yard for use by residents in their home landscapes, but they are occasionally spread at the site of tree work if the truck is full and they are in a rural location. Granby doesn't track the size of their wood chip pile as residents make good use of it and the Town has never had to pay to have wood chips hauled away. All wood is chipped to the size appropriate to eliminate emerald ash borer (EAB) and Asian longhorn beetle (ALB) concerns.

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<sup>24</sup> Massachusetts Urban & Community Forestry Information, <http://maps.massgis.state.ma.us/dcr/forestry/forestry23.html>



**GRANBY'S TREE CREW REMOVING HAZARD LIMBS ON A TOWN RIGHT-OF-WAY. PHOTO CREDIT: DAVE DEROSIERS**

Butt logs pose more of a problem. These logs, often coming from old maples, are over 2 feet in diameter and harder to process as firewood, so residents are not as interested in them. The DPW piles butt logs in their yard, and when they have a big enough pile, they hire Wagner Wood for hauling and disposal. Wagner Wood has the capability to chip these logs, and it is assumed they use the chips in their chip sale operation. It costs between \$400-500 per truckload to hire Wagner Wood for this process. In FY19, Granby spent a total of \$1,800 on hauling and disposing of butt logs. A few residents do sometimes ask DPW for butt logs for artisanal uses.

The most recent natural events that generated a large amount of tree debris were the 2011 October snow storm and the ongoing damage of EAB infestations and a local gypsy moth population explosion. The 2011 snow storm resulted in 22,000 cubic yards of tree material in Granby alone, which was sent to a local burn yard. In 2020, the Town has so far removed over 600 trees due to insect damage (largely gypsy moth), whereas a normal year would typically involve removal of only 30 trees due to insect damage. The Town reports still having hundreds more that are dead due to insect damage and need to be removed.

Twice each year—in the spring and fall seasons—the DPW holds a leaf litter collection day. Brush gets chipped and leafy material goes to a commercial composting operation in Belchertown.

### Tree Management Concerns

Historically, National Grid would be the primary party responsible for removing any hazardous limbs or trees near electrical wires, but recently National Grid is prioritizing Three Phase power electrical work, which is not prevalent in Granby. Thus, the DPW is doing much more tree trimming around electrical wires than they used to, which is a strain on time and budget. Granby has been asking National Grid to be more proactive on removing problem or hazard oaks in town, but with little success, and the Town is concerned about these trees or limbs falling and creating potentially dangerous electrical or public safety situations. Last year, for the first time in 20 years, Granby saw a falling branch do damage to a passing car. The driver had to go to the hospital. The concern is that these types of events will become more common as maintenance is deferred and tree health declines due to damage from pests and weather.



**GRANBY'S CREW REMOVING TREES WITH A SENNBOGEN AND FELLER BUNCHER FORESTRY CUTTER. PHOTO CREDIT: DAVE DEROSIERS**

Oaks seem to be preferred targets for the gypsy moth, which has been posing a major threat to tree canopies in Granby and neighboring communities over the past two years. Whole sections of canopy have been deforested. The DPW director predicts that in the very near future, as early as next year, communities will be inundated with dead wood due to EAB (which has been confirmed in Granby) and gypsy moth destruction.

In Granby, the disposal of tree debris is included in the same budget line item as catch basin cleaning (\$13,500 total). The cost of catch basin cleaning is about to soar due to the Chicopee landfill closure and Granby will have to truck catch basin clean out to Fitchburg. This added expense, combined with the anticipated influx of tree debris due to pests, will be a great burden to the Town.



## Municipal Tree Debris Profile: Town of Belchertown

### About the Community

Belchertown, lying on the western banks of the Quabbin Reservoir, has 52.7 square miles of land area, with some square mileage forming part of the Quabbin Reservation. As of the 2010 census, the town population was over 12,600. Belchertown is governed by a board of five selectmen, who appoint the Director of Public Works which is coupled with the Tree Warden role. The Town has 83% forest canopy density.<sup>25</sup>

### About Belchertown's Tree Program

Belchertown's Tree Warden/DPW Director, Steve Williams, conducts the community's tree maintenance program via a combination of in-house and hired labor. The DPW crew conducts groundwork with its own chip truck, which usually consists of brush removal ( $\leq 6''$  in diameter). The Town contracts out for any take downs or bucket work, and is currently engaged with Asplundh Tree Expert Company.

### Debris Processing

Belchertown stores chip at their town yard for use in DPW projects, such as roadside stabilization. They only very rarely blow chip in rural work locations. The DPW director has to coordinate Asplundh's dump locations as they do not have their own site and do not capitalize on their chip.

Although residents are not welcome to come to the town yard to pick up chips, the tree crew does take requests drop off a pile from the truck if the residents live close-by the work site. If Asplundh takes a tree down, the DPW is responsible for coordinating the disposal of logs and stumps. These items are brought to the transfer station to grind (see below). If the logs are of good quality and hardwood, the DPW director says that residents often beat his crew to picking the wood



**WAGNER WOOD PERFORMING BELCHERTOWN'S ANNUAL BUTT LOG GRINDING IN JULY 2020. PHOTO CREDIT: STEVE WILLIAMS**

<sup>25</sup> Massachusetts Urban & Community Forestry Information, <http://maps.massgis.state.ma.us/dcr/forestry/forestry23.html>



up. He is happy to have this happen, as it saves the Town time and money.

The DPW tends to generate more chip than they can use. If a pile is getting old, the DPW crew can bring it to the transfer station where it is stored alongside residential brush until they hire a grinder to process the debris and remove it. This occurs on an annual basis. In the past, they have used 360 Recycling and Wagner Wood for this. If the piles get to be too large before the annual grind, the DPW can bring some chip or wood to Wagner Wood in Amherst. The DPW does not sort the wood debris area of the transfer station.

### Tree Management Concerns

Mr. Williams says: “[The way we process and deal with wood] all clicks. It all fits together and works. It’s a resource that could be better utilized, but there are no problems it poses in how the system works now.”

Mr. Williams is concerned about the liability of having residents wandering the town yard and especially cutting their own firewood if they were to be welcomed to use the accumulated wood material. If residents weren’t cutting their own wood, he would be less concerned about liability, but he acknowledges doesn’t have the time to share his crew to run a wood bank or to organize a crew of volunteers. However, Mr. Williams would be interested in wood bank literature; many Belchertown residents heat with wood, so firewood is in demand.

Mr. Williams’ main concern is hazard mitigation, especially in light of significant tree mortality with EAB and gypsy moth. The primary concern is the cost of taking these trees down—processing isn’t as much of a concern as most of the trees will be hardwood and adjacent property owners will want to use the wood.

Over the past five years, Belchertown has taken down 513 trees—just over 100 per year. However, this the rate of hazard tree removal is accelerating. As of mid-August 2019, the DPW assessed about two-thirds of their roadways for hazard trees (87 miles out of 130) and had already identified 741 trees that need immediate or quick attention. At the time of this interview, Mr. Williams reports that given budget and time restraints, the Town would likely only be able to remove 100 of those trees in the 2019 calendar year, so they will select the biggest hazards on the main roads to address first and “hope for the best” with the rest. The cost of work needed to address all 741 hazard trees is estimated at \$885,000.00. The largest tree tagged for removal was 65” in diameter.

Mr. Williams expressed pride in the fact that Belchertown does not have large piles of wood sitting around, and that all of their debris ends up used either in the town or by companies like Wagner Wood that repurpose and sell wood products. He also expressed an interest in a regional biomass facility, so that excess wood could be converted into energy.

# Municipal Tree Debris Profile: City of Northampton

## About the Community

As the county seat of Hampshire County, the population of Northampton (including its outer villages, Florence and Leeds) was over 28,550 as of 2010. The city has a total area of 35.8 square miles, of which 34.2 square miles are land. With an urbanized downtown, Northampton's outer reaches are more suburban, and overall the city maintains a 70% canopy cover. The City is governed by a mayor and nine-person city council. City charter states that Tree Warden is an employee of the Department of Public Works which the mayor appoints.

## About Northampton's Tree Program

Richard Parasiliti, Jr. had been the DPW Highway Superintendent for years when, in 2014, he was appointed to perform the duties of Tree Warden. Then in 2018 he transitioned to the Superintendent –Tree Warden of the Forestry, Parks & Cemetery Division. This new position was created to oversee the newly formed division within the Department of Public Works. The division is responsible for the maintenance of the city's municipal parks, cemeteries and over 11,000 urban shade trees. Mr. Parasiliti is an ISA Certified Arborist Municipal Specialist and a Qualified Tree Risk Assessor who has helped to develop Northampton's vigorous tree program.

The Tree Warden is responsible for the care and control of all public shade trees in the right of way, and municipal parks & cemeteries. The full time staff of the division does all of the routine maintenance which is supplemented by contractors who perform tree injections. This work includes routine public tree trimming, removals (about 60-80 per year) and stump grinding. The professional tree crew isn't typically involved in tree plantings, which are done by a large base of volunteers. Volunteers plant about 300 trees per year and conduct approximately 300-400 young tree "trains" (pruning) during the winter and early spring.

Northampton's public tree inventory is approximately 33% maple and 13% oak. Mr. Parasiliti is prioritizing the development of a more diverse, resilient canopy, and the City has been working toward planting 2000 new trees. Averaging 250 to 300 trees per year, volunteers have planted 851 trees since 2015 and will plant their 1,000th tree this fall.



**BURLS, SUCH AS THIS ONE FROM A CITY MAPLE TREE, ARE OFTEN REQUESTED BY LOCAL ARTISANS FOR USE.**

## Debris processing

Northampton does not track the amount of tree debris the City processes. The tree crew chips all wood less than 14" in diameter and transports the chips to the Highway Department chip bin, located at the DPW yard. The City uses some of these chips for mulching at their tree nursery and to hill up the trees in winter. The majority of chips go for free to the public, who use them for their landscaping purposes. The City has never had an excess of wood chips as residents use them enthusiastically, collecting them with 5 gallon pales and trash cans.

Everything over 14" gets cut into cordwood length and processed in the City's wood debris facility on Sylvester Road. Butt logs, which are too

large and too decayed to be processed into cordwood with the DPW's current equipment, are also sent to this facility where they are stocked until the pile gets big enough (based on a qualitative estimate, as opposed to quantitative) to contract with a vendor to grind and chip them into mulch. The goal is for this location to eventually become a community wood bank, modeled after that of the Town of Petersham.

To Mr. Parasiliti, one of the appeals of a wood bank is that it returns public property to the public. In his eyes, that is the highest use of public tree debris:

"To me, [keeping wood products made from public trees free and locally available is] important because it's a public product. In essence [when you hire] a contractor, you're paying them to deal with surplus public property. You could take the woody debris and tree debris and give it to residents for their own use so that there's public benefit."

The DPW processes their own tree and limb debris after weather events, as well. Mr. Parasiliti calls this a "cut and push operation," as the team uses front end loaders or snow plows to keep roads open and



**NORTHAMPTON'S WOOD DEBRIS FACILITY STORES BUTT LOGS FROM THE CITY'S TAKEDOWNS, WHICH WILL EVENTUALLY BE SPLIT INTO FIREWOOD FOR A WOOD BANK.**

move the debris to the side of the right-of-way. The DPW then generates a master list of all damage and assigns crews to sections of the city, trying to eliminate high risk tree issues first. In the case of the 2011 October snowstorm, Northampton used their own DPW staff over the course of two-and-a-half months to clean all the broken branches and tree limbs off of the roadways, without hiring contractors to assist.

Twice a month, the transfer station on Glendale Road hosts a Leaf and Yard Waste Drop-Off Day, allowing residents to bring in woody debris no larger than 4" in diameter. The City contracts with a vendor when necessary to chip and haul this debris away.

### Tree Management Concerns

Mr. Parasiliti is mostly confident in his tree management program, and sees few problems with the City's robust operation. However, he is concerned over the financial and administrative strain that an increased frequency of large storms could incur for the City. Mr. Parasiliti cited the 2011 October ice storm as an example of a storm that was a huge drain on the City's finances and staffing capacity. The storm not only caused public trees and limbs to fall, but also generated a lot of private yard waste. Residents have the opportunity to bring their in woody debris no larger than 4" in diameter to the Leaf and Yard Waste Facility on Glendale Road, which is open twice a month. Normally, the City will hire a contractor when necessary to remove this debris. After the 2011 storm, the amount of residential yard waste collected at this site was so large that the City had to hire a contractor for an extended period to manage the debris. In addition, clean-up of community tree debris was expensive and required the commitment of all DPW crews. Mr. Parasiliti also expressed the opinion that working with FEMA to coordinate and reimburse debris clean-up was protracted, inefficient, and ultimately not cost effective. Therefore, the threat of more severe weather events causing large amounts of tree debris is of concern to the Northampton forestry program.

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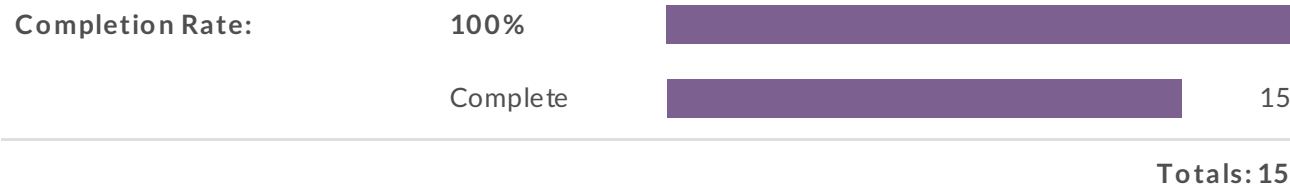


*APPENDIX B: SURVEY OF HAMPSHIRE  
COUNTY TREE WARDENS REGARDING  
COMMUNITY TREE DEBRIS*

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# Report for Tree Debris Survey

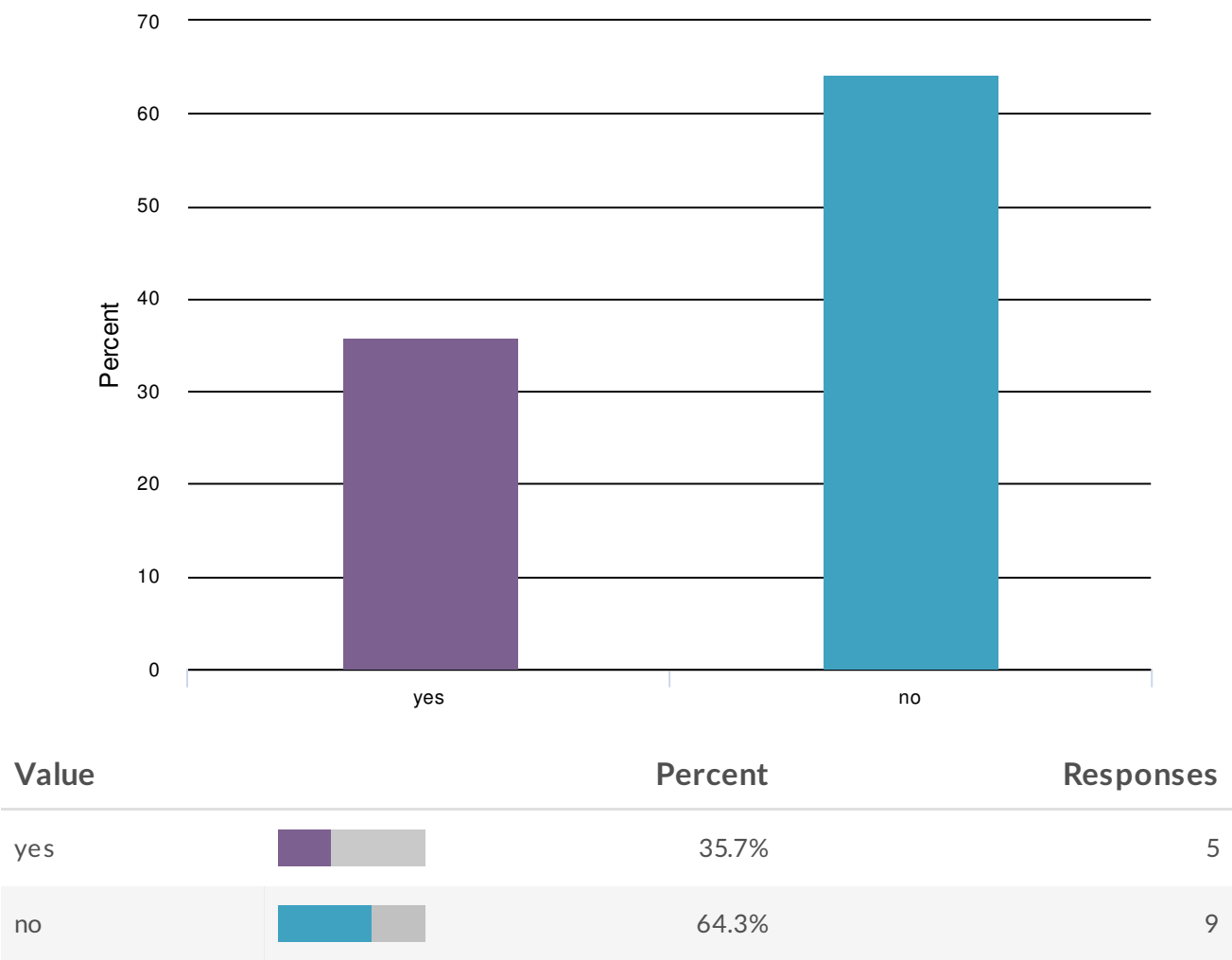
Response Counts



## 1. What municipality do you represent?

ResponseID	Response
2	Middlefield
3	Goshen
4	Cummington
5	Pelham
6	Northampton
7	Williamsburg
8	Huntington
9	Amherst
10	Granby
11	Granby
12	Ware
13	Southampton
14	south hadley
15	Chesterfield

2. Do you have a tree inventory?

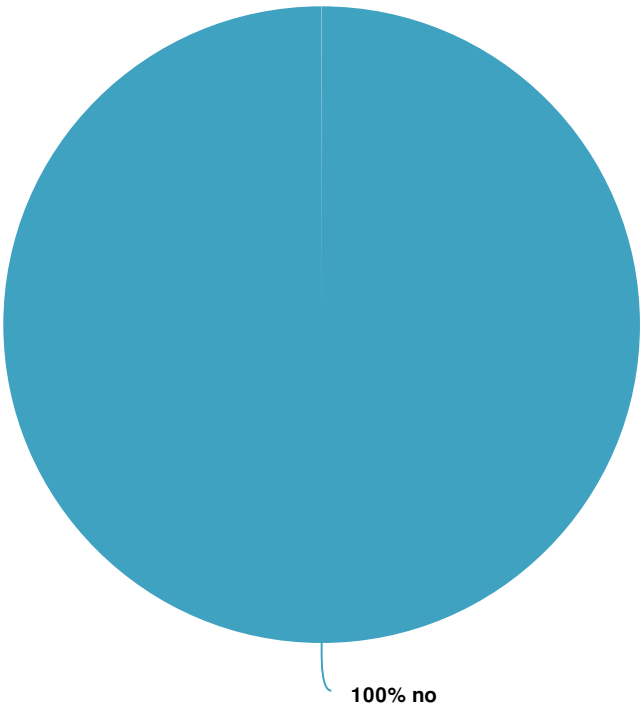


3. If yes, when was the tree inventory last updated? Please list year.

ResponseID	Response
3	2020
6	2016
9	2012
10	2020
11	2020



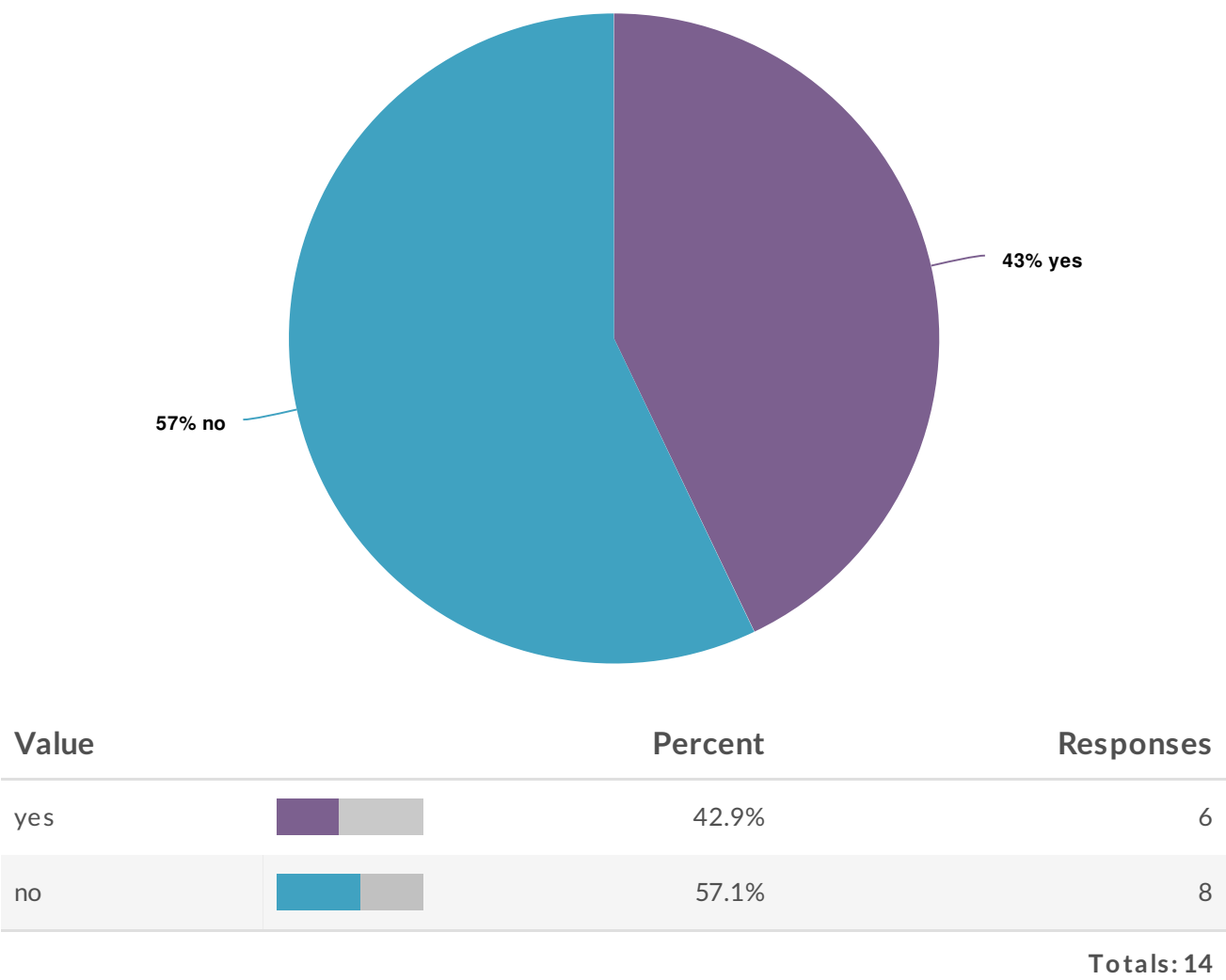
4. If yes, does the tree inventory include information regarding the quality of wood, and/or potential reuse options for individual trees?



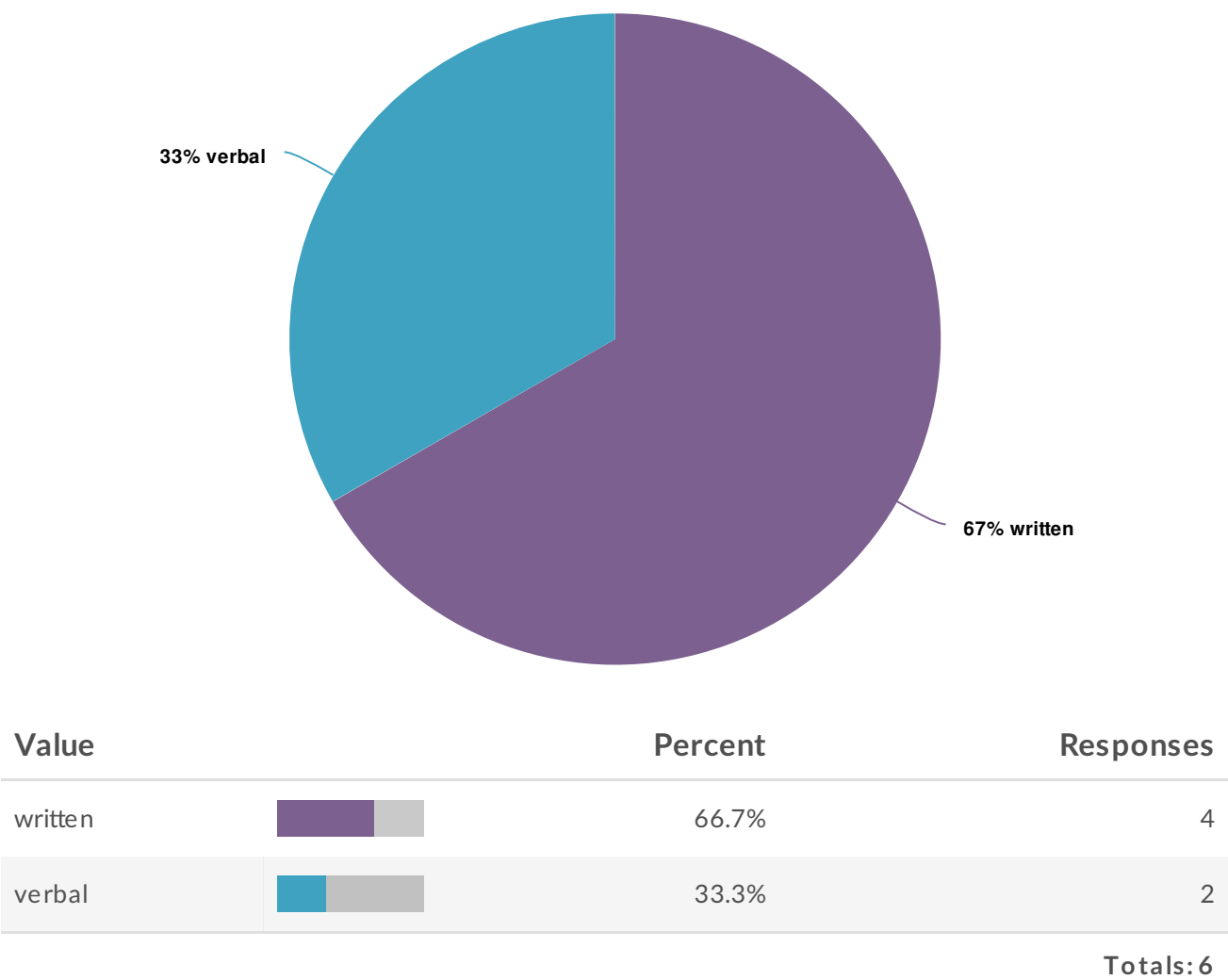
Value		Percent	Responses
no	<div></div>	100.0%	5
			Totals: 5

Other - Write In	Count
Totals	0

5. Does your community have well established procedures governing reclamation/reuse of tree debris?



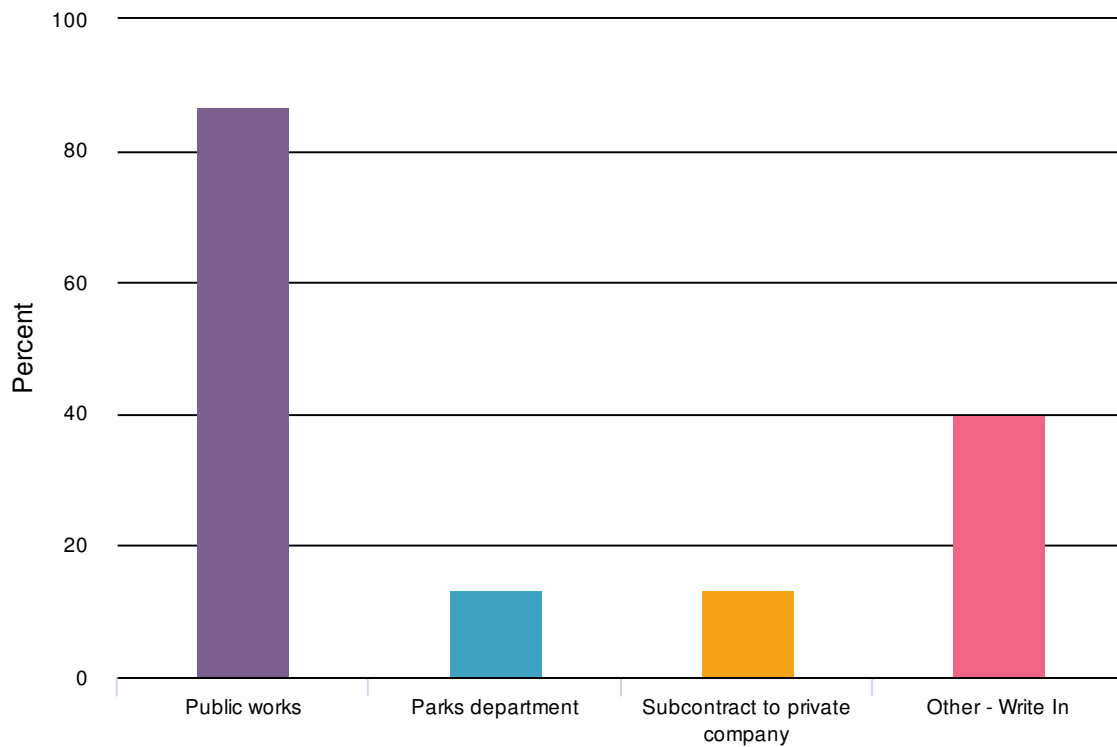
6. If yes, are the procedures written or verbal?



7. How does tree debris typically get removed from roadway right of ways and public properties? What is the process for removal? Please explain.

ResponseID	Response
2	Left for adjacent property owners if they want the wood. Otherwise smaller debris is chipped and larger pieces removed to a Town off-site area.
3	Highway department chips in place if possible. When trees are too big we take them to the wood storage area.
4	Bucket loader and a wood chipper
5	Tree care contractor removes debris from the site. Brush is chipped at time of work. Wood removal arranged for a later date.
6	Trees debris get removed by the City's tree crew. All brush is chipped and butt logs are disposed of at the wood waste facility.
7	-a lot of wood chips from debris scattered in place - sound wood left for homeowner or public collection/consumption
8	the highway or tree company
9	Town tree crew perform all tree work, chip all wood up to 16", remaining logs are stored at town holding yard.
10	National Grid tree contractors or Contractor's hired by town
11	National Grid tree Contractors or Contractors hired by Town and Town crews
12	By dpw and if the residents don't take the wood it sits on town land and rots or until we can acquire monies to have a tub grinder.
13	Hazard trees generally addressed by Tree Warden. ROW vegetation management and clearing of fallen trees performed by the Highway Department. Debris generally chipped when possible, butt logs stacked at a dedicated location for eventual tub grinding.
14	chip
15	Chipped or hauled away

8. Which departments are responsible for overseeing any aspect of public tree maintenance, including pruning and/removing public trees? Please select all that apply.

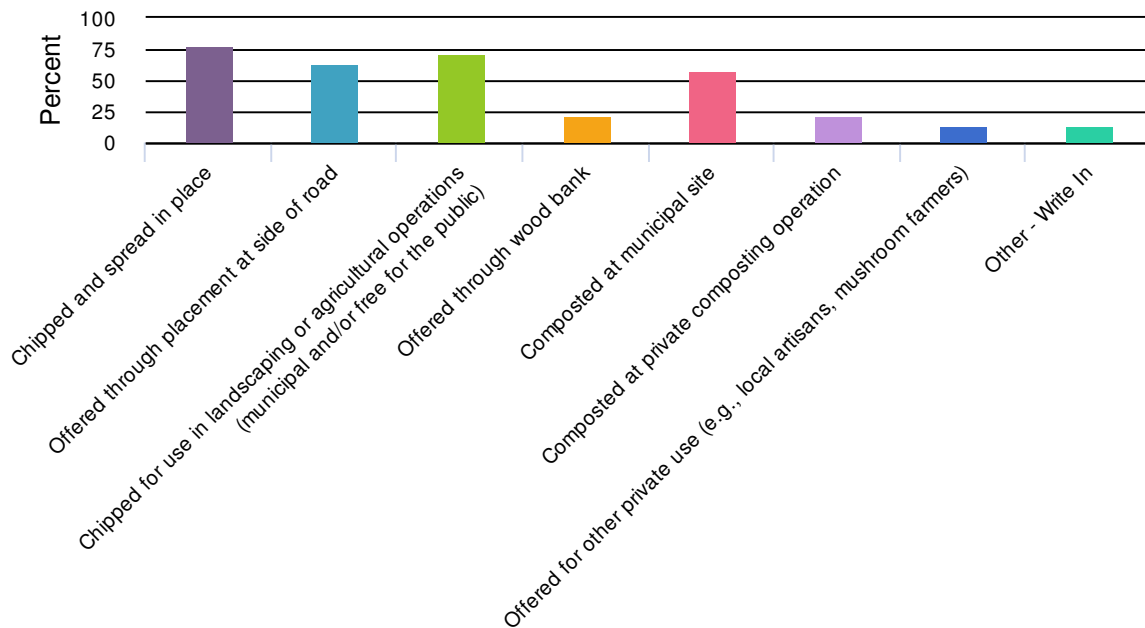










Value		Percent	Responses
Public works		86.7%	13
Parks department		13.3%	2
Subcontract to private company		13.3%	2
Other - Write In		40.0%	6

Other - Write In	Count
Tree Warden	3
National Grid	1
tree warden	1
Totals	5



9. After collection from roadways and public properties, what is the destination of this material? Please select all that apply.



Value		Percent	Responses
Chipped and spread in place		78.6%	11
Offered through placement at side of road		64.3%	9
Chipped for use in landscaping or agricultural operations (municipal and/or free for the public)		71.4%	10
Offered through wood bank		21.4%	3
Composted at municipal site		57.1%	8
Composted at private composting operation		21.4%	3
Offered for other private use (e.g., local artisans, mushroom farmers)		14.3%	2
Other - Write In		14.3%	2

**Other - Write In****Count**

---

All Chips are reused by the residents and available at Transfer Station

1

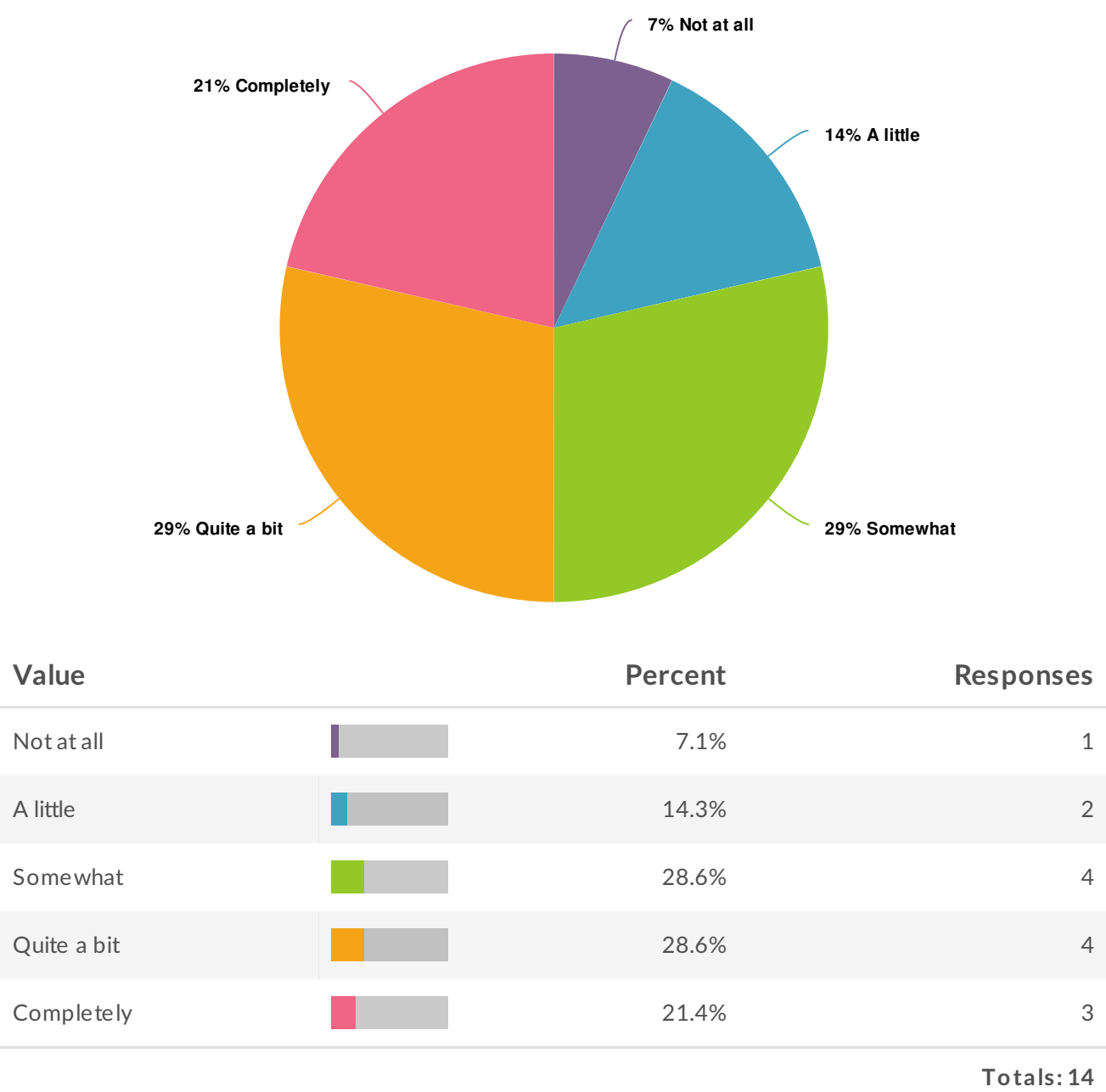
burned

1

Totals

2

10. How adequately do these tree debris disposal/reuse approaches meet your needs?

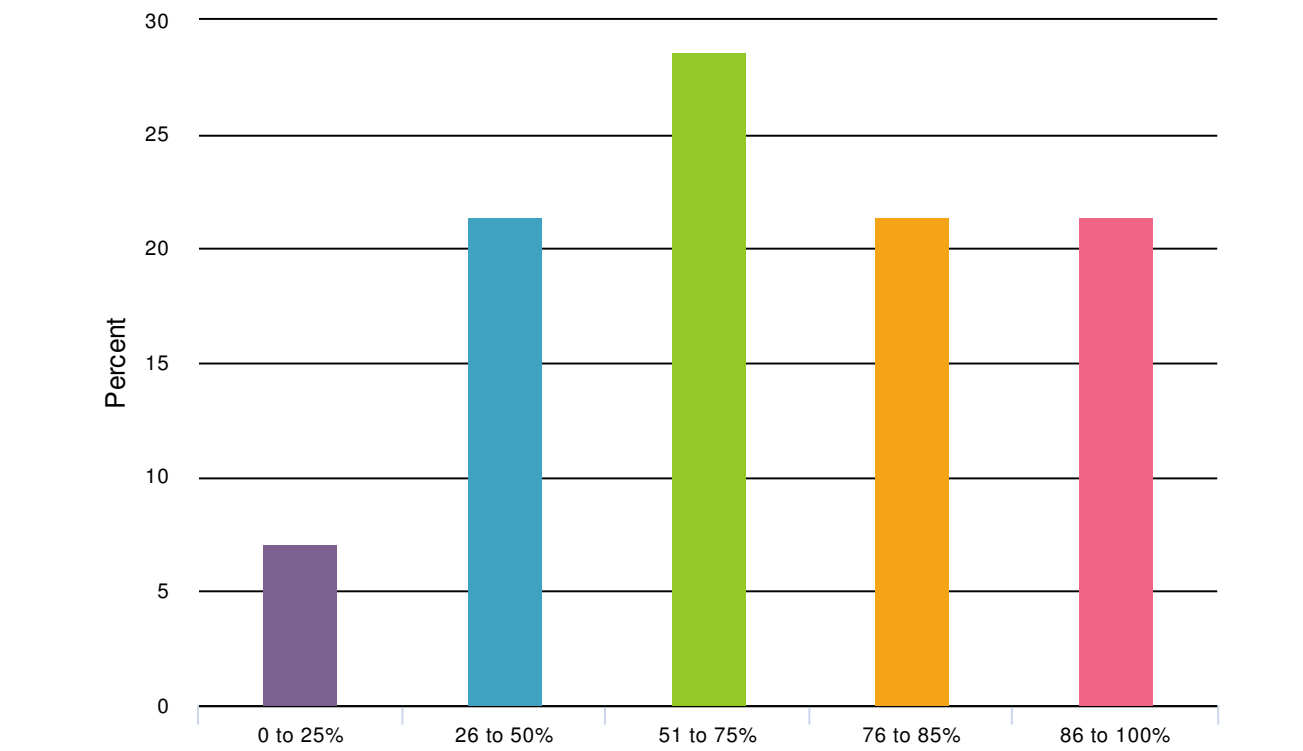


## 11. Please tell us how your needs are or are not being met.

ResponseID	Response
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3	Most of the time the trees that fall on from private property into the public way. The highway department has no budget for removal or really time so when trees are being taken care off other work is not getting done.
5	Good for now.
7	We would prefer to have any kind of use for chips
8	money to maintain
9	Ability to efficiently move and organize larger diameter wood would make up cycling Municipal wood possible. As it stands now we just dump logs at our holding yard and it gets picked through for fire wood.
12	I feel there is a better way to handle the wood, I am currently looking into grants so I can get a wood splitter, then having volunteers help run the wood bank and distribute the wood starting with residents who need the help the most
13	we end up with chips that require effort to truck or load with no financial benefit to the Town. Composting operations are also not efficient as we do not have a soil screener to finish product. If we had one, product could be offered to public.

12. Of all tree debris in the municipal right of ways or on public property, what percentage do you estimate is recovered?



Value		Percent	Responses
0 to 25%	<div><div></div></div>	7.1%	1
26 to 50%	<div><div></div></div>	21.4%	3
51 to 75%	<div><div></div></div>	28.6%	4
76 to 85%	<div><div></div></div>	21.4%	3
86 to 100%	<div><div></div></div>	21.4%	3



13. Please provide some estimate of the volume of total downed wood you are recovering in a normal year (without major damaging storm event)? Note: Thinking of dump truck volumes may help in providing estimates here.

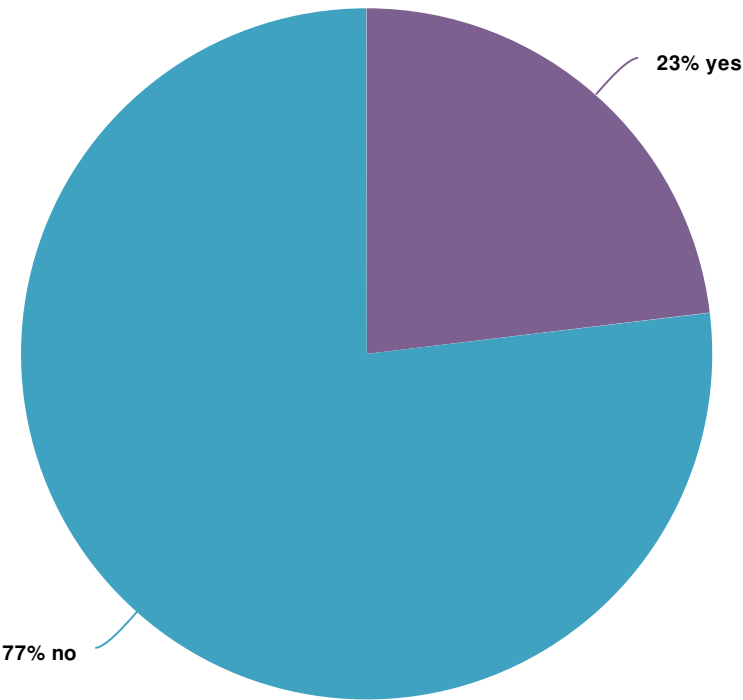
Cubic yards of chipped wood

ResponseID	Response
2	Unk
3	250
4	Seven try axle loads.
5	100
6	1500-2000
7	500
8	200
9	6000
10	300
11	300
12	honestly I have no clue
13	1000
14	n/a
15	300

Cubic yards of un-chipped wood

ResponseID	Response
2	Unk
3	500
4	Seven try axle loads.
5	50
6	480-500
7	350
8	200
9	3000
12	50
13	1000
14	n/a
15	200

14. Have you explored other methods of disposal/reuse?



Value		Percent	Responses
yes	<div><div></div></div>	23.1%	3
no	<div><div></div></div>	76.9%	10

Totals: 13

15. If yes, please describe what issues, barriers you may have encountered:

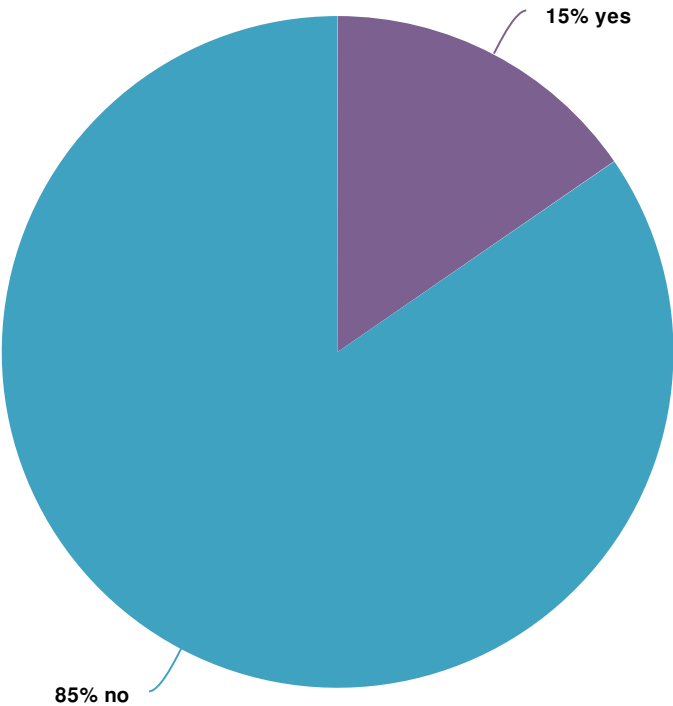
ResponseID	Response
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4	Give the towns people the corn wood.
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9	Creating a organized wood yard where logs are sorted into categories for re-use. Firewood, milling, wood turning, chipping for biomass etc. Forestry grapple on an interview excavator or a log loader would make this possible. Currently we use forks on a front end loader to move logs which is every inefficient and limits options for sorting.
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13	most who could use the product either want it loaded for them or trucked to their facility.
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16. When bringing wood to your public works yard, do you sort wood according to quality, size, or intended use?



Value		Percent	Responses
yes	<div><div></div></div>	15.4%	2
no	<div><div></div></div>	84.6%	11

Totals: 13



17. If yes, what is your sorting method?

ResponseID	Response
6	Front end loader and excavator.
11	Sorted for reuse as firewood

18. Do you allow private tree care companies (when doing work for municipality, the state, or utilities) to:

	yes	no	Total Checks
Dump chips or other woody materials at your DPW/town yard?			
Checks	7	6	13
Row Check %	53.8%	46.2%	
Leave wood along roadway right of ways that municipality must then manage?			
Checks	7	7	14
Row Check %	50.0%	50.0%	
Leave wood along roadway right of ways for residential use?			
Checks	11	2	13
Row Check %	84.6%	15.4%	
Total Checks			
Checks	25	15	40
% of Total Checks	62.5%	37.5%	100.0%

19. Given reports of increased insect infestations, and greater frequency of larger storms, what concerns you most in terms of managing additional woody debris on an annual basis (e.g. capacity to manage given size of existing facilities, limitations of equipment to process, etc.)?

ResponseID	Response
3	we do not have any equipment to manage tree debris, we use chains and bucket loader to load onto dump trucks. We do not own a big chipper and have to rent or borrow one.
5	All non-burnable wood and most woodchips are brought to a private processing facility in a neighboring town
6	Concerns are as follows: More infestations and disease lead to more municipal tree mortality, thus increasing whole tree & part failure. This will put more pressure on the ability to manage woody debris after storm events and routine removals
7	We have very limited equipment and resources to support tree maintenance/ care or debris management in Williamsburg
9	Moving wood and storage capacity
11	We have removed over 600 trees this year due to insect damage. A normal year would be about 30. We have hundreds more that are dead and still need to be removed
12	the cost of removal. Better ways to allow residents access to such piles as wood chips etc
13	need for money to rent a tub grinder to manage large butt logs.
14	n/a
15	Storage space

20. Please share any other thoughts you may have on tree debris.

**ResponseID    Response**

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3                      I really think there should not be a tree within 50 feet of a right of way.

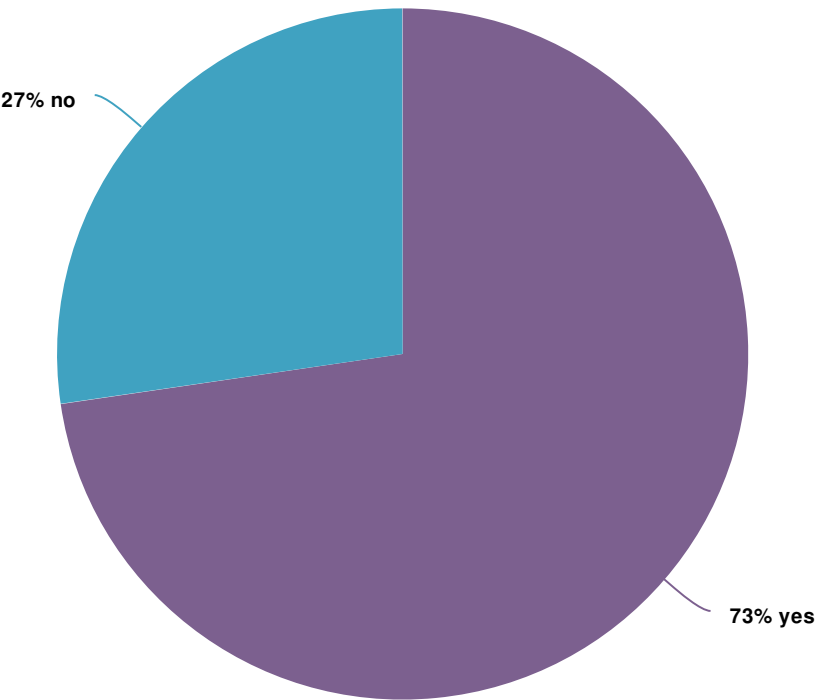
5                      There does not appear to be any interest by the Town and DPW to start a wood bank or composted woodchip facility. Some chips are available for public use but not advertised. Most of these chips are provided by line clearance utility crews and not my contractor.

9                      Developing a list of markets or a network for hobbyists woodworkers and cottage industries that could use urban wood in their product. Wood turning, furniture, building trades, portable bandsaw mills.

13                     for Question 17, it depends on whether they would be contacting me with actual vendors, money or help turning these waste streams into revenue for the Town. If it is webinars that just talk about the methods listed, then no. Thank you.

14                     n/a

21. Would your community like to engage further with Massachusetts Executive Office of Energy and Environmental Affairs and Department of Energy Resources about renewable uses for removed waste wood, including biomass, wood heat, or other markets for wood material?



Value		Percent	Responses
yes	<div><div></div></div>	72.7%	8
no	<div><div></div></div>	27.3%	3
Totals: 11			



22. If yes, please provide your contact information below.

ResponseID	Response
2	Highway Superintendent Skip Savery
6	Richard Parasiliti Jr Superintendent - Tree Warden Forestry, Parks & Cemetery Division 413-587-1570 x4317 rparasiliti@northamptonma.gov
7	Thomas Por 617-840-7272 porthomas@gmail.com
8	town of Huntington highway department highway@huntingtonma.us
9	Alan Snow Div. Dir. Tree & Grounds Department of Public Works Amherst, MA 01002 413-259-3211
11	Dave Desrosiers cell 413-326-3594
12	Jkusnierz@townofware.com
15	Matt Smith Chesterfield Highway Superintendent highway@townofchesterfieldma.com 413-296-4727