



# HARVESTING **BIOMASS** FROM YOUR WOODS

**MAKE AN INFORMED DECISION**

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## INTRODUCTION

Forests have always been an important part of life in New England. In fact, for as long as people have lived here, they have looked to the forests to meet their needs, including heat and energy. Though the challenges we face may differ in scale and complexity from those of our ancestors, we continue to look to our forests to address these needs.

Susan Campbell



The uncertainty surrounding oil prices and concern about global climate change have resulted in a greater focus on the role our local forests may play in addressing these challenges. Biomass from harvested trees can be used as a source of heat and electricity and has

been suggested as a raw material to produce an ethanol gasoline substitute. However, the use of biomass has raised a number of questions about its ecological impact on forests, pollution contribution, and role in global climate change. These questions continue to be debated.

The intent of this publication is not to address these larger questions that surround the use of biomass. Instead, the intent is to help landowners better understand the possible role of biomass in a harvest, learn how the removal of biomass may affect their land, and help them make an informed decision.

Since 70% of the forests in Massachusetts are owned by families and individuals, the supply of biomass in Massachusetts lies largely in the hands of tens of thousands of family forest owners. Some landowners will choose not to have a timber harvest on their land, regardless of whether it includes biomass as a product. However, there are landowners interested in timber harvesting. They need information about the role biomass may play in their harvest to ensure that it will meet their goals for the land.



Kristina Ferrare

# WHAT IS BIOMASS?

Biomass is a generic term for any type of plant material that can be used to generate electricity, heat, or gasoline substitutes such as ethanol. When we use the term “biomass” in this publication, we are referring to residual woody biomass, which comes from trees that have traditionally been used for firewood or other low-economic-value products, as well as portions of trees (e.g., tree limbs and tops) not able to be used commercially for products such as lumber.

## Is a timber harvest operation that includes the harvesting of biomass different from a typical timber harvest operation that does not?

A typical timber harvest in Massachusetts provides a number of different wood products, including sawlogs, that are turned into boards, firewood, and pulp (which is used to make paper products). Harvesting biomass from your land simply means adding another wood product to a typical harvest. All of these products are usually harvested in one timber operation and done by the same logging crew. Therefore, in most ways, a timber harvest that includes biomass is like a typical timber harvest; however, there are some differences.

Perhaps the biggest difference of adding biomass into your harvest is the reduced amount of logging residue or slash (e.g., tree tops, poor-quality logs) left on the ground after the harvest is complete. Important considerations about slash are discussed in the “Aesthetics and Privacy” and “Soil Health” sections of this publication.

A second major difference is that the landing, or roadside area on which the logs are piled to be trucked away, is likely to get larger to either accommodate an additional pile of biomass product or a chipper that turns the biomass into chips before it is transported to its destination. Depending on factors such as the size of your property and the location of the landing, this may or may not be a concern for you.

Susan Campbell



Working with a professional forester and developing a strong timber sale contract are recommended on all timber harvests.

Since biomass is another product from a timber harvest, following standard advice for having a good timber sale will address most issues and ensure that landowner responsibilities, such as meeting the requirements of the Wetlands Protection Act, are met. A professional forester can provide this advice and help you develop a strong timber sale contract that outlines the specific standards of your harvest.

To learn more about what’s involved in a timber harvest, including the important elements of a contract, or to find a forester working in your town, visit [www.masswoods.net](http://www.masswoods.net).

## The Special Considerations of Harvesting Biomass

Though the harvesting of biomass is very much like a typical timber harvest, there are some additional specific considerations.

### AESTHETICS AND PRIVACY

Beauty and privacy are often two of the main reasons landowners enjoy their land. Therefore, one of the most common concerns landowners voice about harvesting biomass from their land is the fear that harvesting biomass means clear cutting their woods. In Massachusetts, timber harvests that include biomass as a product typically are partial harvests that do not remove all the trees. As with any timber harvest, the amount of trees harvested should be based on your landowner goals for the property and should be discussed with your forester.

A common complaint many landowners have about timber harvesting is the “mess” that is made by leaving the logging residue or slash on the ground after the harvest is complete. It is important to know that while some may find logging residue aesthetically displeasing, it does provide substantial benefits, including maintaining or improving wildlife habitat (see “Wildlife” below) and retaining nutrients on the site (see “Soil Health” below). So although there are ecological advantages to leaving slash in the woods, many landowners do not like what they perceive as a messy appearance. The removal of biomass may improve the aesthetics of an area that has been harvested by reducing the amount of slash left on the ground, thus resulting in a harvest that looks “neater” than a traditional timber harvest.



Woodland before a timber harvest



Same woodland after a timber harvest that included the removal of biomass

In order to address the aesthetic concerns of your harvest, be sure to have a conversation with your forester about the types and amounts of trees to be removed and how the unused portions of the trees or slash will be handled. One way to get a better idea of how many trees will be removed is to have your forester “mark” with paint either the trees in the stand to be removed or the trees to be retained. Another option is to visit a nearby property that has had a similar timber harvest.

### WILDLIFE

Many landowners enjoy seeing wildlife and want to make sure their decisions about their land won’t be detrimental to wildlife habitat. However, “wildlife” is a broad term that includes many different types of animals that have many different kinds of needs, sometimes conflicting.

Consequently, when you make any decision about your land (even a decision to do nothing), it will favor some types of wildlife and not others.



The Chestnut-Sided Warbler is an example of a species that uses young forest habitat.

istockphoto© Bob Balestri

In general, forest-dependent wildlife species need forests of different ages, including young forests, old forests, and forests of mixed ages. Animals will use these different-aged forests throughout their lives to meet their needs, including food, cover, and places to breed. If you are interested in favoring wildlife that need young forests (i.e., seedlings, saplings) or open areas, such as some songbirds, then the harvesting of biomass may provide an opportunity to cost-effectively create these habitats. These areas can then either be maintained as open areas or allowed to grow back to young forest, both of which provide important and uncommon habitat.

Anthony D'Amato



Paul Catanzaro

Downed logs and snags provide important wildlife habitat.

Three important types of wildlife habitat in your woods are living trees with holes in them (called cavity trees), standing dead trees (called snags), and downed dead logs. Cavity trees and snags provide food for insects, which in turn provide food for birds. They also provide nesting opportunities for birds and small mammals. When the trees fall on the ground and become downed logs, they provide an important habitat for another suite of species, including insects and salamanders; cover for many species of wildlife, including rabbits and fox; and winter denning sites for bears. In addition, as downed logs rot, they help maintain healthy and diverse populations of soil flora and fauna.

If you do decide to incorporate biomass into your harvest, be sure to leave about 8 to 10 cavity trees and snags per acre, including 1 or 2 that are at least 18 inches in diameter or the largest available, as well as all downed logs for wildlife habitat. In addition, leave enough tops on site to meet the needs of the various wildlife species that use them (see “Soil Health” below).

If you are interested in enhancing the role your land plays in providing wildlife habitat, it is recommended that you talk to your forester about your options. It can also be helpful to communicate to him or her the particular species of wildlife you are interested in favoring. If a timber harvest will help you achieve your goals, work with your forester to be sure that the harvest leaves enough cavity trees, snags, and downed dead logs through proper timber sale planning and appropriate wording in your timber sale contract.

To find a forester working in your town, visit [www.masswoods.net](http://www.masswoods.net).

## SOIL HEALTH

The parts of a tree with the highest proportion of nutrients are the tops (leaves and fine branches) and the root system. The boles, or trunks, of trees have relatively small amounts of nutrients in them. Although the root system is not a part of biomass harvesting, the tops of trees can be utilized for biomass. One of the concerns about biomass harvesting is whether or not the removal of biomass will eventually deplete the nutrients of the soil to a point that negatively impacts the woods. So how much of the tree tops can be taken before there is a negative impact to the nutrients of the site? This remains largely an unanswered question.

We do know that the soils of New England are generally nutrient rich. We also know that some soils are inherently more fertile than others, having more nutrients to begin with, and/or are on bedrock that weathers, contributing more nutrients to the soil than other bedrock types. In addition, since most harvests in Massachusetts are partial harvests, not all of the trees and their nutrients are removed from the site. The long interval of 10, 20, or more years between most harvests in Massachusetts also provides time for sites to regain nutrients through weathering and the accumulation of organic matter, such as dead plants and leaves. Together, these factors suggest there is an amount of biomass that can be removed without causing negative effects in terms of the loss of too many nutrients. However, because we don't know exactly how much can be removed, a conservative approach is to leave at least some of the tops on site.

The Massachusetts Department of Energy Resources (MA DOER) regulates the amount of biomass that can be removed from a timber harvest if that biomass is being taken to a facility that is generating power and seeking qualification to the Massachusetts Renewable Portfolio Standard (RPS) program. For information about those standards, visit [www.mass.gov/doer/](http://www.mass.gov/doer/) or call (617) 626-7300.

John Clarke



As of 2011, there are only regulations for biomass that is going to a power plant. For biomass that is not going to a power plant, there are organizations (e.g., State of Minnesota, Forest Guild) that have suggested guidelines for the amount of tree tops that should be retained on site based on the available research and professional opinion (see “Additional Resources” below). These guidelines suggest

- leaving one-quarter to one-half of the tops well-distributed across the harvest area, depending on the amount of trees being harvested and the amount of time between harvests;
- the more trees that are harvested and the shorter the time period between harvests, the higher the percentage of tops that should be left; and
- leaving more tops on sites that may be less fertile or productive.

Another option is to retain all tops in the woods while including biomass in the timber harvest. This “bole only” harvest removes just the boles, or trunks, of the trees, while the tops are left on site, as is done in a traditional timber harvest.

When considering soil health in any timber harvest, making sure that the appropriate forestry best management practices (BMPs) are used on your site will help maintain soil health by limiting soil erosion and compaction.

In addition to soil health, forestry BMPs are also designed to protect water quality and wetland function. In Massachusetts, these BMPs are required under regulation and are ultimately the responsibility of the landowner to ensure they are implemented. To learn more about Massachusetts’ forestry BMPs, visit the “Water” page of [www.masswoods.net](http://www.masswoods.net).

To specifically address any concerns you have about nutrient loss and soil health and to ensure that the appropriate forestry BMPs are implemented to meet regulatory obligations, you should work with a professional forester to develop the necessary language in a timber sale contract. To find a forester working in your town, visit [www.masswoods.net](http://www.masswoods.net).

## TIMBER MANAGEMENT

Your woods are the result of your land’s past use (e.g., cleared for agriculture) and the decisions you and any previous landowners have made about its management. Depending on what has happened in the past, these factors can result in woods with poor-quality trees and/or low-economic-value species (e.g., red maple, beech, hemlock). Removing these trees through an improvement harvest allows better-quality trees of more valuable species to grow faster, which increases financial return. Finding ways to remove these poor-quality trees and/or low-economic-value species can be challenging since they are worth little and cost money to cut down and transport to a mill.

Because the wood for biomass is chipped, the quality, straightness, and size of the trees don’t matter. This provides a significant opportunity for improvement harvesting by making otherwise poor-quality/low-economic-value trees marketable and, therefore, cost-effective to remove. However, because of the current price of biomass (see “Prices” below), removing low-economic-value trees as biomass will usually need to be a part of a harvest that also removes other forest products of greater value to justify the operation or make it economically feasible. The value of biomass alone is so low that a harvest of only this material would rarely be economically viable.



The harvest shown above removed low-quality trees, allowing more valuable trees to grow faster.

John Clarke



## PRICES

Biomass is sold by the ton. The current price of biomass may offer some financial gain; however, it is often very modest, if there is a gain at all. The amount of tons of biomass removed from your woods depends on the quality of your soil, the type of trees you have, the quality of the trees, the current market conditions for biomass and other poor-quality wood products (e.g., firewood, pulp), and the type of harvest you choose. To find out the latest prices for biomass, visit the “Stumpage Report” page on [www.masswoods.net](http://www.masswoods.net).

The larger financial opportunity provided by harvesting biomass is through an improvement harvest (see “Timber Management” above). Historically, people actually felled or girdled low-economic-value trees and left them in place to improve the growing conditions for trees of greater value. With a market for biomass, the removal of these low-economic-value trees can now be at least a break-even proposition. Therefore, given the current price of biomass, the economic payoff of removing it is not in its sale, but is realized years later after the better-quality trees have grown larger, faster because they have been given more room.

## Destinations for Biomass

Though the future of biomass in Massachusetts remains an open question, there are current examples of biomass facilities in the state—including a hospital, a college, a high school, a state administration building, and a commercial greenhouse—that use wood chips from timber harvests to meet some or all of their heat and energy needs. In addition to the current and potential future destinations of biomass in Massachusetts,



A trailer of biomass being unloaded at a power plant

there are facilities in other states—including a number of schools in Vermont and power plants in New Hampshire and Vermont—that have been using biomass to generate heat and electricity for many years. Each of these is a possible destination for biomass from your land. Like all forest products harvested from your land, the final destination will be the decision of the person who buys your trees.



A biomass boiler used to heat a state administration building



## SUMMARY

The emerging biomass market creates new places for traditionally unmarketable wood to be sold. Since biomass is a wood product that is a part of typical timber harvests, the standard advice for having a successful timber harvest on your land, such as working with a licensed forester and developing a strong timber sale contract that represents your interests, goes very far in ensuring you have a successful harvest.

There are, however, special considerations, including the aesthetics of the job, wildlife impacts, maintenance of soil health, timber management opportunities, and financial impacts that you should consider and understand before moving forward with a harvest that includes biomass.

As the landowner, you are the one who must feel comfortable with the harvest. This is your land. Be sure that you are making an informed decision about your harvest. If you are uncomfortable, there is nothing wrong with holding off on the harvest until you feel comfortable that you have the information necessary to make a decision that will be sure to meet your needs.

## ADDITIONAL RESOURCES

For information on timber harvesting, to find a forester working in your town, to see the common elements of an effective timber sale contract, or to check the latest prices for timber and biomass, visit [www.masswoods.net](http://www.masswoods.net).

For Forest Biomass Retention and Harvesting Guidelines for the Northeast by the Forest Guild, visit [www.forestguild.org](http://www.forestguild.org).

For Biomass Harvesting Guidelines for Forestlands, Brushlands and Open Lands—Minnesota Forest Resources Council, visit [www.frc.state.mn.us/index.html](http://www.frc.state.mn.us/index.html).

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