Five Year Vegetation Management Plan

2024-2028

Unitil Service Corporation
Fitchburg Gas and Electric Light Company
357 Electric Ave
Lunenburg, MA 01462-2246

Submitted: September 5, 2023

Table of Contents:

1: Introduction

The purpose of this Vegetation Management Plan (VMP) is to outline the Fitchburg Gas and Electric Light Company[1] (hereafter referred to as FG&E or the Company) five year plan for managing vegetation in compliance with 333 CMR 11.00 (Appendix 3). The Company's VMP and practices take into consideration not only 333 CMR 11.00 and M.G.L. Chapter 132B, but all applicable state and federal regulations pertinent to the management of utility rights-of-way including but not limited to: all pertinent clauses in Chapter 85 of the Acts of 2000; the Massachusetts Endangered Species Act (MESA; M.G.L. chapter 131A) and its regulations, 321 CMR 10.00; and the Massachusetts Wetland Protection Act (M.G.L. chapter 132A) and its regulations, 310 CMR 10.00 of the Massachusetts Department of Environmental Protection.

The Company manages approximately 350 acres (30 miles) of cross-country transmission rights-of-way and 415 miles of distribution lines through the municipalities of Ashby, Fitchburg, Lunenburg, Townsend, Leominster, Shirley, and Ashburnham. The cross-country transmission rights-of-way traverse uplands and lowlands typical of central Massachusetts. They traverse wetlands and uplands in three municipalities: Fitchburg, Lunenburg and Townsend. These municipalities are primarily rural and suburban, though portions of Fitchburg are urban.

Vegetation management is necessary to ensure safe, reliable delivery of electric service through the transmission and distribution lines located on our rights-of-way. Tall growing tree species must be prevented from growing into or falling on to the lines. Dense woody vegetation, vines, noxious vegetation and all vegetation that interferes with access must be removed from around structures, access roads, and anywhere they prevent access to the right-of-way for inspections, maintenance, repairs, and emergencies.

Considering the variety of landscape conditions, the Company applies an Integrated Vegetation Management (IVM) approach to controlling vegetation on its rights-of-way. Integrated Vegetation Management is defined as a system and framework for managing plant communities by which vegetation managers identify compatible and incompatible vegetation, consider action thresholds, evaluate control methods, select and implement controls to achieve specific objectives, and monitor results to provide continuous improvement. The system requires knowledge of the ecosystem being managed and consideration of natural and cultural resources and input from stakeholders. The choice of control methods is based on the anticipated effectiveness, environmental impact, site characteristics, safety, security, economics and other factors (see A.N.S.I. A300, (Part 7) and Miller, 2021). In electric utility vegetation management, the plants to be controlled are primarily tall growing trees that can grow in to or fall on to electric lines.

IVM was implemented by the Company in 2016 and has been continuously practiced since.

[1] Fitchburg Gas and Electric Light Company is a subsidiary of Unitil Corporation.

2: The Primary Goals and Objectives of the VMP

The primary goal of this VMP is to outline the standard operating procedures for all vegetation management operations on the Company's transmission and distribution rights-of-way. Its purpose is to document the Company's IVM program standards, practices and procedures, which are designed to manage undesirable vegetation on rights-of-way while minimizing the risk of unreasonable adverse effects on human health and the environment.

The VMP is intended to provide a source of information for state and municipal officials and any interested parties regarding the Company's vegetation management program. It also provides guidance for vegetation management workers contracted by the Company to carry-out the vegetation management program.

The following objectives are the primary goals of the Company's vegetation management program:

- To ensure the reliable delivery of electric service to our customers;
- To utilize an IVM program as the preferred method of vegetation management on the Company's transmission rights-of-way;
- To utilize an approach primary consisting of pruning and removal of trees along distribution rights-of-way;
- To ensure that all vegetation management operations are conducted in a safe and effective manner, in conformity with federal and state laws and A.N.S.I. Z133;
- To treat all Sensitive Areas listed in 333 CMR 11.04 according to regulatory and Company policy;
- To follow the procedures in 333 CMR 11.05(4)(d);
- To continually adapt and improve techniques as they arise in accordance with new regulations, scientific advance, operational experience, and/or comments from municipalities, state agencies, the general public, and contractors;

3: Identification of Target Vegetation

Target vegetation refers to vegetation that is incompatible with intended use of the electric utility facility. The primary target plant species are trees, generally defined as woody plants that mature at heights exceeding 12 feet. Trees must be removed or controlled within the cleared rights-of-way. Trees along the edge of rights-of-way shall be pruned or removed to prevent interference with the electric facility. Targeted tree species include but are not limited to: maples, oaks, ash, cherries, birches, beech, pines, hemlock, and spruces. Certain other plants are also targets; some due to their location and others because of their nature. All woody vegetation (trees, shrubs, and vines) on or encroaching upon roads or pathways or immediately adjacent to line structures or equipment will be controlled to provide adequate access to structures along the right-of-way.

Vegetation that impedes access to the right-of-way and/or grows tall enough to interfere with the electric lines must be removed. Target vegetation, therefore, include trees and limbs, tall growing shrubs, vegetation growing around substations, structures, access roads, gates, and anywhere vegetation impedes access to the right-of-way and equipment. If no permanent access route exists along a right-of-way, a pathway may be created and maintained in a suitable location by controlling all woody vegetation within the selected route. Woody vegetation must be removed in these areas to ensure access to and along the right-of-way and line structures for safe efficient inspection, maintenance and repair operations.

Plant species that present a safety problem will be controlled whenever practicable. Noxious and nuisance vegetation present a risk to the safety and health of Company personnel, contractors, and the general public working on or traversing rights-of-way and can impede emergency response. These plants have heavy thorns, dense foliage and/or impenetrable stems. Mechanical control methods do not reduce the presence of these plant populations, therefore the Company uses herbicides to spot treat poisonous plants at sites within its rights-of-way.

Invasive plant species create hazards for the environment. Invasive plants have become an increasing concern in Massachusetts in areas that include right-of-way corridors where they can spread rapidly and then move on to the adjacent landscape. The Massachusetts Invasive Plant Advisory Group defines invasive species as: "non-native species that have spread into native or minimally managed plant systems in Massachusetts, causing economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems". Some examples commonly found on rights-of-way include, but are not limited to: Japanese knotweed, oriental bittersweet, Japanese barberry, and glossy buckthorn. The company strives to be good stewards of the land by controlling the spread of invasive species.

To ensure accurate identification of target and non-target vegetation, all vegetation management personnel are required to be familiar with the vegetative species typically present on Company rights-

of-way. An excellent reference for plant species is the Northeast Shrub and Short Tree Identification book (see Ballard et. al. 2004).

A successful IVM approach to vegetation management leads to establishment of vegetative communities that are compatible with the electric facility. Plant species that are generally encouraged on the right-of-way include herbaceous plants and shrubs that mature less than 12 feet in height. By removing/controlling incompatible plant species, low-growing vegetation are given the opportunity to flourish in the plant community and exert a biological control over future growth of incompatible species. This can create a sustainable right-of-way environment that benefits both the Company and the forest ecology.

4: Integrated Vegetation Management Methods

The Company will use all appropriate methods available including: mechanical, chemical, and biological control methods to maintain its Integrated Vegetation Management plan. Mechanical and chemical control methods facilitate development of a low-growing plant community that in time will become the biological control over the plant community. For more information on biological control, see Section 5, page 11.

The primary mechanical methods will be hand cutting with chainsaws, pruning, and mowing. Chemical methods involve the use of herbicides applied in several ways including: cut-stump treatment, basal treatment and low-volume foliar treatment. All methods except mowing are applied selectively.

The Company will employ concurrent five-year maintenance cycles for both mechanical and chemical vegetation management techniques. Year 1 will include floor and sideline clearing using the appropriate mechanical methods for the site. The following year, the same lines will be treated with chemicals controls to manage the regrowth and allow biological controls to become established. This system of concurrent cycles gives the Company the option of using less aggressive methods of chemical control, such as low-volume foliar, due to the small size of incompatible trees and plants following mechanical control the year before. As cycles progress, the expectation is that mechanical methods used on the right-of-way floor will decrease over time and will begin to transition from mowing to limited hand cutting. Mowing will not be completely eliminated however, due to restricted spray areas.

As the sole means to control vegetation, mechanical controls are a short-term solution. With the exception of most conifer species, cut vegetation re-sprouts, resulting in high density incompatible vegetation. Using herbicides, which kill the root systems, in conjunction with mechanical methods allows for the most effective system of management.

Mechanical methods are the preferred method for non-sprouting conifer species as well as in areas where herbicides are precluded, such as the no-spray areas associated with Sensitive Areas, in visual screens, and where large areas of high-density incompatible species exceed maximum herbicide treatment heights (12 feet). Mechanical methods are applied in combination with chemical methods for hardwoods over 12 feet tall, they are hand cut and stumps treated with herbicide.

Mechanical Methods

<u>Hand Cutting</u>

Hand cutting is the mechanical cutting of vegetation using chainsaws, brush saws, loppers or hand pruners. Hand cutting may be conducted at any time of the year. Target species are cut as close to the ground as practical.

Hand cutting is used to: protect environmental Sensitive Areas; around structures; gates and access roads; to control vegetation greater than 12 feet in height; where herbicide use is prohibited by regulation or easement restriction; on non-sprouting conifer species; and on sites where terrain, site sensitivity or site size makes mowing impractical.

Mowing

Mowing is the mechanical cutting of vegetation using large tree/brush mowers mounted in rubber tired tractors or tracked vehicles.

Mowing may be used at any time of the year except when deep snow prevents safe operation. Selection of specific equipment is based on terrain, vegetation size and equipment availability. Mowing is restricted by steep slopes, rocky terrain, obstructions, wet sites with deep soft soils and debris on the right-of-way.

Mowing is used on sites where herbicide use is prohibited by regulatory or easement restriction, where vegetation is tall and high density, and where terrain, site size and sensitivity permit the efficient use of the equipment.

Selective Pruning

Selective pruning is the mechanical removal of the tops or limbs of trees to prevent them from growing in to or falling on to the lines. Selective pruning may be done at any time of the year. Pruning will be accomplished from the ground, using aerial lifts or by tree climbing crews. This method is used in maintaining trees in visual screens adjacent to yards or roads and along the edges of the rights-of-way to prune off-right-of-way trees.

Slash is the woody debris generated from pruning and cutting operations. Slash will be disposed of by dicing and cutting low to the ground, chipping, piling or removing from the site at the discretion of the Company. The preferred method of disposal is to dice and cut low to the ground and leave to on the right-of-way to decay naturally.

Slash will not be left in waterways, trails or roads, or in such a manner that would permit it to wash into these areas. The placement of slash must comply with applicable State Fire Marshall regulations. Slash from yards or recreational sites will be chipped or removed to an adjacent area or removed. Chipping is used when dicing and cutting low to the ground are prohibited or impractical. Chips will be removed in highly sensitive sites. When left on site, wood chips will be scattered uniformly over the site at depths not exceeding four inches or piled on isolated areas. No chips will be left in wetlands.

Chemical Methods

Herbicide applications include cut stump, basal and low-volume foliar. Herbicides are applied as mixtures consisting of the herbicide formulation(s), adjuvants, carriers and additives. The timing of herbicide applications, materials and mix rates will be detailed in the Company's Yearly Operational

Plan (YOP) and associated notices to municipal officials and newspaper notices. The Company will only use herbicides and mixes consistent with the *Sensitive Area Materials List* published by the Massachusetts Department of Agricultural Resources (DAR). The Company's Forestry Operations Manager will further specify to the contractor the particular materials and mixture rates for individual rights-of-way according to conditions and timing of the treatments. Treatment crews will not deviate from the Company's specification without the approval of the Forestry Operations Manager.

Each herbicide has varying degrees of efficacy on vegetation. Seasonal variations in rainfall and date of application also effect efficacy. No herbicide is equally effective on all species and certain herbicides are more effective on some species than others. The Company selects the herbicide or combination of herbicides in conjunction with the appropriate treatment method to obtain the most effective control of the incompatible vegetation and density on each right-of-way.

Each herbicide and method of application has distinctive results with respect to timing of plant necrosis (browning of areas on a plant indicative of the death of plant cells, also called "brownout") and environmental characteristics. Environmental characteristics such as rate of biodegradation and mobility in the soil are important to consider when prescribing their use. Some herbicide formulations are labeled for use in wetlands, others are not. The selection of herbicide or herbicide mixtures and the appropriate application method is made with equal consideration given to the visual and environmental sensitivity of a right-of-way or site within a right-of-way.

The environmental characteristics, rates of application and selectivity of the application method are critical parameters for consideration by the DAR in development of the *Sensitive Area Materials List*.

Methods of Application:

<u>Selective Low-Volume Foliar Application</u>

Selective low-volume foliar applications are made to fully developed leaves and stems of the incompatible vegetation. Selective low volume foliar applications are limited to the season when leaves are fully developed, typically from June through early October.

The equipment for selective low-volume foliar applications includes hand-pump backpack sprayers and motorized backpack sprayers.

Applications are made as a uniform spray over the plant's entire foliage to dampen or lightly wet the vegetation. This application method minimizes the amount of herbicide applied and reduces impacts to desirable vegetation under and around the incompatible vegetation and deposition to the soil.

Targeted low-volume foliar applications were shown to result in the least deposition of herbicide to the soil. See Nickerson et. al., 1993. Targeted low-volume foliar applications are used on hardwood trees and incompatible shrub species below 12 feet in height. Foliar applications are not used where landowner agreements preclude their use, within visual screens on incompatible species greater than 6

feet in height, or within mechanical only sensitive areas per 333 CMR 11.04. Sprayer pressure is not to exceed 60psi.

Foliar applications are allowed in wetland areas where no standing water is present, per the Department of Food and Agriculture Decision, dated October, 1995, concerning the wetland impact study conducted pursuant to 333 CMR 11.04(4)(c)(2), see Appendix 4.

Basal Application

Basal treatments are the targeted application of an herbicide, diluted in specially formulated oil, to wet the lower 12 to 18 inches of the stem of incompatible trees and shrubs. Application is made using a hand-pump backpack sprayer. The oil carrier enables the herbicide solution to penetrate the bark tissue and translocate within the plant.

When basal applications are used optimally, they are applied at low rates of herbicide per acre. Optimum use is in areas of low stem density with average heights greater than 4 feet, within visual screens, or in areas where a high degree of selectivity is necessary. The application method can be used any time of the year except in conditions that prevent access to the target stems such as seasonal standing water or deep snow. The optimum treatment time frame is in the dormant season when applications are easier due to the lack of foliage and the obstruction caused by grasses and herbaceous growth. Basal applications are not ideal in areas of high stem densities due to the time and cost to apply, the likelihood of missing target plants, and the resulting high level of application of herbicide per acre.

Basal applications are used on the same species and vegetation heights cited above for foliar applications. Basal applications have the advantage of extending the application timing into the dormant season. They also have the advantage of not creating “brownout” of vegetation when used in the dormant season.

Cut Stump Applications

Cut stump applications are the mechanical cutting of incompatible vegetation followed by herbicide application to the phloem and cambium tissue of the stump. The cut stump mixture is diluted with water or a non-freezing liquid carrier and is ideally applied to freshly cut stumps. Application equipment includes low-volume backpack sprayer, hand-pump sprayer, hand held squirt bottles, paintbrushes and sponge applicators.

This application method is used where maximum selectivity is desirable and/or to reduce the visual impact of vegetation management work. It is commonly used to prevent re-sprouts following hand cutting, in sensitive sites where other methods are not possible, and within visual screens.

Like basal applications, cut stump applications may be used at any time of the year provided snow depth does not prevent cutting low to the ground. It is best to avoid application during the season of

high sap flow, and/or moderate to heavy rain; it is not practical in moderate to heavy vegetation densities.

Tree Growth Regulators

Tree growth regulators are plant growth regulator chemicals that manage or reduce the potential growth rates of trees. This application is useful where restricted clearance to electric lines requires repetitive pruning, in high priority areas of electric lines, in difficult to access areas, or where safety is a concern, such as along railroad tracks.

Tree growth regulators can lengthen the time between pruning cycles and improve the aesthetics of street trees requiring severe pruning.

Tree growth regulators can be applied by either basal drench around the base of the tree, or a soil injection next to the buttress root zone.

5: Justification for Herbicide Use

The primary purpose of electric utility rights-of-way is the safe and reliable delivery of electricity to the Company's customers through our transmission and distribution lines. The Company's rights-of-way traverse the heavily forested landscape of central Massachusetts. Reliable delivery requires the Company to maintain vegetation on both cross-country and roadside rights-of-way. This vegetation maintenance must be conducted in compliance with environmental laws and regulations. The goal of these laws and regulations is to protect public shade trees along roads, wetlands, water supplies, and endangered species. Effects on human health, both the public and utility workers, are also a goal of federal, state and local laws. The use of herbicides requires compliance with pesticide regulations as well.

Integrated Vegetation Management provides a framework for both compliance with federal and state environmental laws seeking to maximize effectiveness, while ensuring that the impacts on natural resources are minimized.

MDAR's process for evaluation and development of the *Sensitive Area Materials List* provides a valuable resource of information to the Company. Limiting our application to this list of herbicides helps the Company further reduce the potential of any negative impact by limiting the herbicide formulations used in the limited spray sensitive area areas as defined by 333 CMR 11.04. The MDAR process for developing this list includes review by the Department of Environmental Protection.

333 CMR 11.04(4) also limits the use of herbicides around various surface waters – lakes, ponds, streams and any standing water. However, it makes an exception to the general rule for public utilities by allowing herbicide treatments within wetlands as long as sensitive area approved herbicides are not applied within 10 feet of standing or flowing water. This exception is based on successful completion of a study cited in the DFA Decision Concerning the Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2). This research study showed that selective herbicide applications do not adversely affect wetland plant composition of function (see Appendix 4). In fact, mechanical vegetation management methods can result in a significantly greater negative impact on wetland composition and function. See Nickerson, 1989. Other references showing protection of wetlands, ground water and surface water body buffers include: Environmental Consultants, Inc. 1991; Nickerson et. al. 1994; and Norris 1999.

A potential route for public exposure to herbicides is through drift during foliar applications. The Company's vegetation management program eliminates significant drift from foliar applications by requiring the use of low drift agents, prohibiting treatments in high winds, and setting maximum vegetation heights for foliar application. The quick drying nature of most herbicides and their use on targeted plants at low volumes also significantly reduces the potential for dermal exposure. Further, targeted herbicide applications may reduce the visual impact on the landscape by eliminating the problem of extensive foliar brownout are caused by non-selective herbicide treatment or mechanical methods.

Herbicides eliminate root systems of plant species that would survive and dominate the right-of-way environment if the root systems were not controlled. Mechanical methods alone will not eliminate root systems.

Targeted, low-volume herbicide applications minimize the amount of manpower, equipment and the impact of both on the environment compared to non-selective mowing or hand cutting operations. For example, when used judiciously, they can be much less destructive than mowing to nesting sites and vegetation necessary for food and cover for birds and other wildlife.

An IVM program using herbicides is more cost effective than a purely mechanical program. Mechanical methods alone are a non-selective solution that do not target the root system of plants, which causes many incompatible plant species to proliferate. Following up mechanical work with herbicide use controls the re-sprouting of incompatible species. Over time, this combination of methods can lead to a conversion to a stable, low-growing plant community that requires far less mechanical control, lowering overall program costs.

Mechanical methods can be relatively hazardous to workers, the public, and the environment. Mowers present the risk of flinging wood debris, rocks, or other objects. Chainsaw can cause injuries from kick-backs despite safety features on the saws and protective leg guards. Small diameter cut stumps left by cutting operations may cause trips and falls and damage vehicles on the right-of-way. Mechanical only programs can also spread thorny or poisonous plants which results in unsafe conditions for the public, vegetation management crews, and electric line crews. Again, due to their re-growth habits, rapid re-sprouting of trees leads to impenetrable growth on the rights-of-way.

The net environmental benefits of an IVM based approach to vegetation management are linked to establishing native, low growing vegetation that can exert biological control over re-growth of incompatible species. Promoting desirable, native plant species helps to impede the growth of undesirable plants and reduces the amount of herbicide needed for control. Herbicide use has the long-term effect of reducing mechanical impact on the rights-of-way, which can help prevent soil exposure and erosion that can result from heavy equipment. Herbicide use on invasive species improves native biodiversity, which can have positive impacts on insects and wildlife that prefer forest edge habitat.

In summary: An integrated approach to vegetation management that includes the use of herbicides (used according to the label) is an effective way to control incompatible plant species, has environmental benefits, can be safer to workers and the public, and is more cost-effective than mechanical methods alone.

6: Identification and Vegetation Management Methods in Sensitive Areas

For the purposes of this VMP Sensitive Areas regulated by 333 CMR 11.04 are as follows:

Any areas within rights-of-way, including No-Spray and Limited Spray Areas, in which public health, environmental or agricultural concerns warrant special protection to further minimize the risks of unreasonable adverse effects.

Sensitive Areas include the following:

Water Supplies

- Zone I
- Zone II
- IWPA (Interim Wellhead Protection Area
- Class A Surface Water Sources
- Tributaries to a Class A Surface Water Source
- Class B Drinking Water Intakes
- Private Wells

Surface Waters

- Wetlands
- Open Water Bodies
- Rivers
- The Mean Annual High Water Line of a River
- The Outer Boundary of a Riverfront Area
- Certified Vernal Pools

Cultural Sites

- Agricultural Areas
- Inhabited Areas

Wildlife Areas:

- Certified Vernal Pool Habitat
- Priority Habitat

Protecting these environmentally sensitive sites is accomplished by defining specific sensitive areas and establishing limited spray and no spray areas and treatment restrictions within these

areas based on the sensitivity of each site and the requirement to minimize any unreasonable adverse impacts within that area.

These sensitive areas consist of no-spray areas in which herbicide use is prohibited, limited spray areas, and areas that require special treatment recommendations. A table of the no-spray and limited spray areas is presented below.

Sensitive Area Restriction Guide (333 CMR 11.04)

Sensitive Area	No-Spray or Limited Spray Areas (feet)	Control Method	Restrictions (minimum time between applications)
Public Ground Water Supplies	400'	Mechanical Only	None
Primary Recharge Area	Designated buffer area or 1/2 mile radius	Mechanical, Approved Herbicides*	24 months
Public Surface Water Supplies (Class A & Class B)	100'	Mechanical Only	None
	100'-400'	Approved Herbicides	24 months
Tributary to Class A Water Source, within 400' upstream of water source	100'	Mechanical Only	None
	100'-400'	Approved Herbicides	24 months
Tributary to Class A Water Source, greater than 400' upstream of water source	10'	Mechanical Only	None
	10'-200'	Approved Herbicides	24 months
Class B Drinking Water Intake, within 400' upstream of intake	100'	Mechanical Only	None
	100'-200'	Approved Herbicides	24 months
Private Drinking Water Supplies	50'	Mechanical Only	None
	50'-100'	Approved Herbicides	24 months
Surface Waters	10'	Mechanical Only	None
	10'-100'	Approved Herbicides	12 months
Rivers	10' from mean annual high water line	Mechanical Only	None
	10'-200'	Approved Herbicides	12 months
Wetlands	100’ (treatment in wetlands permitted up to 10’ of standing water)*+	Low-pressure Foliar, CST, Basal, Approved Herbicides	12 months
Inhabited Areas	100'	Approved Herbicides	12 months
Active Agricultural Area (Crops, Fruits, Pastures)	100'	Approved Herbicides	12 months
Certified Vernal Pools	10'	Mechanical Only when water is present	None
Certified Vernal Pool Habitat	10'-outer boundary of habitat	No treatment without approval	
Priority Habitat	No treatment without written approval per 321 CMR 10.14(12)		

*Massachusetts Approved herbicides for sensitive sites

[+]Per the *DFA Decision Concerning the Wetlands Impact Study* for utilities per 333 CMR 11.04(4)(c)(2).

The Company follows all Sensitive Area Restrictions. Herbicide mixes, limits, and frequency of application meet all requirements on the full length and width of all rights-of-way.

7: Operational Guidelines for Applicators of Herbicides

The Company retains independent contractors for all vegetation management work and requires these contractors to comply with all applicable federal and state laws and regulations and the Company vegetation management specifications. Contractor performance with this VMP and appropriate YOP's will be evaluated and enforced by the Company.

Vegetation Management Guidelines

The Company's IVM program will be applied to remove or control all incompatible vegetation within the full width and length of the rights-of-way. The IVM program must result in control or removal of 100% of the incompatible vegetation greater than six feet in height and a minimum of 90% control or removal of all incompatible vegetation less than six feet in height at the time of work.

With few exceptions, all incompatible vegetation will be controlled or removed. This includes all woody vegetation and vines growing on or encroaching upon roadways, trails, or on or within ten feet of structures within the cleared width of the right-of- way. Treatments will also extend around the perimeter of substation following all sensitive area restrictions.

The only exceptions are trees in yards and other landscaped areas and trees or shrub species specified by NHESP in the Priority Habitat of state-listed species. All exceptions, however, must be pruned to maintained appropriate clearance between the vegetation and conductors as specified by the Company.

Environmentally sensitive areas will be treated per 333 CMR 11.04 requirements. Vegetation management operations on these sites are designed to prevent any unreasonable adverse environmental effects. These no-spray and limited spray areas will be maintained using the appropriate control methods.

Conifer species are generally not treated with herbicides since most do not re-sprout after hand cutting. One exception to this general guideline is Pitch Pine, which may be treated with herbicides. This species is rare on the Company rights-of-way.

Right-of-way access will be on established roadways within the rights-of-way and from off-right-of-way locations. The contractor will obtain permission to enter rights-of-way by any other means in advance of the work.

Unreasonable site damage or destruction during any phase of the vegetation management work by the contractor, his agents, or employees, must be repaired or mitigated to the satisfaction of the Company; the Company will determine what constitutes unreasonable damage.

General Operational Guidelines

The Company Forestry Operations Manager will inform the contractor which rights-of-way will be treated, the range of treatment dates and the methods, materials and mixing rates. The Company will supply maps and written instructions outlining any special restriction for each right-of-way. The contractor and the Forestry Operations Manager will work to identify and mark all sensitive areas as appropriate. No work will be carried out until the contractor has the appropriate data, permits, maps, herbicide mix information, special instructions and sensitive area information unless authorized by the Company.

The Company will carry-out and document all correspondence, meetings and input from municipalities within the forty-five day YOP and twenty-one day municipal rights-of-way notification letter review and comment periods and the 48 hour newspaper notification (under 333 CMR 11.06 & 11.07 and Chapter 85 of the Acts of 2000).

The Company will maintain records of treatment methods, rates of herbicide application and treatment results.

The contractor is responsible for providing or adhering to the following:

- Contractor will hold a MA commercial category 40 (ROW) license and will be on site at time of herbicide application
- Supervisors who understand all aspects of the contracted treatment and who are responsive to the guidance of the Company;
- Work carried out in compliance with the A.N.S.I. Z133 Safety Standard;
- Supervisors who effectively manage treatment crews to ensure the satisfactory completion of the work;
- Supervisors who effectively communicate with the public;
- Experienced and/or trained workers, who are appropriately licensed or certified;
- Workers who conduct themselves professionally at all times;
- Supervisors and workers who understand the federal and state legal framework applicable to the work;
- All contractors must have a copy of this VMP;
- All treatment crews must have copies of the YOP and municipal notification letters on- site at all times;
- All treatment crews must carry Company right-of-way maps;
- Comply with all applicable federal and state laws and regulations;
- Utilize appropriate equipment to maintain the highest practical efficiency and effectiveness;
- Calibrate herbicide application equipment will be appropriately;
- Maintain equipment in good visual and working condition.

Vegetation management operations must be conducted according to the VMP, appropriate YOP, contractual terms and conditions and the written instruction of the Company. Failure to do so is grounds for removal of the treatment crew from the property and termination of the vegetation management contract.

Herbicide Application Restrictions and Guidelines

Herbicide application will be restricted during certain adverse weather conditions, such as rain, wind or deep snow.

Rain

Herbicide applications will not be made during periods of moderate or heavy rain fall:

- Foliar applications will cease during measurable rainfall that creates leaf runoff and will wash the herbicide off the target
- Foliar applications interrupted by unexpected rainfall, will not resume until the rain ends and active leaf runoff has ceased
- Basal and cut stump treatment applications are ineffective so will not be made during measurable rainfall
- Basal applications that are interrupted by rainfall will not be resumed until at least fifty percent of the application zone of the target species is dry

Foliar applications are effective and can be used in light mist conditions.

Wind

Wind affects the individual herbicide treatment methods on different levels:

- Basal or cut stump treatments are not affected by all but the most extreme wind conditions because they are applied in such close proximity to the ground, so may be used under most wind conditions
- During foliar applications, excessive winds can cause damage to desirable vegetation on or off the rights-of-way, therefore, to prevent any significant off target drift of herbicides, treatment crews will comply with the following restrictions:

  - During periods of winds strong enough to bend the tops of the main stems of trees on the right-of-way, the treatment crew supervisor will periodically observe the foliar application to ensure that there is no significant movement of the herbicide mixture. If the supervisor can see the mixture moving off the targets, applications will immediately stop until the wind has subsided enough to permit further applications
  - All foliar application mixtures will contain anti-drift agents to reduce the potential of herbicide drift beyond target vegetation. In moderate wind conditions, as per label recommendations,

more anti-drift agents may be added to control significant drift, at the discretion of the contractor supervisor.

Deep Snow

Herbicides will not be applied in deep snow conditions. Deep snow creates logistical impediments for basal and cut stump treatments. Deep snow renders it impractical to basally apply herbicides to the lower six inches of the stem of the targets or to cut target stumps below acceptable maximum height limit.

General Operational Guideline Restrictions

- *Disposal*: The contractor is responsible for the proper disposal of all excess materials and mixtures in accordance with all applicable Federal and State laws, regulations and guidelines.
- *Mixing:* Mixing will take place according to all restrictions in 333 CMR 11.00 and according to the chemical labels.

8: Identification and Qualification of Individuals Preparing and Submitting this VMP and Supervision of the IVM Program

Overall supervision for development and implementation of the VMP will be performed by:

Chris Moultroup
Manager, Forestry Operations
Unitil Service Corp.
1 McGuire St
Concord, NH 03301

The Company Forestry Operations Manager is ultimately responsible for preparation, implementation of and compliance with this VMP and YOP's to be submitted annually. The Forestry Operations Manager's duties include: work scheduling, prescription of herbicides and application methods, procurement of necessary permits, municipal notifications, contractor selection, provision of technical expertise and liaison between Company rights-of-way easement landowners, neighbors, local and state officials and other interested parties and field supervision of vegetation management contractors.

Chris Moultroup has 18 years of experience in electric utility vegetation management, a degree in Forestry from the University of Vermont, and is an International Society of Arboriculture Certified Arborist and Utility Specialist.

This VMP was drafted in consultation with Sara Sankowich, Unitil's Director, Sustainability and Shared Services. It is an update from previous iterations that were submitted in 2014 and 2019.

9: Description of Alternative Land Uses of Rights-of-Way

Alternate land uses of the rights-of-way constitute a cultural control method in the context of an IVM program. Alternate uses include but are not limited to: agricultural use such as crops, pasture, orchards, nurseries and tree farms; maintained landscaped areas such as yards, lawns, parks, golf courses and other recreation areas; and paved areas such as roads and parking lots.

The Company rights-of-way are primarily located on easements. The underlying private or public owner retains the right to use the land for other purposes. The easement specifies use of the right-of-way for construction and maintenance of electric facilities, access to the facilities and vegetation maintenance. Alternative uses of the land must conform to the terms of the easement.

The Company rights-of-way are primarily surrounded by forested lands. There are areas with agricultural uses, landscaped areas and paved areas. Compatible alternate uses are encouraged by the Company. Areas with maintained alternative use do not require maintenance and cost to the Company.

The Company encourages compatible alternative use on the rights-of-way by land owners. An agreement with the Company is required. Interested landowners can apply by sending a request to forestry@unitil.com. Activity cannot include structures and must permit emergency access and maintenance by the Company. All requests are reviewed by the Forestry Operations Manager. Each applicant shall be contacted and an effort made to come to a suitable agreement.

10: Remedial Spill and Emergency Plan

This section is offered as a general procedural guide for responding to chemical spills or related accidents (related accidents include but are not limited to fire, poisoning and vehicle accidents). The Company contracts with independent, professional, certified herbicide applicators that are responsible for the containment, clean up and reporting of chemical spills or accidents. The following is, therefore, only a guide to the information sources that ***shall be*** available to the treatment crew in the event of a chemical spill or emergency situation:

TYPES OF CHEMICAL SPILLS THAT REQUIRE ACTION

Chemicals include, but are not limited to the following:

- Herbicides
- Bar and Chain Oil
- Motor & Hydraulic Oil
- Diesel Fuel
- Gasoline
- Title 3 Hazmat Materials

REQUIRED SPILL RESPONSE EQUIPMENT

As a minimum, the ROW crew shall have available on the job site:

- VMP and YOP with emergency contact lists
- SDS and product labels
- Product Fact Sheets
- Appropriate absorbent material such as “speedi dri” or “soak up”
- Shovel
- Broom
- Flagging
- Leak proof container
- Heavy-duty plastic bags

PERSONAL CONTACT

In the event of **Personal Contact** with hazardous chemicals:

- Wash affected area with plenty of soap and water
- Change clothing which has absorbed hazardous chemicals
- If necessary, contact a physician
- If necessary, contact the proper emergency services

- If necessary, follow the procedures for Major or Minor Spills as outlined below
- Avoid breathing the fumes of hazardous chemicals

REFERENCE TABLES (INFORMATION SUBJECT TO CHANGE AS NECESSARY)

Table 1: Herbicide Manufacturers

MANUFACTURER	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
BASF Corporation	800-832-4357	Arsenal
E.I. du Pont de Nemours and Company	800-441-3637	Krenite & Escort
Dow Agro Sciences	800-992-5994	Accord & Garlon
Rainbow Treecare Scientific Advancements	800-888-8372	Cambistat
Bayer CropScience	800-331-2867	AquaMaster
Nufarm Americas Inc	800-424-9300	AquaNeat & Polaris
Corteva Agriscience	800-992-5994	Vastlan

Table 2: State Agencies

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts Pesticide Bureau	617-626-1700	A.S.A.P (within 48 hours)
Massachusetts Department of Environmental Protection, Emergency Response Section	Main Office: 888-304-1133 Central Region: 508-792-7650	for emergencies involving reportable quantities of hazardous materials; required info: City/town, Street address, Site name (if applicable), material
Massachusetts Poison Information Centers	800-222-1222	for medical emergencies involving suspected or known pesticide poisoning symptoms
Massachusetts Department of Public Health, Bureau of Environmental Health, Assessment Toxicology Program	617-624-5757	

Table 3: Emergency Services

EMERGENCY SERVICE	TELEPHONE NUMBER
Massachusetts State Police, Central Office	617-566-4500 or 911
ChemTrec	800-424-9300

Table 4: Fitchburg Gas and Electric Contacts

FG&E Contact	TELEPHONE NUMBER
Central Electric Dispatch (CED)	603-294-5102
Chris Moultroup- Manager, Forestry Ops	603-227-4652
David Clapham- Forestry Supervisor, FGE	978-353-3252

Table 5: Local Emergency Numbers
(to be filled out with the appropriate towns and included in the YOPs)

Municipality	Emergency Services	Board of Health	Town Hall
	911		

CLEAN-UP PROCEDURES

Education and attention will constantly be directed at accident and spill prevention; however, the following is a guideline in the even the event of a spill:

REPORTABLE SPILLS (Spills of reportable quantity of material): FOLLOW STEPS 1 – 11

NON-REPORTABLE SPILLS: FOLLOW STEPS 1, 2, 3, 4, 8, 9, 10 & 11 and contact the Company representative.

Table 5: HERBICIDE SPILL CHECK LIST

Order	ACTION		Done (v)
1	Use any and all PPE as directed by product label or SDS.		
2	Cordon-off spill area to unauthorized people and traffic to reduce the spread and exposure of the spill.		
3	Identify source of spill and apply corrective action, if possible stop or limit any additional amounts of spilled product.		
4	Contain spill and confine the spread by damming or diking with soil, clay or other absorbent materials.		
5	Report spills of "reportable quantity" to the Massachusetts DEP and DAR: See 310 CMR 40.00		
	Massachusetts DAR, Pesticide Bureau	617-626-1700	
	Massachusetts Department of Environmental Protection, Emergency Response Section	Main Office: 888-304-1133 Central Region: 508-792-7650	
6	If the spill cannot be contained or cleaned-up properly, or if there is a threat of contamination to any bodies of water, immediately contact any of the following applicable emergency response personnel:		
	local fire, police, rescue	911	
	FG&E: Central Dispatch	603-294-5102	
	FG&E: Environmental Dept: Tom Murphy	603-379-3829	
	FG&E: Forestry: Chris Moultroup	603-227-4652	
	Chemtrec	800-424-9300	
	additional emergency personnel		
	If there is a doubt as to who should be notified, contact State Police, Central Office	617-566-4500 or 911	
7	Remain at the scene to provide information and assistance to responding emergency clean-up crews.		
8	Refer to the various sources of information relative to handling and clean-up of spilled product.		
9	If possible, complete the process of "soaking up" with absorbent materials.		
10	Sweep or shovel contaminated products and soil into leak proof containers for proper disposal at approved location.		
11	Spread activated charcoal over spill area to inactivate any residual herbicide.		

Appendices

Appendix 1:

Description of Right-of-Way Segments

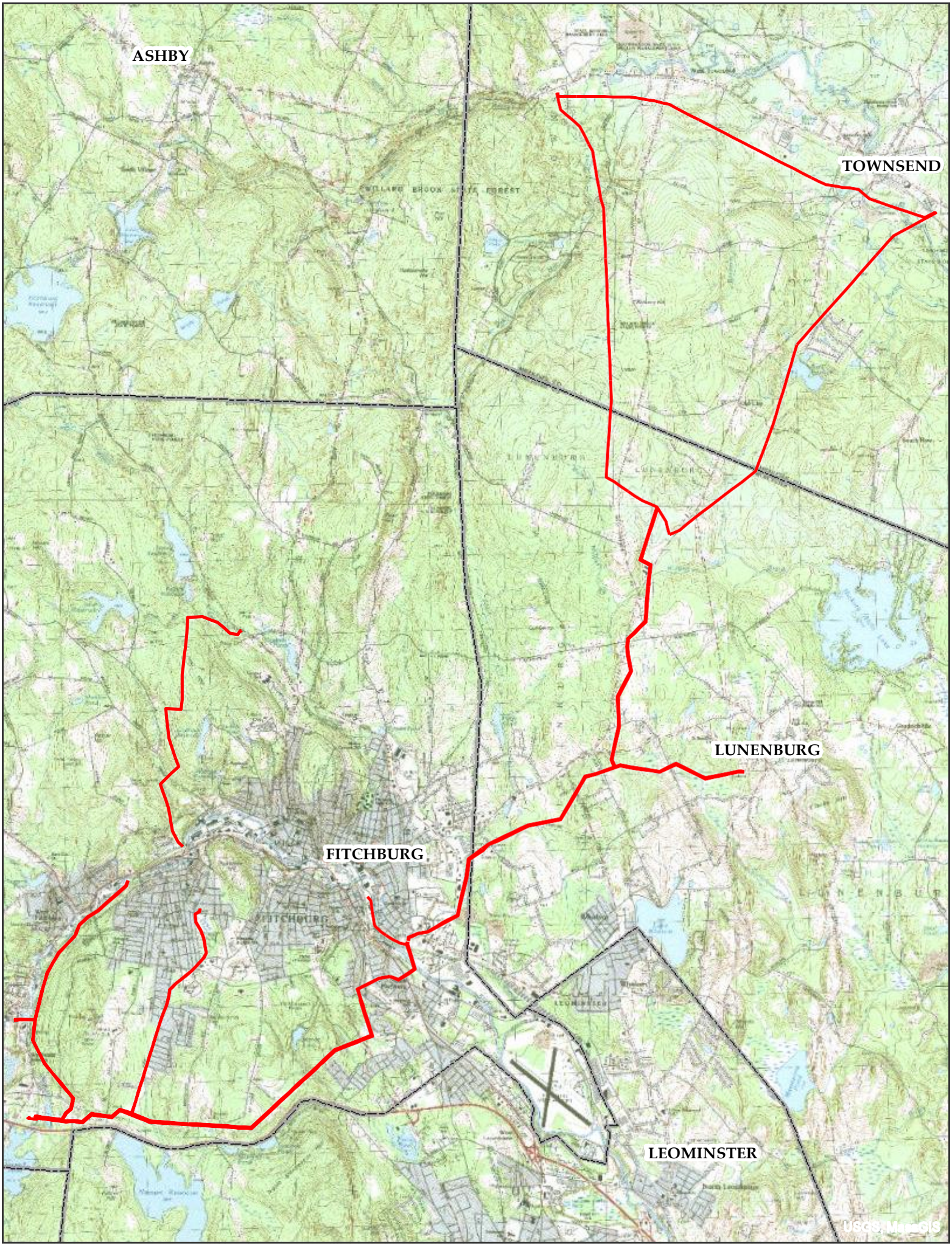
Fitchburg Gas and Electric Light Company

Right-of-Way Segments

Line Number	Voltage	Description	Miles	Acres
1 & 2	69 kV	Flagg Pond Substation #4 to Summer Street Substation #40	4.2	50.7
1 Tap & 3	69 kV	Flagg Pond Substation #4 to River Street Substation #25	2.7	32.5
1& 3 Taps	69 kV	Taps to Princeton Road Substation #50	0.2	2.2
1 & 2 Taps	69 kV	Shea Street Taps to Beech Street Substation #1	2.2	27.0
4	69 kV	Summer Street Substation #40 to Sawyer Passway Sta. #22	0.6	6.8
8 & 9	69 kV	Summer Street Substation #40 to Townsend Junction	5.5	66.3
8	69 kV	Townsend Junction to Townsend Substation #15	3.3	40.1
9	69 kV	Townsend Junction to West Townsend Substation #39	3.2	38.7
10	69 kV	Townsend Substation #15 to West Townsend Substation #39	3.3	40.0
8 & 9 Taps	69 kV	Taps to Lunenburg Substation #30	1.3	15.2
F30W30	13.8 kV	Lunenburg Substation #30 to West Street	0.3	3.0
1341	13.8 kV	Wallace Street Substation #21 to Rindge Road #35	2.5	30.3
		Total:	29.3	352.8

Appendix 2:

Map of Fitchburg Gas and Electric Light Company Rights-of-Way


ASHBY
TOWNSEND
LUNENBURG
FITCHBURG
LEOMINSTER
USGS Mapping

Appendix 3:

333 CMR 11.00 Rights-of-Way Regulations

https://www.mass.gov/files/documents/2018/04/18/333cmr11.pdf

Appendix 4:

Department of Food and Agriculture Wetland Decision

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF FOOD AND AGRICULTURE
100 CAMDRIDGE ST., BOSTON. MA 02202 617-727-3000 FAX 727-7235

WILLIAM F. WELD
Governor

ARGEO PAUL CELLUCCI
LL Governor

TRUDY COXE
Secretary

JONATHAN L. IIEALY
Commissioner

Decision Concerning
The Wetland Impact Study Conducted
Pursuant to 333 CMR 11.04(4)(c)(2)

PUBLIC UTILITY VEGETATION MANAGEMENT PROGRAM FINDING

Background

The Rights of Way Management (ROW) Regulations (333 CMR 11:00) promulgated in 1987 prohibit the use of herbicides to control vegetation along utility right of ways on or within ten (10) feet of a wetland unless the following conditions are met:

1. Submission of a study, the design of which is subject to prior review and approval of the Departments of Food and Agriculture and Environmental Protection, evaluating impacts of proposed vegetation management programs on wetlands; and
2. A finding by the Department, after consultation with the Advisory Committee, that the proposed vegetation management program will result in less impacts to the wetland than mechanical control.
3. Notwithstanding the above, no herbicides shall be applied on or within ten feet of any standing or flowing water in a wetland.

On April 28, .1988, The Departments of Food and Agriculture and Environmental Protection approved the scope of the study. In the fall of 1989, Environmental Consultants, Inc. submitted to the Department of Food and Agriculture the study entitled, "Study of the Impacts of Vegetation Management Techniques on Wetlands for Utility Rights-of Way in the Commonwealth of Massachusetts", dated June 1989. The Department consulted with the Vegetation Management Plan (VMP) Advisory panel at their November 15, 1989, December 7, 1989 and August 1, 1991 meetings.

The study provided some broad information of vegetation control along utility right of ways. The Department based its finding solely upon the narrow scope of whether the "proposed vegetation management program will result in less impacts to the wetland than mechanical control."

The following are the major evaluation points the Department considered in reaching its decision.

What are the Long-term and Short-term Impacts From Herbicide use and Mechanical Control?

Since wetlands are not a static, unchanging resource, there is some difficulty in determining the actual long-term impacts from the various vegetation control practices. The extent of wetland alterations must be the most important factor in determining impacts. With limited or selective removal of unwanted plant species in specific locations, it appears that long-term impacts are negligible. While mowing or foliar application can damage non-target species, neither control practice appears to result in adverse long-term impacts if they are carefully executed. Clear cutting, however, has a greater impact on wetlands since both wanted and nuisance species are removed.

Although there were some reservations about the sites that were chosen to determine the level of chemical residues, the study did show that there was not a buildup of background residues of herbicides applied from previous practices. However, there were some trace amounts of petroleum products - bar oil or hydraulic fluid found. The source of these petroleum products is unclear and may have been the result of public activities not related to vegetation management. Retrospective analyses for herbicide residues in previously treated wetland areas is not generally applicable since the herbicides used today are less persistent than those which were used previously. However, these analyses did indicate that the herbicides used in the past do not persist in the environment.

The study clearly demonstrated that adjacent non-controlled wetland areas did not differ significantly in composition and abundance of plant species from the controlled areas. The control practices did not appear to impact the entire wetland ecosystem, since a long-term comparison of wetland plant species composition between controlled and non-controlled sites did not differ significantly. Therefore, the long-term effects on the entire wetland ecosystem were considered negligible.

The determination of the short-term impacts to the wetland from the control practices was the most noted short-coming of the study. However, this was not part of the original scope. The VMP Advisory Panel felt, and the Department agreed, that a short-term environmental fate study would be needed.

The first study indicated that certain mechanical control practices can impact wetlands and disrupt the ecosystem to a greater extent than the judicious use of herbicides. While cutting may result in re sprouting of some unwanted vegetation in a manner unlikely to be encountered in unaltered wetland areas, unregulated mechanical vegetation control could result in the destruction of other non-target plant species.

What is the Impact to Non-target Wetland Plant Communities?

Basal and cut stump treatment with low mobility, short persistence herbicides that are judiciously applied usually do not impact adjacent plant species. Likewise careful selective mechanical cutting (versus mowing or clear cutting) also usually does not impact non-target wetland plants. The greatest potential risk to non-target wetland plants comes from mowing, clear-cutting, and high volume foliar applications. Low volume foliar applications in wetlands may also cause non-target impacts if application guidelines are not followed (e.g. no applications during high winds, or without using anti-drift agents, etc.).

Is There Enough Information on Which to Base a Finding?

As in most environmental assessments, a complete database is not available to answer all of the questions posed by the Department and the Vegetation Management Advisory Panel. Some of the questions posed were entirely valid, but were beyond the scope of the approved study.

The study did provide some clear evidence that selective mechanical and herbicide use does minimally alter wetlands by removing specific plant species. Mechanical mowing operations, however, can result in far greater short-term and potentially long-term impacts to wetlands since both wanted and un-wanted plant species are indiscriminately removed. Additionally, foliar herbicide applications may cause short-term impacts to non-target species.

The Department did not find any significant difference in wetland impacts between careful mechanical removal (selective hand cutting) of unwanted species

and, cut stump or basal treatment with herbicides.

There is no assurance that prohibiting the use of herbicides in wetlands will result in careful mechanical control. If herbicide use is prohibited in wetland areas, mechanical control in wetlands will be the only practice available to utilities. Financial pressures and other considerations may force Utilities to increase mowing and / or the use of more destructive non-chemical control practices due to a lack of alternative control techniques.

On August 29, 1991, the Department made a finding that the submitted study met the approved scope. However, although the study contained useful information, it was also determined that additional data needed to be gathered and analyzed because the study was inconclusive in a number of instances.

The Department issued a finding that a proposed vegetation program containing the specific elements listed does not pose an unreasonable adverse impact to wetlands. In addition, the Department required a study be conducted to provide important environmental fate data necessary for the long-term implementation of the rights of way program.

AUGUST 1991 FINDING

The Department of Food and Agriculture finds that a proposed vegetation program containing the following elements will not pose an unreasonable adverse impact to wetlands:

1. *The Integrated pest Management (IPM) system, as described in the Vegetation Management Plan and Yearly Operation Plan, is utilized in wetland areas. The IPM system must, at a minimum, place emphasis on encouraging low growth plant species to discourage unwanted vegetation and, minimizing the frequency and amount of herbicide use by only controlling specific non-conifer tree species which will impact transmission line operation and access to the right of way.*

2. *Herbicides may be applied by basal, cut stump or low volume foliar methods. Foliar applications must include the use of drift reduction agents. Foliar applications may only be conducted in situations where basal and cut stump treatments are not appropriate based on the size of the vegetation and potential for off-target drift. Foliar applications must not result*

in the off-target drift to non-target species.

3. *Herbicides are not applied to conifer species (pine, spruce, fir, cedar and hemlock).*

4. *Carriers for herbicides do not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers will be subjected to review by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).*

5. *Herbicides must be recommended by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).*

6. *Herbicides may only be applied by hand operated equipment containing no more than 5 gallons of diluent.*

7. *All other restrictions within sensitive areas remain in effect. In accordance with 333 CMR 11.04(1)(c), no person shall apply herbicides for the purposes of clearing or maintaining a right-of-way in such a manner that results in drift to any areas within 10 feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified under 333 CMR 11.04(2)(c)(3).*

8. *Approved Vegetation Management Plans and Yearly Operation Plans must be amended as needed to reflect the conditions of this FINDING.*

9. *The Department further requires that environmental fate data be provided by the utilities that are applying herbicides to rights-of-way, which characterizes the movement of herbicides applied to wetland areas under these conditions. The Department further requires that all study protocols be reviewed by the Vegetation Advisory Panel and be approved by the Department of Food and Agriculture and the Department of Environmental Protection. Failure to submit the required information by the dates outlined in the schedule below will render this finding void.*

An approvable scope of the study developed and

submitted by January 1, 1992.

Field data submitted to DFA by October 1, 1992. Data must be consistent with the requirements of the approved scope.

Draft study report submitted to DFA by October 1, 1993.

Final Report submitted to DFA by March 1, 1994.

10. *The Department reserves the right to amend or withdraw its FINDING at anytime if it determines that the use of herbicides in wetland areas poses a greater impact than mechanical control or may pose an unreasonable adverse effect to humans or the environment.*

11. *This finding expires December 31, 1994.*

Therefore, herbicide use may be allowed to control certain vegetation along utility right of ways if the proposed vegetation program as described in the approved Vegetation Management Plan and Yearly Operational Plans contains the above elements.

On, April 27, 1992, the Departments of Food and Agriculture and Environmental Protection approved the scope of the *"Study of Fates of Herbicides in Wetlands on Electric Utility Rights of Way in the Massachusetts Over the Short Term"*. The final report was submitted to the Department of Food and Agriculture December 31, 1993. The Department began reviewing the report in consultation with the VMP Advisory panel.

At the end of 1994, the Department had not completed its review. Therefore, on December 22, 1994 the Department extended the current finding for one year (to December 31, 1995) or until such time it is able to make a final determination, whichever occurs first.

Fates of Herbicides Over the Short Term Study

The objective of this study was to determine the short term environmental fate and assess the impacts of selected herbicides applied by four common Right-of-Way management techniques. Additionally, the study evaluated which of the four Right-of-Way management techniques provides the most effective control of target vegetation and which techniques produced the least impact on the non-target plant community, and consequently the least alteration of wooded wetland community.

The study investigated the environmental fate of two herbicides, which are typically used to control vegetation on ROWs, and are included in the list recommended for use in sensitive areas. These herbicides were chosen, among other reasons, for their use patterns, size of area treated, and application rates. Accord, which contains the active ingredient glyphosate, is the primary herbicide used for cut stump treatment and is also used for foliar application. Garlon 4, which contains the active ingredient triclopyr, is the primary herbicide used for basal applications. Collectively these products represent the typical herbicides used to control vegetation on ROWs.

Results

A summary of the most important findings and conclusions of the study include:

* Based upon the samples collected immediately after application, at 1 week, 1 month, 3 months and 1 year:

  - The two herbicides, glyphosate and triclopyr degrade rapidly. Residues reach low quantities quickly, often less than detection limits, within a year.; and
  - There is essentially no movement either laterally or vertically from the treated sites by glyphosate. Triclopyr does not move laterally, but was noted to move vertically in small amounts.

* Drift cards indicate that the herbicides are neither splashed nor carried any distance by the wind. Glyphosate drift is not a significant problem resulting in slight effects on neighboring vegetation and are not detectable in the next year's growth. Sphagnum moss next to trunks treated basally with triclopyr were killed within three months in a 15 cm diameter circle immediately around the target tree, but the dead circle did not continue to enlarge.

* Filter paper recovered immediately after application of herbicide showed that all methods of application deposit herbicide on the ground. Treated bare soil samples showed as consistent a drop in herbicide concentrations and as little vertical movement as did samples beneath target trees.

* The use of the herbicides glyphosate and triclopyr at the strengths and application rates used does not pose a risk of accumulation in organically rich soils.

* Herbicide concentrations in soil continue to decline as time advances.

* Rainfall occurring more than a week after application does not appear to spread the herbicide nor does groundwater carry any substantial fraction of what has been applied to a particular site down into the soil or horizontally.

* Based upon the results of the study, an assessment of the environmental fate, and observations of both treatment effectiveness and non-target impacts, an effective and environmentally sensitive ranking from most effective and posing least potential environmental risks to least effective and posing the most environmental risk is suggested:

1. Most effective control and exclusive effect on target:
   low-volume foliar (with glyphosate).

2. Most consistent control with lethal effects on bordering vegetation:
   high-volume foliar (with glyphosate)

3. Total control with rings of dead vegetation around treated trunks:
   low-volume basal (with triclopyr)

4. Incomplete target control and leaving largest soil residues:
   cut-stump (with glyphosate)

It is important to note that the results of the second short term study suggest that the most efficacious application techniques and which pose the lowest environmental risk were not those recommended in the interim finding.

DEPARTMENT DETERMINATION

Based upon the results of the two ROW impact studies, the general information in the literature, and after consultations with the Vegetation Management Panel, the Department finds that the following proposed vegetation management program will result in less impacts to wetlands than exclusive use of mechanical control methods. Therefore, the Department finds that any vegetation management program that incorporates the conditions under which the study was conducted as well as taking into account the results of previous studies, will result in the least impacts to wetlands.

These conditions include:

1. An Integrated Pest Management (IPM) system, also known as Integrated Vegetation Management (IVM), as described in the Vegetation Management Plan and Yearly Operation Plan is utilized in wetland areas. The IPM system must, at a minimum, place emphasis on encouraging low growth plant species to discourage unwanted vegetation and, minimizing the frequency and amount of herbicide use by only controlling specific non-conifer tree species which will impact transmission line operation and access to the right of way.

2. Herbicides may be applied by low volume foliar, basal, or cut stump methods. Foliar applications must include the use of appropriate drift reduction agents, and must not result in the off-target drift to non-target species. Basal and cut-stump treatments may be conducted in those situations where the size of the vegetation, potential for off-target drift, or other considerations precludes the use of low-volume foliar applications. Cut stump and basal applications shall be restricted, when practicable, to periods when static ground water levels are low or otherwise when conditions are less susceptible to potential contamination.

3. Herbicides are not applied to conifer species (pine, spruce, fir, cedar and hemlock).

4. Carriers for herbicides do not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers will be subjected to review by the Department of Food and Agriculture and DEP through 333 CMR 11.04(1)(d).

5. Only herbicides recommended by the Departments of Food and Agriculture and Environmental Protection through 333 CMR 11.04(1)(d) may be used in sensitive areas.

6. Herbicides may only be applied by hand operated equipment containing no more than 5 gallons of diluent.

7. All other restrictions within sensitive areas remain in effect. In accordance with 333 CMR 11.04(1)(c), no person shall apply herbicides for the purposes of clearing or maintaining a right-of-way in such a manner that results in drift to any areas within 10 feet of standing or flowing water in a wetland or area within 400 feet of a public drinking water supply well; or area within 100 feet of any surface water used as a public water supply; or area within 50 feet of a private drinking water supply identified under 333 CMR 11.04(2)(c)(3).

8. A minimum of twelve months must elapse between herbicide treatments. Only touch-up applications may be performed between twelve and twenty four months.

9. Approved Vegetation Management Plans and Yearly Operation Plans must be amended as needed to reflect the conditions of this determination.

.....

Therefore, herbicide use may be allowed to control certain vegetation along utility right of ways if the proposed vegetation program as described in the approved Vegetation Management Plan and Yearly Operational Plans contains the above elements.

Jonathan Healy, Commissioner

10/12/95
Date

Appendix 5:

Bibliography

Right-of-Way Vegetation Management: References

Subjects: Integrated Vegetation Management (IVM), Herbicide Use, Environmental Impacts, Wetland Impacts, Vernal Pool Impacts, Wildlife Impacts, Invasive Species, Rare/Threatened/Endangered Species, ANSI Standards – IVM and Safety

American National Standards Institute, Inc. A300 (Part 1). 2017. Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning).

American National Standards Institute, Inc. A300 (Part 7). 2018. Tree, Shrub, and Other Woody Plant Management – Standard Practices (Integrated Vegetation Management).

American National Standards Institute, Inc. A300 (Part 8). 2013. Tree, Shrub, and Other Woody Plant Management – Standard Practices (Root Management).

American National Standards Institute, Inc. A300 (Part 9). 2017. Tree, Shrub, and Other Woody Plant Management – Standard Practices (Tree Risk Assessment a. Tree Failure).

American National Standards Institute, Inc. Z133. 2017. Safety Practices for Arboricultural Operations.

Ball, S.K. 2012. Capitalizing on Conservation: The Ecological Benefits of Transmission Line Rights-of-Way. In Proceeding of the Ninth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich-Mahoney, D. Mutrie, and J, Reinemann, Eds.).

Ballard, B.D., H.L. Whittier and C.A. Nowak. Northeastern Shrub and Short Tree Identification: A Guide for Right-of-Way Vegetation Management. 2004. Research Foundation of the State University of New York, Albany, New York.

Bodin, M. "Powerlines as Habitat," Northern Woodlands, Autumn 2011.

Bramble, W.C. and W.R. Byrnes. 1992. Small Mammals in Plant Cover Types on an Electric Transmission Right-of-Way. Journal of Arboriculture 18(6): page 316-321.

Bramble, W.C., Yahner, R.H., and W.R. Byrnes. 1992. Nesting of breeding birds on an electric utility line right-of-way. Journal of Arboriculture 20(2): page 124-129. 1994.

Bramble, W.C. and W.R. Byrnes. Thirty Years of Research on Developments of Plant Cover on an Electric Transmission Right-of-Way. Journal of Arboriculture, 9(3): 67-74. 1983.

Bramble, W.C., R.H. Yahner and W.R. Byrnes. Effect of Herbicide Maintenance of an Electric Transmission Right-of-Way on Butterfly Populations. Journal of Arboriculture, 25(6): pages 302-307. 1999.

Carson, R.L. Silent Spring. Published by Fawcett World Library, New York, NY. Pages 73-75. 1962.

Chaney, W.R. 2005. Growth Retardants: A Promising Tool for Managing Urban Trees. Purdue Extension publication FNR-252-W.

Confer, J.L. 2000. Density, Diversity and Nesting Success of Birds on Managed Shrublands of Northeastern United States: The Importance of Utility Rights-of-Way. Study Report.

Confer, J.L. Vegetative Structure and Shrubland Birds in Rights-of-Way Management. In Proceeding of the Seventh International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich-Mahoney, D.F. Mutrie, C.A. Guild, Eds.). Electric Power Research Institute, Washington, D.C., pages 373-381. 2002.

Confer, J.T., T.Hauck, M-E. Silvia, and V. Frary. 2008. "Avian shrubland management and shrubland nesting success." In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich-Mahoney, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 407-412.

Deubert, K.H. 1985. Studies on the Fate of Garlon 3A and Tordon 101 Used in Selective low volume foliar applications in the Maintenance of Utility Rights-of-Way in Eastern Massachusetts, Final Repot for New England Electric et. al.

Donohue, S., M. Tyrrell, and T. Doyle. 2012. Important Considerations for Utility Right-of-Way Selection, Routing, and Vernal Pool Management. In Proceeding of the Ninth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich-Mahoney, D. Mutrie, and J, Reinemann, Eds.).

Duncan, C.P., A. Finamore, A. Slayton and K. Marcoux. 2012. Vernal Pool Occurrence and Species Distribution within Transmission Right-of-Ways in Maine. Abstract accepted for the Tenth Symposium on Environmental Concerns in Right-of-Way Management.

Egler, F.E. 1953. Vegetation Management for Roadside and Rights-of-Way. Smithsonian Institution 1953 Annual Report, pages 299-322. Smithsonian Institution, Washington D.C.

Egler, F.E. 1975. The Plight of the Right-of-way Domain. Futura Media Services, Mount Kisco, New York.

Electric Power Research Institute, Technical Update. Long-Term Right-of-Way Effectiveness: Update 2000. Palo Alto, California. 2000.

Electric Power Research Institute, Technical Update. Cost Comparison of Rights-of-Way Treatment Methods: Update 2000. Palo Alto, California. 2000.

Electric Power Research Institute, Technical Update. Wildlife and Integrated Vegetation Management on Electric Transmission Line Rights-of-Way. Palo Alto, California. 2002.

Environmental Consultants, Inc. 1991. Determination of the Effectiveness of Herbicide Buffer Zones in

Protecting Water Quality on New York State Powerline Rights-of-Way. Empire State Electric Energy Research Corporation, Schenectady, New York. Report EP 89-44.

Ferrandiz, L.S. 2008. A Broad-Based, IVM Approach to Right-of-Way Management on Long Island, NY. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 65-69.

Finch, K.E., and S.D. Shupe. Nearly Two Decades of Integrated Vegetation Management on Electric Transmission Rights-of-Way. In Proceeding of the Sixth International Symposium on Environmental Concerns in Rights-of-Way Management. 1997.

Guerrero-Murphy, Galen, Follensbee II, Tim, and Disorda, Jeff. 2015.
"Best Management Practices (BMPs) for Protection of Threatened and Endangered Species during Integrated Vegetation Management Operations of Electric Transmission Lines in Vermont." Environmental Concerns in Rights-of-Way Management, 11th International Symposium, Halifax, Nova Scotia.

Gwozdz, John, Payne, Lewis, Gorski, Kendra, and Kooser, Jim. 2015.
"Herbicide Use Rates Over Four Treatment Cycles: Proof the IVM Tool is Working." Environmental Concerns in Rights-of-Way Management, 11th International Symposium, Halifax, Nova Scotia.

Haggie, M.R., R.A. Johnstone, and H.A. Allen, Jr. Tree, Shrub and Herb Succession and Five Years of Management Following the Establishment of a New Electric Transmission Right-of-Way through a Wooded Wetland. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 47-59. 2008.

Johnstone, R.A. 1990. Vegetation Management: Mowing to Spraying. Journal of Arboriculture 16(&): 186-189.

Johnstone, R.A. 1995. Vegetation Management with Environmental Stewardship. In Proceeding of the Fifth International Symposium on Environmental Concerns in Rights-of-Way Management. , September 19-22, 1993, Montreal, Quebec, Canada.

Johnstone, R.A., M.R. Haggie, H.A. Allen, Jr. Tree, Shrub and Herb Succession and Five Years of Management Following the Establishment of a New Electric Transmission Right-of-Way through a Mixed Woodland. In Proceeding of the Seventh International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich-Mahoney, D.F. Mutrie, C.A. Guild, Eds.). Electric Power Research Institute, Washington, D.C., pages 73-81. 2002.

Lentz, J. and D. Krause. 2012. Bramble and Byrnes: 60 Year Milestone of Applied Research Supporting IVM Practices. Abstract accepted for the Tenth Symposium on Environmental Concerns in Right-of-Way Management.

Marshall, J.S., L.W. VanDruff, S.D. Shupe and E. Neuhauser. Effects of Powerline Right-of-Way Vegetation Management on Avian Communities. In Proceeding of the Seventh International Symposium

on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich-Mahoney, D.F. Mutrie, C.A. Guild, Eds.). Electric Power Research Institute, Washington, D.C., pages 355-362. 2002.

McLoughlin, K.T. Application of Integrated Pest Management to Electric Utility Rights-of-Way Vegetation Management in New York State. 1997. In Proceeding of the Sixth International Symposium on Environmental Concerns in Rights-of-Way Management. Electric Power Research Institute, Washington, D.C.

Miller, R.H. 2021. Best Management Practices: Integrated Vegetation Management. International Society of Arboriculture.

Money, N.R. 2008. Development of an Integrated Resource Management Strategy for Transmission Right-of-Way Corridors for Successful Implementation of Integrated Vegetation Management in California. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights- of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 33-36.

Neiring, W.A. and R. Goodwin. 1974. Creation of Relatively Stable Shrublands With Herbicides: Arresting Succession on Rights-of-Way and Pastureland.

Nickerson, N.H., R.A. Dobberteen, and N.M. Jarman. 1989. Effects of Power-Line Construction on Wetland Vegetation in Massachusetts, USA. Environmental Management 13 (4): 477-483.

Nickerson, N.H. and F.R. Thibodeau. 1984. The Effect of Power Utility Rights-of-Way on Wetlands in Eastern Massachusetts. Final report submitted to the New England Power Company, 25 Research Drive, Westboro, Massachusetts.

Nickerson, N.H. 1992. “Impacts of Vegetation Management Techniques on Wetlands in Utility Rights-of-Way in Massachusetts.” Journal of Arboriculture, 18(2): 102-106.

Nickerson, N.H., G.H. Moore and A.D. Cutter. 1994. Study of Environmental Fates of Herbicides in Wetlands on Electric Utility Rights-of-Way in Massachusetts Over the Short Term. Final Report.

Norris, L.A., N.H. Nickerson, K. Bentsen, W.C. Bramble, W.R. Byrnes and K.L. Carvell. 1989. Study of the Impacts of Vegetation Management Techniques on Wetlands for Utility Rights-of-Way in the Commonwealth of Massachusetts. Environmental Consultants, Inc.

Norris, L.A. 1999. Environmental Consultants, Inc. Determination of the Effectiveness of Herbicide Buffer Zones in Protecting Water Quality. Electric Power Research Institute, Palo Alto, CA.

Nowak, C.A., and B.D. Ballard. 2005. A Framework for Applying Integrated Vegetation Management on Rights-of-Way. Journal of Arboriculture. Pages 28-37.

Nowak, C.A. 2012. Herbicides Really are Most Effective in Creating Sustained, Desirable Plant Communities on Powerline Corridors – Conclusions and Results for the 40 Year Volney-Marcy Project in Upstate New York. Abstract accepted for the Tenth Symposium on Environmental Concerns in Right-of-Way Management.

Putz, F.E. and C.D. Canham. 1992. Mechanisms of Arrested Succession in Shrublands: Root and Shoot Competition Between Shrubs and Tree Seedlings. Forest Ecology and Management, 49 267-275.

Sullivan, T.E., M. Gach, D.D. Cary and M. Rigby. 2012. Urban Wildlife Sanctuary Along an Electric Transmission Right-of-Way: A Successful Partnership. Abstract accepted for the Tenth Symposium on Environmental Concerns in Right-of-Way Management.

US EPA. 2008. United States Environmental Protection Agency. Fact Sheet: Integrated Vegetation Management.

VanBossuyt, R. 1987. New England Electric System Companies' Selective Right-of-Way Management Program. Pages 123-127. In W.R. Byrnes and H.A. Holt (editors) Proceedings of the 4th Symposium on Environmental Concerns in Rights-of-Way Management, October 25-28, 1987, Purdue University, Indiana.

Walden, D.L., S. Morawski and I.E. Hegemann. Mitigation Measures for Rare Species During Necessary Maintenance Activities Within Existing Rights-of-Way. In Proceeding of the Eighth International Symposium on Environmental Concerns in Rights-of-Way Management. (J. W. Goodrich, L. P. Abrahamson, J. L. Ballard, S. M. Tikalsky, Eds.). Electric Power Research Institute, Washington, D.C., pages 529-539. 2008

Yahner, R.H. and R.J. Hutnik, "Integrated Vegetation Management on an Electric Transmission Right-of-Way in Pennsylvania, US, Journal of Arboriculture 30(5): pp. 295-300, September 2004.

Yahner, R.H., B.D. Ross, R.T. Yahner, R.J. Hutnik and S.A. Liscinsky. Long-Term Effects of Rights-of-Way Maintenance via the Wire-Border Zone Method on Bird Nesting Ecology. Journal of Arboriculture 2004.

Yahner, R.H. 50 Years of Wildlife Research Along a Pennsylvania Right-of-Way. Dow Agro Sciences. 2002.

Yahner, R.H., W.C. Bramble and W. R. Byrnes. Response of Amphibian and Reptile Populations to Vegetation Maintenance of an Electric Transmission Line Right-of-Way. Journal of Arboriculture 27(4), pages 215-220. 2001.