

**WASHINGTON ELECTRIC  
COOPERATIVE, INC.**

**VEGETATION MANAGEMENT PLAN**

**July 2006**

## I. Purpose

The primary purpose of this document is to provide guidance on methods to be used to manage vegetation within Washington Electric Cooperative's (WEC) rights-of-way (ROW) in a safe, efficient and environmentally sound manner. In providing this guidance, it is understood that all line clearing, maintenance and other vegetation management work shall be performed in strict conformance with all applicable federal, state and local government laws and regulations, including OSHA Rule 29 CFR 1910.269, Electric Power Generation, Transmission and Distribution Regulations.

## II. Background

WEC currently serves approximately 10,000 members in 41 rural Vermont towns in the counties of Washington, Orange, Caledonia and Orleans. Today, WEC's electric system consists of 1,237 miles of distribution line and 18 miles of local transmission line, plus an additional 7.4 miles of transmission line in Coventry. Of those line miles, approximately 800 miles of distribution line and 10.47 miles of local transmission line require tree trimming.

The terrain in WEC's service territory is described as hilly, often rugged and for the most part heavily forested with various deciduous and coniferous species. While distribution lines were constructed across fields in the early years of the Co-op in order to minimize time and the cost of construction, WEC has been routinely relocating those lines nearer to roadsides during major rehabilitation projects whenever possible. However, in many cases, it is likely that landowners will be reluctant to allow WEC to relocate their lines due to aesthetic and environmental impacts.

For the last several years, the WEC Board of Directors has authorized increased funding of the annual ROW budget in an effort to improve reliability. The amount of money budgeted and spent on tree trimming in each of the past four years is as follows:

### Distribution System and Danger Tree Removal

Year	2003	2004	2005	2006
Budgeted	\$351,000*	\$418,000	\$436,000	\$467,620
Actual	\$347,496	\$410,993	\$435,751	\$467,539

\* Original 2003 budget was \$378,000, but funding had to be curtailed due to budget constraints.

### Transmission System

Year	2003	2004	2005	2006
Budgeted	\$13,000	\$13,400	\$13,500	\$14,000
Actual	\$11,522	\$8,121	\$10,267	\$13,966

The number of miles of line that WEC has cleared and maintained, and the number of danger trees removed, in each of the last three years is as follows:

2003

Distribution Miles Cleared: 54.26	Distribution Miles Maintained: 83.48
Transmission Miles Cleared: 1.20	Transmission Miles Maintained: 2.03
Danger Trees Removed: 700	

2004

Distribution Miles Cleared: 59.94	Distribution Miles Maintained: 85.62
Transmission Miles Cleared: .78	Transmission Miles Maintained: 1.30
Danger Trees Removed: 900	

2005

Distribution Miles Cleared: 55.12	Distribution Miles Maintained: 84.80
Transmission Miles Cleared: .98	Transmission Miles Maintained: 1.51
Danger Trees Removed: 1,000	

### **III. Policy**

WEC shall strive to maintain its transmission and distribution ROW corridors in accordance with Policy 80, attached hereto as Appendix A, as well as in the following manner:

- a. In a safe, professional, efficient and environmentally sound manner, while being sensitive to the concerns of property owners and the general public.
- b. In a manner that will provide reliable electrical service in conformance with the Electrical Safety Code;
- c. In a manner that protects all electrical system infrastructure necessary to transmit power between substations;
- d. In a manner that uses the services and knowledge of employees and contract ROW crews who are professionally trained and inherently concerned with proper ROW techniques in conjunction with safe work practices.

### **IV. ROW Management Practices**

#### **Inspections:**

As part of WEC's annual pole inspection and treatment program, and in accordance with RUS operational planning requirements, a visual inspection of ten percent (10%) of WEC's electrical T&D system shall be conducted on an annual basis. In addition to noting the physical condition of the poles and wires, ROW vegetation growth conditions shall be noted.

**Species:**

It is the practice of WEC to control the following tree species the full width of the ROW:

Ash	Cherry	Locust	Pine
Basswood	Fir	Maple	Poplar
Beech	Hemlock	Oak	Spruce
Birch	Larch		

This practice of vegetation management control allows for safe passage by WEC employees and contractors within the ROW for maintenance purposes, and removes potential fire and safety hazards to humans and animals in the area.

In general, it is desirable to use or enhance existing natural vegetation that does not interfere with the distribution of electricity. Herbs, most shrubs and low maturing trees should be left in the ROW to suppress the invasion of tall-growing trees. Following is a partial list of some of the low shrubs and plants that are native to WEC's service territory:

Alpine Azalea	Juniper	Rhododendron
American Yew	Laurel	Serviceberry
Dogwood	Leatherwood	Steeplebush
Dwarf Willow	Meadowsweet	Virginia Creeper
Eastern Redbud	Partridge Berry	Wintergreen
Fern	Pussy Willow	Witch Hazel
Gooseberry	Raspberry/Blackberry	

**Notification:**

In general, the Cooperative membership and affected property owners will be notified prior to any ROW clearing or reclearing maintenance work, except during emergency restoration or if hazardous conditions exist. Such notification shall include one or more of the following:

- First: by a general article in *Co-op Currents* listing all ROW maintenance projects scheduled for the year
- Second: by a mailed postcard to the member, or to the property owner if different from the member and readily known, who will be affected by the ROW maintenance work
- Third: by either an automated or personal telephone call to the member, or to the property owner if different from the member and readily known, informing them that ROW maintenance work is about to commence

## **General Practices**

### A. The Removal of Trees by Manual Means (Chainsaws)

This method of control is primarily used for softwood and hardwood trees which have the potential for interfering with line reliability. The principal method of dealing with this type of vegetation is to cut it at ground level (flat cutting) using chainsaws and brush saws. Whenever trees are removed, all stumps are to be cut as close to the ground as practical so as to discourage multi-stemmed sprout regrowth. Side trimming and danger tree removal work are to be performed in conjunction with flat cutting.

### B. Trimming/Pruning

It may not always be necessary, economically feasible or aesthetically acceptable to flat cut all trees within the ROW. This may be in response to a property owner's request, when the tree is a compatible, non-interfering vegetation variety, or it may be that while the tree itself is in the required clearance zone, only its branches immediately threaten the electric line. In these cases, it may be appropriate to prune or trim the tree.

Limbs to be removed are those that are dead, decayed, insect damaged, or structurally weak, including limbs which could break at weak points and strike conductors when swinging down in an arc. Pruning guidelines are as follows:

#### 1. Tree Under Conductor – Under Trimming

Under-trimming is cutting back large portions of the upper crown of a tree. Under-trimming is required when a tree is located directly beneath a line. The main leader or leaders are cut back to a suitable lateral. (The lateral should be at least one-third the diameter of the limb being removed.) Most cuts should be made with a saw; the pole pruner is used only to trim some of the smaller lateral branches.

For the sake of appearance and the health of the tree, it is best not to remove more than one-third of the crown when under-trimming.

#### 2. Tree at Side of Conductor – Side Trimming

Side trimming consists of cutting back or removing the side branches that are threatening the conductors. Side trimming is required where trees are growing adjacent to utility lines.

Limbs shall be removed to the trunk or to a lateral that is growing parallel to or away from the conductors.

Where possible, or as designated by WEC, the contractor shall eliminate all branches growing within 10 feet beneath and toward the conductors.

### 3. Tree Over Conductors – Overhead Trimming

Overhead trimming consists of removing limbs beneath the tree crown to allow wires to pass below. Most of the natural shape of the tree is retained in this type of trimming, and the tree can continue much of its normal growth. Overhanging limbs should be removed as dictated by the species of the tree, location, and the general condition of the tree. When trimming, remove all dead branches above the wires, since this dead wood could easily break off and cause an interruption.

The contractor shall remove all weakly attached overhanging limbs that are capable of hitting the conductor if the limb were to split at the point of attachment.

Where possible, all branches within ten (10) feet above conductors shall be removed as dictated by the species of the tree, location, and the general condition of the tree.

Overhead trimming must be performed in accordance with current VOSHA/OSHA trimming regulations.

### 4. Combination Trimming

It is often necessary to use judgment in combining several types of arboricultural trimming techniques in order to achieve a good looking job and provide adequate clearances.

### 5. Improper Trimming Techniques

a. Pollarding: This is done by stubbing off major limbs until the tree assumes the desired shape. The result is not only unsightly, but a multitude of fast-growing suckers will sprout from the stubs, resulting in a line clearance problem more serious than before. The stubs are quite likely to fall victim to decay and disease.

b. Rounding Over: Rounding over or shearing is done by making small cuts so that the tree top is sheared in a uniform line. This creates an unhealthy condition and results in rapid regrowth of suckers directly toward the electrical conductors.

c. Side Trim Stubbing: This is done by stubbing off portions of limbs along the side of the tree to obtain clearance. This method of trimming, like pollarding and rounding over, creates many fast growing suckers that become a serious line clearance problem. These trimming methods should be avoided.

d. Topping: Removing top and upright branches should be avoided. Where necessary, use natural or directional pruning methods.

### C. Proper Trimming Techniques

Various trimming shapes were previously described. The following provides the details for WEC standard line clearance and can be used for overhead trimming, side trimming, under trimming, and combinations. Pollarding, rounding over and side trim stubbing shall be avoided.

All trimming shall be performed to direct the growth of a tree away from the conductors. Branches shall be cut back toward the center of a tree to a suitable lateral branch, parent limb or the tree trunk. This is commonly called drop crotch, lateral or natural trimming (see Figure 1). When cutting back to a lateral branch, the diameter of the lateral branch must be at least one-third of the diameter of the branch being removed in order to sustain growth. Almost all cuts are made with a saw and very little pruner work is required. If a proper lateral branch is not available, the branch shall be cut back to the parent limb or tree trunk.

Trimming shall be done in such a manner as to protect tree health and condition.

All saw and pruner cuts shall be made back to the branch collar at an angle equal to but opposite of the branch bark ridge on the parent limb or trunk in order to leave no stubs.

No damage by loosening or stripping of the bark or splitting of branches shall be caused during trimming.

All severed limbs and branches (hangers) shall be removed from trees after trimming.

#### C. Removal of Trees by Mechanical Means (Brontosaurus)

WEC shall utilize the Brontosaurus wherever possible to clear ROW. The Brontosaurus is an excavator on steel tracks that utilizes a hydraulically driven shearing mechanism that pulverizes the tree and root system. Having utilized this machine over the past several years, WEC's field observations indicate that it effectively reduces the rate of resprout in many species. The Brontosaurus effectively removes trees, shrubs and brush within a ROW, however, this method still requires contract ROW crews to revisit the ROW to do side trimming and danger tree removals which adds to the cost of this method of clearing. Use of the Brontosaurus is limited due to its inability to safely work in narrow ROWs, and near roadsides and members' homes.

#### D. Danger Tree Removal

A danger tree is any tree, due to its location, species and condition, which is tall enough to pose a threat to WEC's electric lines. Many of the trees at the edge of the ROW have crowns that are heavily grown in towards the line, and when they fall, are likely to make contact with the electrical conductors. Danger tree removal is most effective towards reducing outages associated with high wind storms, prolonged rain incidents and routine outages due to "rotten trees". This, in effect, targets short-term and long-term reliability while also reducing the duration of outages due to excessive damage. For every danger tree

that is targeted and removed, a future outage is avoided. (See Figure 2 for minimum clearances for danger tree removal.)

Since 2002, WEC has been aggressively targeting and removing danger trees in an effort to improve reliability. In 2005, approximately 1,000 danger trees were removed at a cost of \$96,333.

E. “Hot Spot” Clearing

Selective clearing of ROW line sections outside the normal reclearing schedule helps to improve reliability to those members located at the end of a single-phase line. Identification of these problem line sections normally comes from the members who are affected by poor reliability. Devoting resources to “hot spot” line sections improves reliability and/or power quality to specific problem areas, improves line crew access and outage restoration time, and improves overall reliability of a particular line. Hot spot trimming is the least efficient method of ROW clearing, but is essential to good member relations.

F. ROW Clearing During Emergency Restoration and When Hazardous Conditions Exist

In the best interests of employee and public safety, any tree making contact with WEC’s electric system conductors shall be immediately removed to mitigate the hazard. It is not reasonable to provide advance notification to property owners under these conditions.

In the event of a power outage caused by trees within or outside of WEC’s ROW, the trees shall be cut to the extent that is necessary to safely restore power. Advance notification to property owners is not possible under these conditions.

Under both of the above circumstances, a WEC employee shall coordinate with WEC’s ROW Management Coordinator to arrange for any necessary cleanup.

G. Clearing Within Municipal Street or Highway ROW

In situations where the Cooperative does not hold a valid ROW easement along a public street or highway, whether for a new service or for relocation of an existing line, no tree within that street or highway shall be cut in the construction, relocation, maintenance or repair of electric power lines without the written consent of the adjoining property owner(s) or occupant, unless the transportation board or selectmen of the town in which the tree is situated, after due notice to the parties and upon provision for a hearing, shall decide that such cutting is necessary (Title 30 VSA, § 2506), or unless such decision is made by the appointed municipal tree warden for the town (Title 24 VSA, § 67).

H. Clearing Within Wetlands

Wetlands are considered to be sensitive areas for vegetation management practices. These may include swamps, marshes and bogs, and other areas identified in the National Wetlands survey, and will be identified by WEC's representative prior to ROW management activities. Handcutting will be used near wetland areas where necessary to control undesirable vegetation. If extensive wetlands are encountered, WEC may elect to carry out the work in winter because of improved access. Vegetation in wetland areas will be managed according to the Vermont Department of Environmental Conservation's policy on wetlands.

#### I. Clearing Within Stream Corridors

Stream buffers are areas adjacent to streams requiring special vegetation management, and these areas shall generally be maintained to a minimum width of 75 feet on each side of the stream. Where distribution lines cross streams, standing woody vegetation, shrubs and low mature height trees will be allowed to grow within the ROW if consistent with the terrain and existing land use. This cover will protect fish habitat, service wildlife travel lanes, and control soil erosion.

Where the electric line spans a ravine, streamside vegetation may be allowed to grow taller as specified by WEC's representative. Where an undesirable woody species becomes taller than 12 feet, it will be removed to ensure protection of line conductors. In general, provision of the Vermont Agency of Environmental Conservation policy on river and stream bank management shall be followed.

#### J. Clearing Where Electric Lines Cross Roads

Electric lines that cross roads will be treated similarly to streams. Low woody shrubs, such as Sweet Gale and other compatible plant species identified on page 4, which have a low height at maturity, will be permitted and encouraged at road crossings in order to provide screening of the electric lines.

#### K. Clearing Within Wildlife Travel Areas

Wildlife travel areas shall be maintained to promote the movement of white-tail deer and other wildlife across the corridor of extended cross-country distribution and transmission lines. In general, WEC's objectives will be to favor vegetation that can support snow and thereby keep the snow depth on the ground shallow enough for deer to move about and to conceal wildlife as it crosses through wildlife travel lanes. Treatment will be similar to high visibility ROW areas, and preference may be given where practical to preserving a conifer canopy. WEC shall use the Vermont Agency of Natural Resources policy on wildlife management as a guide to maintaining wildlife travel lanes.

#### L. Stump Height

ROW clearing will be limited during winter months. Deep snow during winter months often results in unsightly ROWs because of excessive stump height, which oftentimes need to be recut in the spring, which adds to the cost. Excessive stump height

also encourages the regrowth of saplings. At other times of the year whenever trees are removed, all stumps will be cut as close to the ground as practical so as to discourage multi-stemmed regrowth of the original species.

M. Cherry Tree Disposal Precaution

Wilted leaves from cherry trees are poisonous to livestock. Therefore, in areas frequented by livestock, any cherry cuttings shall be disposed of immediately by removing any cuttings from the enclosed livestock grazing area.

## V. Trees and Debris Removal

Disposal techniques for each ROW section will be determined by WEC's representative, taking into account federal, state and local regulations, the practicality of certain disposal methods, the potential for wood utilization, and the wishes of the property owner. Whenever roadside trimming is performed, all log length material shall be picked up by a log truck as soon as possible and disposed of in accordance with the property owner's request. All other brush and wood material shall be removed from the ditch and municipal ROW and appropriately chipped or stacked at the tree line. If the ROW maintenance area is located more than fifty (50) feet from a public road or highway, then the log or tree length wood shall be moved to the tree line. All brush shall be windrowed at the edge of the ROW in order to provide unobstructed access for maintenance purposes. All other wood material shall be cut in four foot lengths and stacked at the tree line (see Figure 3). There will be no brush left in stream beds, across fence lines, stone walls, paths or roadways.

## VI. Prioritization of ROW Clearing

WEC's Vegetation Management Plan promotes the prioritization of ROW clearing as it statistically relates to reliability of service. In general, the focus of the ROW management program shall be as follows:

1. Transmission Lines

- Annually patrol 18 miles of local transmission line as well as 7.4 miles of 46 kV transmission line in Coventry for purposes of identifying potential equipment problems and marking danger trees for removal.
- Flatcut WEC's 10.47 miles of local transmission line as needed to ensure maximum reliability to WEC's substations.
- Flatcut WEC's 7.4 miles of Coventry transmission line as needed based on annual patrol to ensure 100% availability.

2. 3 Phase Lines

Three-phase circuits are critical links from substations to all members. Damage to one conductor of a three-phase line require the entire three conductors to be de-energized when repairs are made. WEC's three-phase lines are prone to greater damage for any given tree contact due to construction type and phase-to-phase voltage levels. The reliability of three-phase circuits, like substations, have a direct impact on the reliability of all single-phase lines. Improving the reliability of WEC's three-phase circuits is essential to achieving state mandated SAIFI and CAIDI indices.

### 3. Two-Phase Lines

Two-phase lines shall be treated similarly to three-phase lines as they serve a greater number of members than do single-phase lines.

### 4. Single-Phase Lines

Maintain single-phase line ROWs based on member density.

### 5. Worst-Performing Circuits

At the beginning of each year, WEC shall analyze circuit performance for the previous calendar year and identify the five worst performing circuits based on annual reliability. The reliability of the worst-performing circuits shall be further analyzed to determine if there are conditions that can be changed to improve the reliability of the circuits, including danger tree removals, flat cutting, line relocation and reconstruction if needed. In all cases, the circuit analysis shall take into consideration year-to-year fluctuations and longer-term trends to identify root causes of the reliability problems.

## **VII. CLEARANCE ZONE REQUIREMENTS**

In general, single phase primary and/or secondary conductors shall be cleared of trees within 15 feet of each side of the pole line center. Three phase primary conductors shall be cleared 25 feet each side of the pole line center. (See Figure 4 for clearance zone dimension measurements.)

## **VIII. ROW Contractor Training and Requirements**

ROW contractors hired by WEC are required to become familiar with the procedures and requirements of this plan and to utilize safe and proper ROW clearing techniques that are in compliance with state and federal laws and regulations. Each ROW crew must have two (2) qualified line clearance tree trimmers. Minimum qualifications include the following:

- Annual CPR and first aid training
- Annual electrical hazard awareness training
- Ability to perform an aerial rescue from a minimum height of 35 feet in four minutes or less. Aerial rescue must be practiced at least once a year.

- Knowledge of electric line voltages and minimum approach distances
- Annual inspection and dielectric testing of bucket trucks to be used for tree trimming
- *Need to add all references to OSHA 1910.269 material*

This plan has been prepared and adopted in order to provide a broad assessment of WEC's ROW vegetation management goals and policy objectives, and the operational methods and practices that shall be used in attaining those goals and objectives. The procedures outlined herein are designed to provide general guidelines for the safe operation and maintenance of electrical distribution and transmission lines, while minimizing visual and other environmental impacts within the communities served by WEC.