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Potential Consequences of the North American Electric Reliability Corporation (NERC) Regulations for Utility Vegetation Management on the Application of Integrated Vegetation Management (IVM)

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PRODUCT DESCRIPTION

The North American Electric Reliability Corporation (NERC) FAC-003-1 standards for vegetation management on electric transmission line rights-of-way (ROWs) have been in place since April 2006. These mandatory standards regulate electric transmission line vegetation management across the United States, and are narrowly focused on minimizing vegetation caused outages in electricity transmission. The NERC FAC-003-1 standards are potentially broadened by the voluntary American National Standards Institute (ANSI) A300 standards for vegetation management, which are referenced in the NERC standard as "best practices."

Over the past decade, EPRI and various cooperators have developed a system of vegetation management—Integrated Vegetation Management, or IVM—that strives to promote the cost-effective, safe, and reliable transmission of electricity. In IVM, vegetation management is to be accountably practiced in an environmentally sensitive, socially responsible, and financially viable manner. Accountability comes, in part, with the application of EPRI IVM performance standards that define key elements and processes needed to balance considerations for socioeconomics and the environment. The EPRI IVM standards are defined by 10 principles, 42 criteria, and 37 indicators. With the advent of the NERC FAC-003-1 standards, concern has developed that the application of IVM will be compromised as transmission organizations focus exclusively on NERC. There is further concern that gains made in practicing vegetation management to balance environmental considerations with socioeconomics will be lost. This report addresses the potential consequences of these regulations on IVM.

Results & Findings

A comparison of the NERC FAC-003-1 standards with the EPRI IVM standards supported the expectation that most elements of IVM are not covered by FAC-003-1. The FAC-003-1 standards are almost exclusively focused on documentation and activity associated with only the following four IVM elements: 1) tolerance levels as to when vegetation would need to be treated, 2) inventorying vegetation to determine a need for treatment with reference to tolerance levels, 3) strategically planning for treatment, and 4) monitoring reliability. Nearly all elements of performance that are social or environmental are not included in the FAC-003-1 standard. However, many of these missing elements in the NERC standards are covered by the voluntary ANSI A300 standards. If the mandatory NERC FAC-003-1 standards and the voluntary ANSI A300 standards are combined to guide practice, it appears that transmission organizations will practice IVM.

A survey of EPRI Rights-of-Way Research Program 57 members discerned levels of awareness and engagement of transmission organizations in the practice of IVM. Current vegetation management, as practiced on electric transmission line ROWs, was found to be relatively consistent with IVM principles and elements. Only a few elements of IVM are apparently not consistently practiced by Program 57 members. Given these results, it appears that NERC FAC-

003-1 regulations have not negatively affected the practice of IVM. However, the questionnaire respondents were only part of a select group of electric transmission organizations—those belonging to EPRI's Program 57. These organizations may not represent the industry, and it may be that other organizations practice vegetation management in a way much less like the EPRI IVM system. It is highly possible that transmission organizations not belonging to EPRI's Program 57 will endeavor to only minimally meet the NERC FAC-003-1 standards and that the voluntary ANSI A300 standards will not be followed—which will mean that the practice of IVM will be abandoned, if even attempted. In such a case, there will be important, attendant breakdowns of critical social and environmental elements of IVM.

Challenges & Objective(s)

This report is aimed toward managers, regulators, and policymakers working on reliability of electricity transmission and vegetation management. Transmission organizations will benefit by gaining increased understanding of mandatory regulations and voluntary guidelines for electric transmission line vegetation management.

Applications, Values & Use

It is expected that both vegetation management regulations and the EPRI IVM system will continue to evolve. Practitioners of vegetation management on electric transmission line ROWs should be aware of those evolutions so as to continue producing cost-effective, reliable electricity transmission.

EPRI Perspective

Several years ago, EPRI raised the question as to whether the NERC standards for vegetation management might compromise the application of IVM along transmission ROWs. Since that time EPRI has conducted several IVM assessments with Program 57 members. These assessments have shown that companies are largely compliant with the IVM Principles and Criteria, found in Appendix B of this report. This report further substantiates that, at least for Program 57 members, the NERC standards have not adversely affected the practice of IVM. This is good news, as the practice of IVM will reduce vegetation management costs while meeting environmental goals.

Approach

The goal of the study was to promote the practice of IVM in this new era of elevated federal regulation of vegetation management on electric transmission line ROWs. This was accomplished by identifying potential consequences of the mandatory regulations, as defined in contemporary Federal Energy Regulatory Commission (FERC)/NERC Reliability Standards FAC-003-1, and voluntary guidelines for best management practices, as defined in the ANSI A300 standards.

Keywords

North American Electric Reliability Corporation (NERC) FAC-003-1
American National Standards Institute (ANSI), ANSI A300
Electric Transmission Line Rights-of-Way (ROWs)
Integrated Vegetation Management (IVM)

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1
INTRODUCTION

Vegetation management on power line corridors has evolved over the past century. In the early and mid parts of the 20th century, vegetation on rights-of-way was regularly and routinely removed to create an open corridor for the safe and reliable transmission of electricity (Nowak et al. 1993; Jackson 1997). With the advent of herbicides in the 1940s/50s and attendant opportunities for selective removal and control of problem plants, coupled with the environmental movement in the 1960s and 1970s, a more in-depth and encompassing approach to vegetation management was developed by academia and industry (Nowak and Abrahamson 1993). Over the past two decades, this evolving approach to vegetation management has been progressively connected to the discipline of Integrated Pest Management (McLoughlin 1997, 2002). Today, the evolution of vegetation management continues with the ongoing development of a pest management system specifically tuned to power line rights-of-way—Integrated Vegetation Management (IVM) (McLoughlin 1997, 2002; Nowak and Ballard 2005).

IVM has a focus on eliciting site-specific, ecosystem-sensitive, economically-sensible, and socially-responsible treatment effects that lead to refined prevention and control of target plant pests (Wagner 1994; Nowak and Ballard 2001; EPRI 2002; Nowak et al. 2002). A model for Integrated Vegetation Management for rights-of-way that fully incorporates this focus, and frames it in a full system context, has been developed for the electric utility (Nowak and Ballard 2001, 2005, 2005; EPRI 2002, 2004a,b), roadside (Nowak 2005) and gas pipeline (Nowak et al. 2002) industries. This IVM model was developed, in part, using key support from EPRI (EPRI 2004a,b).

Electric transmission line vegetation management has only recently been broadly regulated by state and federal entities. Historically, the federal government has deferred regulations on vegetation management to the states; some states having more stringent regulations that others (e.g., New York State has had an encompassing, law-based approach to regulating vegetation management on power line corridors since the early 1980s [see Jackson 1997], whereas New Mexico or Kentucky do not [personal observation]).

The role of the federal government in regulating vegetation management on power line corridors changed significantly after the August 2003 blackout that affected more than 50 million people in the eastern United States and Canada. In 2004, the Federal Energy Regulatory Commission (FERC) released a series of reports on vegetation management associated with the blackout, with a respondent sequence of draft standards for vegetation management released from 2005-2006. These standards are being promulgated and audited by the North American Electric Reliability Corporation (NERC). As of October 2006, FERC proposed to approve the standard that directly affects vegetation management on power line corridors (200 kV and above, but can be applied for lesser voltages for those power lines designated as critical); Reliability Standards FAC-003-1 with certain interpretations and directions [EPRI 2007]). The Reliability Standards FAC-003-1

mostly focuses on transmission mechanics and infrastructure at local and regional scales, but it does include important direction for vegetation management so as to provide and account for highly reliable transmission of electricity. These vegetation management directions generally include the following: 1) documentation of an approved vegetation management program (schedules for inspection, identification and documentation of clearance needs between lines and vegetation); 2) annual, approved work plans; 3) quarterly reports of sustained outages caused by vegetation; and 4) an approved transmission vegetation management plan, including plans for and results of monitoring elements associated with [1]).

The new ANSI A300 standards are referenced in the NERC FAC-003-1 standards as complementary, supplemental, voluntary best practices for vegetation management. The ANSI standards were updated in 2006 as best management practices (BMPs) for Integrated Vegetation Management to "serve as a field guide for front-line supervision, as well as an aid for managers to help facilitate planning" (Miller 2007). The ANSI A300 BMPs were developed to exceed the NERC FAC-003-1 standards and contains sections on safety, communication, planning and implementation, and application (Miller 2007).

The NERC FAC-003-1 standards dominant role in regulating vegetation management activities on electric transmission rights-of-way across the United States, and the standard's narrow focus on planning and monitoring has led to a concern that IVM practices may be abandoned or untried by many electric transmission organizations. The two studies reported herein were set to address this concern. Study #1 was designed to determine what elements of IVM are specifically covered, or not, by both the NERC FAC-003-1 standards and the ANSI A300 standards. Study #2 was designed to determine the extent to which IVM is being practiced by EPRI Rights-of-Way Program 57 members, as representatives of the electric transmission industry.

2
STUDY #1: COMPARISON OF THE FERC/NERC RELIABILITY STANDARDS FAC-003-1 FOR VEGETATION MANAGEMENT WITH THE EPRI IVM STANDARDS

Study Objective

Systematically compare the NERC Reliability Standards FAC-003-1 for vegetation management with the EPRI IVM system.

Methods

The EPRI IVM performance standards for practicing IVM (see Appendix B for a full copy of the standards) were compared to both the NERC Reliability Standards FAC-003-1 and the ANSI A300 standards. The ANSI A300 standards are referenced in FAC-003-1 as "best practices" that could be followed by vegetation managers, but not required. Focus on FAC-003-1 standards was on Section B. Requirements (Requirements 1-4). The entire ANSI A300 standard was compared to the EPRI IVM standard. Each criterion that was covered, or not, by the FERC/NERC and ANSI standards was accounted for in tabular format, and patterns and consequences of coverage (or not) synthesized and reported.

Results

Comparison of NERC FAC-003-1 Standards With EPRI IVM Standards

Only 11 of the 42 criteria from the EPRI IVM standards were able to be cross-referenced with the NERC FAC-003-1 requirements (Table 1 and Appendix C), and only two criteria were well covered. These two EPRI IVM criteria that were well covered by the NERC FAC-003-1 standards were as follows (see Appendix C for full accounting of these and other connections):

- use of tolerance levels (Criterion 6.2)
- monitoring implementation of management plans (Criterion 10.1)

Table 2-1
Cross-referencing of the EPRI IVM Standards With the NERC Standard FAC-003-1—Transmission Vegetation Management Program and the ANSI A300 (Part 7)-2006 IVM Standards.

	Industry Standards*	
	NERC	ANSI
EPRI IVM Standards -- Principles and Criteria**	**FAC-003-1**	**A300**
Principle 1: Compliance With Laws		
Criterion 1.1: abide by all laws and regulations		X
Criterion 1.2: control of unauthorized use		
Criterion 1.2: demonstrated long-term commitment to IVM		X
Principle 2: Tenure and Use Rights and Responsibilities		
Criterion 2.1: easements and other, formal defined use rights		X
Criterion 2.2: dispute resolution with external stakeholders	X	X
Principle 3: Community Relations and Workers' Rights		
Criterion 3.1: rights of workers to organize and negotiate		
Criterion 3.2: workers as civic participants via service		
Criterion 3.3: health and safety of employees		X
Criterion 3.4: worker grievance resolution		
Criterion 3.5: fair wage levels and other worker compensation		
Principle 4: Management Planning		
Criterion 4.1: strategic management plan	X	
Criterion 4.2: tactical management plan	X	
Criterion 4.3: periodic revision of management plans	X	
Criterion 4.4: public summary of planned management activities		
Criterion 4.5: skilled and knowledgeable workforce	X	X
Criterion 4.6: organizational infrastructure needed for management		
Criterion 4.7: annual public summary of management plans		
Principle 5: Understanding Pest and Ecosystem Dynamics		
Criterion 5.1: biological/ecological knowledge of ROW systems		X
Criterion 5.2: research and development		
Criterion 5.3: worker training	X	X
Principle 6: Setting Management Objectives and Tolerance Levels		
Criterion 6.1: setting management objectives, including social		X
Criterion 6.2: use of tolerance levels	X	X

	Industry Standards*	
	NERC	**ANSI**
EPRI IVM Standards -- Principles and Criteria**	**FAC-003-1**	**A300**
Criterion 6.3: stakeholder consultations		X
Criterion 6.4: regular modification of plans using 6.1-6.3		
Principle 7: Compilation of a Broad Array of Treatment Options		
Criterion 7.1: consideration of a variety of treatment methods	X	X
Criterion 7.2: regular addition of new treatment methods		
Criterion 7.3: emphasize prevention/biological-ecological control		X
Principle 8: Accounting for Economic and Ecological Effects of Treatments		
Criterion 8.1: cost effectiveness (economics, environment)		X
Criterion 8.2: promotion of non-chemical treatment methods		X
Criterion 8.3: judicious use of chemical treatment methods		X
Criterion 8.4: pesticide use record keeping		X
Criterion 8.5: maintenance of equipment to prevent fluid leaks		X
Criterion 8.6: chemical/container disposal		X
Criterion 8.7: non-use of exotics in planting		
Criterion 8.8: special sites (e.g., cultural, ecological) are conserved		
Principle 9: Site-Specific Implementation of Treatments		
Criterion 9.1: small-scale land management unit designation		X
Criterion 9.2: written prescriptions/operational plans		X
Criterion 9.3: inventories as a basis for prescription / treatment	X	X
Principle 10: Adaptive Management and Monitoring		
Criterion 10.1: monitoring implementation of management plans	X	X
Criterion 10.2: monitoring vegetation management activities/effects		X
Criterion 10.3: periodic revision of plans based on monitoring		
Criterion 10.4: public summary of monitoring results	X	
Source of standards: see NERC (2006) and ANSI (2006) in Literature Cited section of the report.		

* An "X" indicates that the specific criterion in the EPRI IVM standards is covered by either or both of the two standards of vegetation practice on electric transmission line rights-of-way--NERC FAC-003-1 or ANSI A300.

** Each Criterion is presented with a simple description of its associated elements—see the full standard in Appendix C for a complete accounting of those elements.

The NERC FAC-003-1 standards do not address—directly or indirectly—most of the EPRI IVM standards (Table 2-1). Principles from the EPRI IVM standards completely not covered by the NERC standards were as follows: 1) Principle 1—Compliance with laws; 2) Principles 3—Community relations and workers' rights; and 3) Principle 8—Accounting for economic and ecological effects of treatments.

Comparison of ANSI A300 Standards With EPRI IVM Standards

Twenty four (24) of the 42 criteria from the EPRI IVM standards were cross-referenced with the ANSI A300 recommended practices (Table 2-1 and Appendix C). All of the EPRI IVM principles were related to at least one ANSI A300 standard. Criteria that were most connected between the ANSI A300 standards and the EPRI IVM standards were the following (see Appendix C for full accounting of these and other connections):

- health and safety of employees (Criterion 3.3)
- consideration of a variety of treatment methods (Criterion 7.1)
- emphasize prevention/biological-ecological control (Criterion 7.3)
- promotion of non-chemical treatment methods (Criterion 8.2)
- judicious use of chemicals (Criterion 8.3)
- maintenance of equipment to prevent leaks (Criterion 8.5)
- inventories as a basis for prescription and treatment (Criterion 9.3)

Summary and Interpretation

A comparison of the NERC FAC-003-1 standards with the EPRI IVM standards supported the expectation that many elements of IVM are not covered by FAC-003-1. The FAC-003-1 standards are almost exclusively focused on documentation and activity associated with the following four elements of IVM: 1) tolerance levels as to when vegetation would need to be treated; 2) inventorying vegetation to determine a need for treatment with reference to tolerance levels; 3) planning for treatment (strategic and tactical); and 4) monitoring reliability. Nearly all elements of performance that are social or environmental are not included in the FAC-003-1 standard. Many of these missing elements are covered by the ANSI A300 standards.

It appears that if a transmission organization follows both the mandatory NERC FAC-003-1 standards and the voluntary ANSI A300 guidelines, a significant portion of IVM will be practiced; if only NERC FAC-003-1 standards are followed, most of IVM will not be practiced.

A transmission organization that fully implements both FAC-003-1 and ANSI A300 standards will still miss some elements of IVM, especially with regard to community relations and workers' rights (see Principle 3 of the EPRI IVM standard in Appendix B) and conserving culturally or ecologically special right-of-way sites.

3
STUDY #2: PATTERNS OF PERFORMANCE OF IVM WITHIN THE ELECTRIC UTILITY INDUSTRY

Study Objective

Transmission organizations have been conducting vegetation management under the auspices of FAC-003-1 for over 1-year. A survey of these organizations—as represented by the 29 members of EPRI's Rights-of-Way Research Program 57—was conducted to determine if electric utilities are practicing IVM, or if they are only focusing on meeting the FAC-003-1 standards.

Methods

An email questionnaire/survey was constructed to feature questions associated with all of the principles and criteria from the EPRI IVM performance standards (Appendices D and E). The survey was constructed with only 13 questions so that it could be completed in 30 minutes or less, so as to maximize participant involvement. A longer survey could have derived more information, but the return rate would have likely been reduced as more people would choose not to fill out the survey because of time limitations. Performance of IVM was measured through summated rating scales, i.e., multiple questions that combine several indicators and use Likert scales; e.g., after Germain et al. [2002]. Respondents were asked to describe various elements of their vegetation management program through directed questions or by rating IVM elements using a various scales to measure frequency. The survey was emailed to the 29 standing members of EPRI's Rights-of-Way Research Program 57 on December 1st, 2007 (see email in Appendix F and list of participants in Appendix G). A follow-up email was sent to survey participants on December 14th, 2007, so as to remind people about the surveys and extend the due date. A total of nine surveys were returned by December 31, 2007, for a return rate of 32 percent. The nine respondents represented transmission organizations that collectively manage a total of 40,261 miles of transmission ROWs, which is an average of 4,473 miles per company.

Survey results were summarized into one survey form (Appendix H). These results were rated in comparison to the EPRI IVM standard as follows: 1) meet; 2) marginally meet; and 3) do not meet, as presented on a question-by-question basis in the "Results" section, below.

Results

Question #1. What Are the Most Important Laws and Regulations That Govern Vegetation Management?

A variety of state and federal laws and regulations were listed by the survey participants, including universal listing of the NERC FAC-003-1 standards. State regulations commonly included those related to pesticide use and wetlands. Commonly listed federal regulations included the Endangered Species Act, Clean Water Act, National Historic Preservation Act, Healthy Forest Initiative, and the National Environmental Policy Act. A few, important references were made to ANSI A300 standards and the Memorandum of Understanding between Edison Electric Institute and federal agencies (Kuhn et al. 2006).

Comparison with EPRI IVM standard: Surveyed organizations meet the EPRI IVM standard with regard to awareness of laws and regulations. It was clear that all organizations did not provide a complete list of all local, state and federal laws and regulations that pertain to vegetation management on electric transmission line rights-of-way. It is expected that all such laws and regulations are being followed, and that a more complete accounting could be made by each organization for listing and reference.

Question #2. What Unauthorized Activities Occur on Rows? How Often Do These Activities Occur?

The most commonly cited unauthorized activities were encroachments (e.g., buildings, fences, race tracks, swimming pools, grade changes), dumping, and recreational use (e.g., snowmobiles, ATV, motorcycle). Also listed were regionally unique unauthorized activities such as mining and stockpiling (logs, manure, dirt). Unauthorized uses were described as occurring at varying amounts, including "weekly" and on "less than 2% of the lines". A difference in unauthorized uses was recognized as occurring in urban settings (high occurrence) versus suburban or rural settings (low occurrence).

Comparison with EPRI IVM standard: Surveyed organizations meet the IVM standard with regard to unauthorized use and associated compliance with laws.

Question #3. What Proportion Of Rows Are in Easement? Are All Easements Consistent and Complete in Regards to Being a Strong Legal Basis for Vegetation Management?

Proportion of ROWs in easement were reported to range from 33 to 99.9%, with a general average of 80%. Easements were generally described as not consistent nor complete in regards to being a strong legal basis for vegetation management. To quote one survey respondent: "Our easements are not consistent and complete in regards to being a strong legal basis for vegetation management. It varies a great deal. Many of our older easements do not make mention of vegetation management at all. Over the years we have developed stronger language (that) we have placed in our easements, especially in recent years, the last 10 years or so."

Comparison with IVM standard: Surveyed organizations do not meet the IVM standard with regard to easements and related tenure and use rights and responsibilities. An explicit and agreed upon legal framework for managing ROW land is critical to the sustained production of ROW conditions needed for the safe and reliable transmission of electricity. A key, legal document is the easement.

Question #4. How Are Consultations Maintained With People and Groups Directly Affected by Management Operations?

Most organizations conduct either formal or informal consultations with people and groups directly and indirectly affected by vegetation management operations. Various forms of notification are used for these consultations, including door hanger/flyers, mailings, phone, and personal contact (door-to-door). Personal contacts include an important emphasis on having technically qualified personnel from the utility at the point of the consultation.

Comparison with IVM standard: Surveyed organizations meet the IVM standard with regard to stakeholder consultations and community relations. A few organizations apparently only had marginal attention to these consultations.

Question #5. What Are the Most Common Stakeholder Disputes Associated With Vegetation Management?

The most common stakeholder dispute is how vegetation management affects aesthetics, with specific reference to loss of screening, visual impacts, and complaints about disturbance, mess and debris. Other disputes included access issues, use rights (e.g., questioning whether everything needs to be removed on the easement, questions about the easement itself—see finding associated with easements, above), and herbicide use (no herbicides desired).

Evaluation versus EPRI IVM standard: Surveyed organizations meet the IVM standard with regard to the awareness of disputes. The total number and diversity of disputes was relatively low, and mostly focused on aesthetics.

Question #6. What Types of Research and Development Activities Are Supported That Directly Affect Vegetation Management? What Type Of Support is Provided: in-Kind Or Monetary?

Surveyed organizations listed their current membership in EPRI and their support for Program 57 as their sole effort in research and development activities related to vegetation management. A few respondents indicated they also supported research activities with consulting firms and universities on transmission and distribution topics, including research on plant ecology and on effectiveness and efficacy of vegetation management treatments.

Evaluation versus EPRI IVM standard: Surveyed organizations meet the IVM standard with regard to research and development, mainly because of their support of EPRI's Rights-of-Way Program 57. In addition it might be valuable for transmission organizations to support local development of information and knowledge as related to vegetation management.

Question #7. What Types of Training Are Afforded to Vegetation Managers and Practitioners Each Year?

A mix of state, regional, national and international meetings and workshops are attended by respondents each year. Most commonly, meetings and workshops are associated with the International Society of Arboriculture. Pesticide applicator certification and safety were common training themes.

Evaluation versus EPRI IVM standard: Surveyed organizations meet the IVM standard with regard to training.

Question #8. What Are the Various Types of Cultural Resources That Are Conserved on Rows While Managing Vegetation?

Only a few respondents had management programs that included sensitivity to cultural resources, namely prehistoric and historic sites. These respondents indicated that they preclude the use of mowers in some areas, referencing the National Historic Preservation Act, and noting a connection of interest to archaeological sites. Most respondents erroneously included lists of areas that had been culturally treated, such as grasslands, Christmas tree farms, active orchards, and wildlife food plots—these are not cultural resources. Others respondents included lists of animals, such as falcons, ospreys, and birds—these too are not cultural resources.

Evaluation versus EPRI IVM standard: In general, surveyed organizations do not meet the IVM standard with regard to conservation of cultural resources. It may be that these resources are being routinely conserved, but that there was some misunderstanding in the survey as to what was meant by "cultural resources".

Question #9. How Is the Implementation Of Your Management Plans Monitored?

Monitoring was described as involving specialized personnel (e.g., line foremen, senior forester, utility forester, engineering technician) and was focused on vegetation condition before and after treatment. Annual line patrols, on the ground or by air (helicopter), are a routine part of many organizations. Only one organization mentioned monitoring elements other than related to vegetation, indicating that quality of work and customer satisfaction were monitored.

Evaluation versus EPRI IVM standard: Surveyed organizations marginally meet the IVM standard with regard to monitoring. Monitoring should focus on determining if management was successful in achieving objectives. Objectives should be specific, measurable and achievable, and be developed in a way that is sensitive to stakeholders and fully accounts for important environmental, social and economic elements of the system. Survey respondents focused on

vegetation conditions as the management element of interest only. Monitoring information is intended to demonstrate to stakeholders the outcomes of vegetation management over time, but more importantly, it is used to improve the system based on empirically-based determinations that management objective were not met. This effort at improvement based on monitoring is referred to as "adaptive management". In the IVM system, it is this adaptive management that starts the new management cycle over again.

Question #10. What Vegetation Management Treatments Are Available for and Used in Operations?

Mechanical (mowing, handcutting) and chemical (herbicides) treatments were indicated as being predominantly "Usually" used and cultural treatments (planting low-growing vegetation, fertilizing) as "Seldom" used; biological/ecological (promote low-growing plants to suppress trees) were described as having mixed use with "Always", "Usually", "Seldom" and "Never" indicated by 22%, 33%, 33% and 11% of the respondents.

Evaluation versus EPRI IVM standard: Surveyed organizations apparently, generally both meet and do not meet the IVM standard with regard to types of treatments being used to control vegetation on ROWs. A wide range of treatments are being used, but there is apparently not enough emphasis on biological/ecological control methods. IVM requires the integration of biological/ecological control into all treatment schemes. Biological/ecological control lead to a long-term reduction in pest (usually tall-growing tree) populations and attendant reductions over time in treatment efforts and associated reductions in environmental impacts and other direct and indirect costs.

Question #11. What Environmental Factors Are Considered When Managing Vegetation?

Water resources, wildlife and rare, threatened and endangered species are "Usually" to "Always" considered by 89%, 100%, and 100% of the respondents in vegetation management on ROWs, respectively. Non-native, invasives are "Seldom" considered (56% of respondents). Consideration of biodiversity and aesthetics were mixed amongst the respondents, with "Always", "Usually", "Seldom" and "Never" indicated by 0%, 33%, 44% and 11% of the respondents for biodiversity, respectively, and indicated by 0%, 44%, 44% and 12% for aesthetics, respectively.

Evaluation versus EPRI IVM standard: Surveyed organizations both meet and do not meet the IVM standard with regard to environmental factor considerations for water resources, wildlife, and rare, threatened and endangered (RT&E) species, but only marginally meet or do not meet the IVM standard for biodiversity and aesthetics. Biodiversity is a complex subject that includes water resources, wildlife, and RT&E species—but it is more than these. Biodiversity is a word used to capture the management accounting of all aspects of life in our ecosystems of interest, ranging from awareness of variability in gene pools associated with individual species of all forms of life (from bacteria to megafauna) to the functions that are the outcome of all the interacting elements of an ecosystem. Healthy functioning ecosystems are generally those that are biodiverse. The other area of apparent shortfall in terms of vegetation manager consideration

is aesthetics. Aesthetics is the reaction of stakeholders to an environment in terms of how it makes them feel. While all five human senses are linked to aesthetics, visuals are the key component of aesthetics as controlled by vegetation managers on transmission ROWs. Aesthetics is a source of concern and disputes for stakeholders who directly interact with vegetation management on transmission ROWs (see Question #5). The apparent disconnect between the low level of importance assigned to aesthetics by vegetation managers and the high degree of importance assigned to aesthetics by stakeholders seems a critical area for IVM work.

Full consideration of environmental factors, in concert with other considerations related to economics and administration, is made accessible and accountable using cost effectiveness metrics. Cost effectiveness metrics both measures and predicts the success of treatments in balancing stakeholder responses, economics, plant community dynamics and related environmental considerations. An important aspect of cost effectiveness is the indirect costs of treatments associated with their impacts on water quality, wildlife habitat and aesthetics.

Question #12. Which Elements Are Included in Written Prescriptions (Operational Plans) For Vegetation Management?

Nearly all major elements for written plans were indicated as being included in such by the respondents, including land management unit designation (67% yes), description of current vegetation and environmental conditions (67% yes), desired future condition (89% yes), definition of treatment (78% yes), and site-specific maps (89% yes). Only the element of justifying treatments was not rated by the majority as "yes": 44% yes, and 56% no.

Evaluation versus EPRI IVM standard: Surveyed organizations meet the IVM standard with regard to operational-level planning. Operational-level plans are also referred to as "prescriptions". Prescriptions in vegetation management should be developed by a professional based on inventories of site and vegetation conditions, and should be site-specific. Written prescriptions are critical so that ROW conditions and treatment efforts can be documented over time, which may be an important form of monitoring.

Question #13. How Important Are the Following For Vegetation Management On Transmission Rows?

1. Compliance with laws
2. Accounting of ownership and tenure use rights
3. Developing community relations
4. Conserving worker rights
5. Management planning
6. Understanding pest and managed ecosystem dynamics
7. Use of tolerance thresholds in deciding to treat vegetation
8. Maintaining a broad array of vegetation treatments
9. Cost effectiveness measures as a basis for prescribing vegetation treatments

10. Site-specific implementation of treatments
11. Adaptive management and monitoring

None of the phrases were rated as "not important". Most respondents rated all the phrases as important to critical; only "Compliance with laws" was rated as "critical" by all respondents.

Evaluation versus EPRI IVM standard: Surveyed organizations apparently meet the IVM standard with regard to recognizing the importance of all of the phrases. The phrases were directly related to the 10 principles of the EPRI IVM standards, so such high ratings from the respondents is indicative of the respondents broad, general commitment to practicing IVM.

Synthesis and Interpretation

Are transmission organizations in EPRI's Rights-of-Way Program 57 conducting IVM? The answer: yes, with some important areas for improvement.

The elements of the EPRI IVM standard that the transmission organization apparently met includes the following:

- awareness of laws and regulations
- concern for unauthorized uses
- maintenance of high level of notification and consultation with stakeholders
- research and development activity
- completeness of written operational plans, or prescriptions
- monitoring of vegetation conditions
- consideration of water quality, wildlife and RT&E species

The areas of EPRI IVM that were apparently not met included the following:

- monitoring social elements
- missing emphasis on biological/ecological control as the means for treating vegetation
- lack of consideration of biodiversity and aesthetics

Given these results, it appears that NERC FAC-003-1 regulations have not negatively affected the practice of IVM. However, the questionnaire respondents were only part of a select group of electric transmission organizations—those belonging to EPRI's Rights-of-Way Program 57. These organizations may not represent the industry, and it may be that other transmission organizations practice forms of vegetation management that is much less like the EPRI IVM system.

4
SUMMARY AND SYNTHESIS OF THE TWO STUDIES

EPRI has co-sponsored the development of IVM performance standards over the past 5 years with various utilities, academics, and state and federal agencies (see website: www.esf.edu/ivm). These performance standards were based on an accepted, operational system for IVM and strategic and tactical elements associated with Environmental Management Systems (e.g., ISO 14001). These EPRI-based standards for IVM are at a "proof of concept" stage. One Department of Transportation (New York State; Nowak 2005) and three electric utilities have been assessed using the IVM standards (Public Service Company of New Mexico in 2006, East Kentucky Power Cooperative in 2007, and New York Power Authority in 2008). EPRI's objective is to refine the performance standards and their use across the United States.

At the operational-level, IVM is considered to be a system composed of steps that formalizes the relationships among phases of management to prevent, monitor, and control undesirable plants and plant communities (EPRI 2002; Nowak and Ballard 2005). In addition to these operational steps, the EPRI-sponsored IVM standards include principles and criteria on policy, planning and procedures consistent with Environmental Management Systems. In total, there are 10 principles and 42 criteria that describe all of the environmental, social and economic elements of an IVM system (Nowak et al. 2008).

The new NERC regulations – FAC-003-1 Transmission Vegetation Management – were developed in 2006 to minimize vegetation-related transmission outages. The emphasis of the standards is on documentation (planning of vegetation maintenance and monitoring of outages) and control of vegetation (tolerance levels, inventory of vegetation conditions, and treatment) (EPRI 2007, also see results reported in Section 1 of this report). If transmission owners focus their vegetation management activities to only narrowly meet the FAC-003-1 standards, most of the elements and processes of IVM will be ignored. A comparison of the NERC FAC-003-1 standards with the EPRI IVM standards supported the expectation that most elements of IVM are not covered by FAC-003-1. The FAC-003-1 standards are almost exclusively focused on documentation and activity associated with the only following four elements of IVM: 1) tolerance levels as to when vegetation would need to be treated; 2) inventorying vegetation to determine a need for treatment with reference to tolerance levels; 3) planning for treatment (strategic and tactical); and 4) monitoring reliability. Nearly all elements of performance that are social or environmental are not included in the FAC-003-1 standard. Many of these missing elements are covered by the voluntary ANSI A300 standards. If NERC FAC-003-1 and ANSI A300 guidelines are combined to guide practice, it appears that much of IVM will be practiced.

A survey of EPRI Rights-of-Way Program 57 members was used to discern levels of awareness and engagement of transmission organizations in the practice of IVM. Current vegetation management as practiced on electric transmission line ROWs was found to be relatively consistent with IVM principles and elements. Only a few elements of IVM are apparently,

inconsistently practiced by Program 57 members. Given these results, it appears that NERC FAC-003-1 regulations have not negatively affected the practice of IVM. However, the questionnaire respondents were only part of a select group of electric transmission organizations—those belonging to EPRI's Rights-of-Way Research Program 57. These organizations may not represent the industry, and it may be that other organizations practice forms of vegetation management that is much less like the EPRI IVM system. It is highly possible that transmission organizations that do not belong to EPRI's Program 57 will endeavor to only, minimally meet the NERC FAC-003-1 standards, that the voluntary ANSI A300 standards will not be followed, and that the practice of IVM will be abandoned, if even attempted. If this is the case, there will be important, attendant breakdowns of critical social and environmental elements of IVM.

5
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A
ACRONYMS

EPRI	Electric Power Research Institute
FERC	Federal Energy Regulatory Commission
IVM	Integrated Vegetation Management
NERC	North American Electric Reliability Corporation
ROW	Right-of-Way (singular)
ROWs	Rights-of-Way (plural)

B

EPRI STANDARDS FOR ASSESSING PERFORMANCE OF INTEGRATED VEGETATION MANAGEMENT ON RIGHTS-OF-WAY

PRINCIPLE #1: COMPLIANCE WITH LAWS

Laws and regulations are constructs developed to protect natural resources and associated benefits and values accruable to society. IVM practitioners meet or exceed all laws, regulations, and guidelines related to vegetation management on ROWs.

1.1. Vegetation management shall respect all national, state, and local laws and regulations, for example, use of pesticides by certified applicators, Best Management Practices and other protective measures for water quality that exist within the state or other appropriate jurisdiction(s) in which the operations occur.

1.2. Vegetation management areas should be protected from unauthorized activities.

1.3. Managers and practitioners shall demonstrate a long-term commitment to adhere to the IVM Principles and Criteria.

a) Where opportunities afford, IVM Principles and Criteria are explicitly supported in the public arena.
b) Commitment is well defined via environmental policy.

PRINCIPLE #2: TENURE AND USE RIGHTS AND RESPONSIBILITIES

Sustainable land management, including vegetation management, requires that the land be properly vested, clearly owned, and demarcated.

2.1. Clear evidence of long-term land use rights (e.g., land title or lease agreements) shall be demonstrated, including clearly identified, on-the-ground land boundaries.

2.2. Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights.

a) Resource conflicts with adjoining landowners or other resource users are resolved or being addressed in a systematic and legal manner.

PRINCIPLE #3: COMMUNITY RELATIONS AND WORKERS' RIGHTS

IVM shall maintain or enhance long-term social and economic well-being of vegetation management workers. A fairly compensated, respected, knowledgeable workforce is critical to long-term, sustainable vegetation management.

3.1. The rights of workers to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in Conventions 87 and 98 of the International Labor Organization (ILO).

a) Managers and their contractors develop effective and culturally sensitive mechanisms to resolve disputes between workers and management.
b) Workers are free to associate with other workers for the purpose of advocating for their own employment interests.

3.2. The communities adjacent to the vegetation management area should be given opportunities for other professional services from the vegetation manager such as: representation in local civic activities, e.g., Earth Day cleanup, Arbor Day plantings, etc. contribution to public education about vegetation management practices in conjunction with schools, community colleges, and/or other providers of training and education.

3.3. Vegetation management meets or exceeds all applicable laws and regulations covering health and safety of employees, including the development and implementation of safety programs and procedures that include the following:

a) well-maintained and safe machinery and equipment;
b) use of safety equipment appropriate to each task;
c) documentation and posting of safety procedures in the workplace;
d) education and training;
e) contracts with safety requirements; and
f) safety records, training reports, and certificates.

3.4. Appropriate mechanisms are employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources, or livelihood of local peoples. Measures shall be undertaken to avoid such loss or damage.

a) Managers attempt to resolve grievances and mitigate damage resulting from management activities through open communication and negotiation prior to legal action.
b) Managers and their contractors have adequate liability insurance.

3.5 Workers are fairly compensated for work, especially in wage levels as matched to the degree of skill and difficulty in job.

PRINCIPLE #4: MANAGEMENT PLANNING

Documentation of philosophy, principles, procedures and practices are critical to long-term, sustainable management, as embodied by various levels of plans, including resource inventories and maps. Written plans cause managers to be held highly accountable for both successes and failures as judged against stated goals and objectives. Improvement in management practices are predicated on learning from both successes and failures.

4.1. A strategic management plan and supporting documents must be in place that provide:

a) Management policy and objectives.
b) Description of the resources to be managed (e.g., water, soil, wildlife, aesthetics) and socioeconomic conditions, and a profile of adjacent lands.
c) Description of the vegetation management system, based on the ecology of the ecosystem in question and information gathered through resource inventories.
d) Provisions for monitoring, including feedback mechanisms for revising procedures as appropriate to more effectively achieve objectives.
e) Environmental limitations and safeguards, based on environmental assessments.
f) Plan for biodiversity.
g) Maps describing the resource base.

4.2. Tactical management plans are developed that report local considerations and activity plans on a year-by-year basis.

4.3. Strategic and tactical management plans shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social, and economic circumstances.

4.4. A summary of vegetation management activities is produced annually, and both strategic and tactical management plans are revised at least every 10 years.

4.5. Workers shall receive adequate training and supervision to ensure proper implementation of the management plans.

4.6 Organization infrastructure, e.g., vegetation treatment equipment, including computers and GPS, is well developed and maintained to ensure proper implementation of the management plans.

4.7. While respecting the confidentiality of information, vegetation managers shall make publicly available a summary of primary elements of the management plan, including those listed in Criterion 4.1.

PRINCIPLE #5: UNDERSTANDING PEST AND ECOSYSTEM DYNAMICS

Knowledgeable managers and practitioners are needed. Being able to identify pests and desirable organisms in the managed system, and understanding the ramifications of management based on knowing life histories and ecosystem processes, is foundational knowledge for IVM.

5.1. Vegetation managers are knowledgeable about the managed ecosystem, especially with regard to the basic biology and ecology of all organisms in the system, and the environment in which they live.

5.2. Research and development activities are engaged to produce missing basic information on ecology of the managed ecosystem.

5.3. Vegetation managers and practitioners are provided opportunities to improve their skills and knowledge through training.

PRINCIPLE #6: SETTING MANAGEMENT OBJECTIVES AND TOLERANCE LEVELS

IVM, as developed from IPM, depends upon basic elements to function as a system. Tolerance levels are one of the top elements as part of IVM, whereby vegetation is only treated if critically necessary to meet objectives. Objectives are set in context of socioeconomics and environmental desires.

6.1. Management planning, including the development of management objectives, shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups directly affected by management operations (see also Criterion 6.3 and PRINCIPLE #4).

6.2. Tolerance levels are used to develop thresholds for when vegetation management activities are applied to control vegetation.

6.3. People and groups affected by management operations are apprised of proposed vegetation management activities and associated environmental and aesthetic effects in order to solicit their comments or concerns.

6.4. Significant concerns identified in Criteria 6.1 and 6.3 are addressed in management policies and plans (for example, management activities are modified in response to concerns, or a rationale is provided for not responding to a concern).

PRINCIPLE #7. COMPILATION OF A BROAD ARRAY OF TREATMENT OPTIONS

IVM does not focus on the use of one treatment; instead, every ROW management situation has a treatment prescribed only after considering all possible treatments. A full "toolbox" of treatments is needed to make this consideration full and robust.

7.1. A wide variety of different mechanical, physical, chemical, cultural, and biological/ecological treatments are available for use/consideration on all sites.

7.2. New treatments are progressively evaluated and added to the vegetation management program, with emphasis on non-herbicide alternatives.

7.3. Where possible, treatments are featured that lead to, directly or indirectly, pest prevention and biological and ecological control of pests.

PRINCIPLE #8: ACCOUNTING FOR ECONOMIC AND ECOLOGICAL EFFECTS OF TREATMENTS

Cost effectiveness of treatments, in its broadest sense, is used as a basis for selecting treatments. A conservative, environmental approach is used that favors prevention. If control is needed, there is an effort to use non-synthetic pesticide alternatives and biological approaches.

8.1. Vegetation management should strive toward economic viability, while taking into account the full environmental, social, and operational costs of vegetation management. Treatment choices are made with full consideration of cost effectiveness, including a wide array of positive and negative environmental externalities.

a) Water resources: perennial and ephemeral streams, wetlands, vernal pools, seeps (see also Criterion 8.5).
b) Wildlife: common plants, animals and their habitats, and imperiled, threatened, and endangered species and their habitats (according to state and federal statutory listings).
c) Biodiversity: efforts are made to control invasive, exotic plants; also, if state or federal listings and species databases indicate the likely presence of a rare, threatened or endangered species or plant community type, either a survey is conducted prior to management activities being carried out (to verify the species presence or absence) or the vegetation manager manages as if the species were present. If an applicable species and plant community type is determined to be present, its location is reported to the manager of the applicable database, and necessary modification are made in both the management plan and its implementation.

d) Aesthetics: visual impacts of treatments are assessed. Written guidelines shall be prepared and implemented to address management of these resources.

8.2. Management systems shall promote the development and adoption of environmentally-sensitive, non-chemical methods of pest management and strive to minimize the use of chemical pesticides. If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks. (see also Criterion 1.1)

8.3. Chemicals are used to control plants only when non-chemical management practices have proven ineffective or cost prohibitive.

8.4. When chemicals are used, a section is included in the prescription that fully describes the risks and benefits of their use and the precautions that workers must employ. Records are kept to document the occurrence of pests, measures to control them, and incidences of worker exposure to chemicals.

8.5. Broken and leaking equipment and parts are repaired and removed from a right-of-way as they may contaminate a site with fuel, oil, or other chemicals; discarded parts are taken to a designated disposal facility. Equipment is not parked in riparian zones, or near groundwater supplies, where fluid can leak into them.

8.6. Chemicals, containers, and liquid or solid non-organic wastes including fuel and oil shall be disposed of in an environmentally appropriate manner at off-site locations. (see also Criterion 1.1)

8.7. Use of exotic species in planting is minimized, carefully controlled, and actively monitored to avoid adverse ecological impacts. Furthermore, use of exotic plant species is contingent on peer-reviewed scientific evidence that any species in question is non-invasive and does not diminish biodiversity. If non-invasive exotic plant species are used, the location of their use is documented, and their ecological effects actively monitored.

8.8. Special cultural, ecological, economic or religious resources shall be clearly identified, recognized and protected by vegetation managers.

PRINCIPLE #9: SITE SPECIFIC IMPLEMENTATION OF TREATMENTS

ROWs should be divided into ecologically- and socioeconomically-sensible management zones. These zones have vegetation management plans (prescription) that are contemporaneous in development and benchmarks for future evaluations of treatment success.

9.1. Land management units are designated within right-of-way for areas that warrant different management treatments, for example, buffers to protect water resources, conservation areas, and vegetative communities that may cause a change in successional directions or rate.

9.2. Written prescriptions (or, operational plans) are used to describe/prescribe treatments on a land management unit basis, and justify treatment choices using ecological, socioeconomic, and administrative opportunities and constraints. Prescriptions should include the following:

a) land management unit designation;
b) description of current vegetation and environmental conditions;
c) desired future conditions;
d) definition of treatment;
e) justifications for treatment based on tolerance thresholds (also see PRINCIPLE # 6) and ecological, environmental, socioeconomic, and administrative considerations; and
f) site-specific maps that detail land management units, and show important cultural and environmental features.

9.3. Prescriptions and the decision to treat are based on contemporary inventories of vegetation and environmental conditions.

PRINCIPLE #10: ADAPTIVE MANAGEMENT AND MONITORING

IVM has a self-improvement mechanism: vegetation management objectives are used to evaluate whether management outcomes are acceptable. Monitoring is the collection of appropriate data to judge successes and failures of vegetation management. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessment of change.

10.1 Implementation of the strategic and tactical management plans are periodically monitored to assess the following:

a) the degree to which the management vision, goals and objectives have been achieved;
b) deviations from the plan;
c) unexpected effects of management activities and other disturbances; and
d) social and environmental effects of management.

10.2. Vegetation management should include the research and data collection needed to monitor, at a minimum, the following indicators:
   a) condition of the right-of-way;
   b) composition and changes in the flora and fauna;
   c) environmental and social impacts of operations;
   d) chemical use; and
   e) cost, productivity, effectiveness and efficiency of vegetation management.

10.3. Results of monitoring shall be incorporated into the implementation and revision of the management plan.

10.4. While respecting the confidentially of information, vegetation managers shall make publicly available a summary of the results of monitoring indicators, including those listed in 10.1.

C

REQUIREMENT-SPECIFIC CROSS-REFERENCING OF THE EPRI IVM STANDARDS WITH THE NERC STANDARD FAC-003-1 -- TRANSMISSION VEGETATION MANAGEMENT PROGRAM AND THE ANSI A300 (PART 7)-2006 IVM STANDARDS

	Industry Standards*	
	NERC	**ANSI**
EPRI IVM Standards -- Principles and Criteria**	**FAC-003-1**	**A300**
Principle 1: Compliance With Laws		
Criterion 1.1: abide by all laws and regulations		71, 74.1
Criterion 1.2: control of unauthorized use		
Criterion 1.3: demonstrated long-term commitment to IVM		74.2
Principle 2: Tenure and Use Rights and Responsibilities		
Criterion 2.1: easements and other, formal defined use rights		74.6.2
Criterion 2.2: dispute resolution with external stakeholders	R1.4	73.4.1
Principle 3: Community Relations and Workers' Rights		
Criterion 3.1: rights of workers to organize and negotiate		
Criterion 3.2: workers as civic participants via service		
Criterion 3.3: health and safety of employees		70.4, 70.4.1, 70.4.2, 70.4.3, 74, 74.1
Criterion 3.4: worker grievance resolution		
Criterion 3.5: fair wage levels and other worker compensation		
Principle 4: Management Planning		
Criterion 4.1: strategic management plan	R1	
Criterion 4.2: tactical management plan	R1, R2	
Criterion 4.3: periodic revision of management plans		
Criterion 4.4: public summary of planned management activities		
Criterion 4.5: skilled and knowledgeable workforce	R1.3	70.3.1
Criterion 4.6: organizational infrastructure needed for management		
Criterion 4.7: annual public summary of management plans		

	Industry Standards*	
	NERC	**ANSI**
EPRI IVM Standards -- Principles and Criteria**	**FAC-003-1**	**A300**
Principle 5: Understanding Pest and Ecosystem Dynamics		
Criterion 5.1: biological/ecological knowledge of ROW systems		72.22, 75.3.1
Criterion 5.2: research and development		
Criterion 5.3: worker training	R1.3	70.3.1
Principle 6: Setting Management Objectives and Tolerance Levels		
Criterion 6.1: setting management objectives, including social		73.1.1
Criterion 6.2: use of tolerance levels	R1.2, R1.2.1, R1.2.2., R1.2.2.1, R1.2.2.2	73.1.2, 74.3
Criterion 6.3: stakeholder consultations		73.4.1
Criterion 6.4: regular modification of plans using 6.1-6.3		
Principle 7: Compilation of a Broad Array of Treatment Options		
Criterion 7.1: consideration of a variety of treatment methods	R2	73.3.1, 73.3.3, 75.5, 75.5.1, 75.5.2, 75.6, 75.6.1, 75.6.2, 75.6.3
Criterion 7.2: regular addition of new treatment methods		
Criterion 7.3: emphasize prevention/biological-ecological control		70.2, 73.3.4, 74.5, 74.6.1
Principle 8: Accounting for Economic and Ecological Effects of Treatments		
Criterion 8.1: cost effectiveness (economics, environment)		73.3.2, 75.2.1.3
Criterion 8.2: promotion of non-chemical treatment methods		74.4, 74.4.1, 74.4.2, 75.4.1
Criterion 8.3: judicious use of chemical treatment methods		75.2.1, 75.2.1.1, 75.2.1.2, 75.2.1.4, 75.2.1.5, 75.3.3
Criterion 8.4: pesticide use record keeping		71
Criterion 8.5: maintenance of equipment to prevent fluid leaks		75.1, 75.1.1, 75.1.2

Requirement-specific cross-referencing of the EPRI IVM Standards with the NERC Standard FAC-003-1 -- Transmission Vegetation Management Program and the ANSI A300 (Part 7)-2006 IVM standards

	Industry Standards*	
	NERC	**ANSI**
EPRI IVM Standards -- Principles and Criteria**	**FAC-003-1**	**A300**
Criterion 8.6: chemical/container disposal		71
Criterion 8.7: non-use of exotics in planting		
Criterion 8.8: special sites (e.g., cultural, ecological) are conserved		
Principle 9: Site-Specific Implementation of Treatments		
Criterion 9.1: small-scale land management unit designation		75.3.2, Annex A
Criterion 9.2: written prescriptions/operational plans		73.2.5
Criterion 9.3: inventories as a basis for prescription / treatment	R1.1	73.2.1, 73.2.2, 73.2.3
Principle 10: Adaptive Management and Monitoring		
Criterion 10.1: monitoring implementation of management plans	R1.5, R3, R3.1, R3.2, R3.3, R3.4, R3.4.1, R3.4.2, R3.4.3	74.7.1, 74.7.2
Criterion 10.2: monitoring vegetation management activities/effects		73.2.4, 73.2.5
Criterion 10.3: periodic revision of plans based on monitoring		
Criterion 10.4: public summary of monitoring results	R3, R4	

Source of standards: see NERC (2006) and ANSI (2006) in Literature Cited section of the report.

* The letter/number sets as referenced are the specific requirement or performance element associated with the two standards.

** Each Criterion is presented with a simple description of its associated elements—see the full standard in Appendix C for a complete accounting of those elements.

D

2007 VEGETATION MANAGEMENT QUESTIONNAIRE – EPRI'S RIGHTS-OF-WAY PROGRAM 57

Please answer the following set of questions as they relate to your company's vegetation management program, practices, and personnel for transmission line rights-of-way (ROWs). Results of this survey will be summarized and reported on an EPRI and industry-wide bases; therefore, your individual responses will be strictly confidential.

Company name: _____

Your name and company position (job title):
_____

Transmission lines managed (miles):

_____ <100kV _____ 100-199 kV _____ 200-500 kV _____ > 500 kV

Miles of transmission line requiring active vegetation management: _____

VEGETATION MANAGEMENT QUESTIONS

1) What are the most important laws and regulations that guide your vegetation management?

2) What unauthorized activities occur on your ROWs? How often do these activities occur?

3) What proportion of your ROW is in easement? Are all easements consistent and complete in regards to being a strong legal basis for vegetation management?

4) How are consultations maintained with people and groups directly affected by management operations?

5) What are the most common stakeholder disputes associated with vegetation management?

6) What types of research and development activities are supported by your company that directly affect vegetation management? What type of support is provided: in-kind or monetary?

7) What types of training do you and your associated vegetation managers and practitioners attend each year?

8) List the various types of cultural resources that you have conserved on ROWs while managing vegetation.

9) How do you monitor the implementation of your management plans?

10) What vegetation management treatments are applied in your operations? (Always, Usually, Seldom, Never)

Mechanical (mowing, handcutting, etc.)?
Chemicals (herbicides)?
Cultural (plant low-growing vegetation, fertilizing, etc.)?
Biological/ecological (promote low-growing plants to suppress trees)?
Comments: _____

11) What environmental factors are considered when managing vegetation? (Always, Usually, Seldom, Never)

Water resources?
Wildlife?
Rare, threatened and endangered species and communities?
Non-native, invasives?
Biodiversity?
Aesthetics?
Comments: _____

12) Which of the following elements do you include in your written prescriptions (operational plans) for vegetation management? (Yes, No or Not Applicable)

Land management unit designation?
Description of current vegetation and environmental conditions?
Desired future conditions?
Definition of treatment?
Justification of treatment?
Site-specific maps?
Comments: _____

Please rate the following phrases with regard to their importance to your vegetation management program for transmission line rights-of-way. Use a scale from 1 to 5, with 1 being not important, 3 important, and 5 critical:

Compliance with laws?
Accounting of ownership and tenure use rights?
Developing community relations?
Conserving worker rights?
Management planning?
Understanding pest and managed ecosystem dynamics?
Use of tolerance thresholds in deciding to treat vegetation?
Maintaining a broad array of vegetation treatments?
Cost effectiveness measures as a basis for prescribing vegetation treatments?
Site-specific implementation of treatments?
Adaptive management and monitoring?

E

RELATING THE EPRI PROGRAM 57 VEGETATION MANAGEMENT QUESTIONNAIRE QUESTIONS TO THE PRINCIPLES AND CRITERIA ASSOCIATED WITH EPRI'S VEGETATION MANAGEMENT STANDARD

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1. **What are the most important laws and regulations that guide your vegetation management?** See Principle #1, Criterion 1.1
2. **What unauthorized activities occur on your ROWs? How often do these activities occur?** See Principle #1, Criterion 1.2
3. **What proportion of your ROW is in easement? Are all easements consistent and complete in regards to being a strong legal basis for vegetation management?** See Principle #2, Criterion 2.1
4. **How are consultations maintained with people and groups directly affected by management operations?** See Principle #3, in general, and Principle #6, Criterion 6.3 and 6.4
5. **What are the most common stakeholder disputes associated with vegetation management?** Principle #2, Criterion 2.2, and Principle #3, Criterion 3.4
6. **What types of research and development activities are supported by your company that directly affect vegetation management? What type of support is provided: in-kind or monetary?** Principle #5, Criterion 5.2
7. **What types of training do you and your associated vegetation managers and practitioners attend each year?** Principle #4, Criterion 4.5, and Principle #5, Criteria 5.1 and 5.3
8. **List the various types of cultural resources that you have conserved on ROWs while managing vegetation.** Principle #8, Criterion 8.8, and Principle #9, Criterion 9.2
9. **How do you monitor the implementation of your management plans?** Principle #10, Criteria 10.1 and 10.2
10. **What vegetation management treatments are applied in your operation?** Principle #7, Criteria 7.1 and 7.3

11. **What environmental factors are considered when managing vegetation – water resource; wildlife; rare, threatened and endangered species; non-native, invasives; biodiversity and/or aesthetics?**
    Principle #8, Criterion 8.1

12. **Which of the following elements do you include in your written prescriptions (operational plans) for vegetation management – land management unit designation; description of current vegetation and environmental conditions; desired future condition; definition of treatment; justification of treatment; and site-specific maps?**
    Principle #9, Criteria 9.1 and 9.2

13. **Please rate the following phrases with regard to their importance to your vegetation management program for transmission line rights-of-way. Use a scale from 1 to 5, with 1 being not important, 3 important, and 5 critical:**
    Each of the phrases is associated with one of the principles from the EPRI IVM standards.

    1. Compliance with laws
    2. Accounting of ownership and tenure use rights
    3. Developing community relations
    4. Conserving worker rights
    5. Management planning
    6. Understanding pest and managed ecosystem dynamics
    7. Use of tolerance thresholds in deciding to treat vegetation
    8. Maintaining a broad array of vegetation treatments
    9. Cost effectiveness measures as a basis for prescribing vegetation treatments
    10. Site-specific implementation of treatments
    11. Adaptive management and monitoring

F

EMAIL TO POTENTIAL PARTICIPANTS IN THE 2007 VEGETATION MANAGEMENT QUESTIONNAIRE AS PART OF THE EPRI RIGHTS-OF-WAY PROGRAM 57 STUDY

Name, title of survey respondent:

I am writing to ask your help in an EPRI study on the level of Integrated Vegetation Management (IVM) on transmission power line corridors to help the industry better understand the broad impact of federal regulations on vegetation management and the transmission of electricity. The FERC/NERC standards apparently are in near final form, and they have already affected vegetation management practices across the country. It is surmised that some of those affects may have negative environmental, social and economic consequences. Understanding the current state of IVM practice will aid in determining the short- and long-term effects of federal regulations.

John W. Goodrich-Mahoney, EPRI's Rights-of-Way Program Manager (Program 57), provided me with your contact information and indicated that I could ask your assistance in completing the attached electronic questionnaire. Results from the questionnaire will be used to gauge the level of IVM being performed by you and your company. Questions related to key elements of the IVM system are the focus of the questionnaire, as defined by EPRI and the electric industry over the last decade. In order for us to know what affects the FERC/NERC regulations will have on vegetation management, it is important to have a baseline on current industry practice. Your collective responses to the survey will help us gain that knowledge.

Your answers to the survey questions will be confidential and will be released only as summaries along with others in which no individual's answers can be identified. When you electronically complete your survey, you and your company's name will be deleted and never connected to your answers in any way. The questionnaire is voluntary; however, you can help us very much by taking time to share your knowledge, experiences and opinions.

Please respond electronically (the questionnaire is a Word document and should be able to accept your typewritten answers) within 10 days (DUE: December 10th) so as to assure your input is included in the pending EPRI Technical Report. If for some reason you prefer not to respond, please let me know by returning a blank survey via email. My email address is: canowak@esf.edu

If you have any questions or comments about this study, I would be happy to talk with you. My phone number is: 315-470-6575. Or you may contract John W. Goodrich-Mahoney at 202-293-7516.

Thank you for helping with this important study.

Sincerely,

Chris Nowak

Christopher A. Nowak, PhD
Principal, C.A. Nowak Consulting
Associate Professor
Chair, Undergraduate Studies Committee
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G

LIST OF PARTICIPANTS IN THE 2007 VEGETATION MANAGEMENT QUESTIONNAIRE AS PART OF THE EPRI RIGHTS-OF-WAY PROGRAM 57 STUDY

Contact Person	Company
Karl Schoeberl	Central Hudson Gas & Electric Co.
Terry Eaton	Kansas City Power & Light Co.
Larry Fernandez	Keyspan Energy / LIPA
Lew Payne	New York Power Authority
Karen Noe	Public Service Electric and Gas
Ray Hedrick	Salt River Project
Tina Broyles	Tennessee Valley Authority
Karl Myers	Tri-State G&T Association, Inc.
Kenneth Kinsey	TXU / OnCor Electric Delivery

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SUMMARIZED RESPONSES TO THE QUESTIONS IN THE 2007 VEGETATION MANAGEMENT QUESTIONNAIRE – EPRI'S RIGHTS-OF-WAY PROGRAM 57

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1) What are the most important laws and regulations that guide your vegetation management?
- NERC FAC-003-1
- NYSPSC Case 04-E-0822
- NYSDEC Pesticide Rules/Regs
- NYSDEC Wetlands
- NERC/FERC
- Missouri PSC 2007 rulings
- NYS PSC part 84 –development and implementation of a system wide long range vegetation management plan.
- NYS PSC Article VII agreements for building some of the newer lines
- FERC Standard FAC-003-1
- FERC/NERC
- NJ Board of Public Utilities
- Freshwater Wetland Regulations
- T&E Species
- new NERC FAC-003-1 standard
- ANSI A300, Tree Care Operations (Part 1) – 2001 Pruning; ANSI A300 (Part 7) – 2006 IVM; ANSI Z133.1 – 2006; ISA Best Management Practices: Utility Pruning of Trees – 2004; ISA Best Management Practices Tree Pruning – 2002
- Endangered Species Act, Clean Water Act and the National Historic Preservation Act, as well as other environmental requirements
- NERC FAC-003 Transmission Vegetation Management Program, 2006
- FERC Vegetation Management Order, 2004
- National Fire Plan, 2000
- Executive Order 13212
- Healthy Forests Initiative
- Vegetation Management Order
- Energy Policy Act of 2005 (P.L. 109-58) (Signed August 8, 2005)
- MOU between Edison Electric Institute and Federal Agencies (USFS, BLM, NPS, USFWS and EPA) Confirmed May 25, 2006
- Easement grant
- FERC regulations
- Forest Service Special Use Permits
- FIFRA
- ESA

- NEPA
- NERC Reliability Standards
- FERC regulations
- State tariff

2) What unauthorized activities occur on your ROWs? How often do these activities occur?
- Recreational (snowmobiling, ATV's, etc)
- building encroachments --- frequency varies
- Encroachment of all types, weekly
- Dumping
- motorcycle and ATV trespass
- property line encroachment
- Building/construction development encroachments
- dumping
- burning
- unapproved planting
- Constant
- Mining
- Dumping
- Building non conforming features such as buildings, race tracks, swimming pools, etc.
- Stock piling items such as logs, manure, dirt
- Changing grades for roads or parking lots
- Fences
- sheds
- ATV trespass
- some planting
- In the urban areas we have major issues with trespassing and dumping on our fee property (SRP owned ROW property).
- In outlying areas we don't have much fee owned property, so in those areas it isn't much of a concern.
- However, the next biggest issue we have is with unapproved encroachments by the landowner, such as fences, structures, and grade changes.
- Buildings
- vegetation
- fire hazards
- Less then 2% of the lines.

3) What proportion of your ROW is in easement? Are all easements consistent and complete in regards to being a strong legal basis for vegetation management?
- Most is held in easement. There is some consistency, but that varies with the age of the easement. Most are strong enough to facilitate vegetation management as needed.
- 75% are under easement agreements and no, not all easements give us the right to maintain vegetation under our current guidelines.
- About 1/3 of our cross country ROWs are in easement. They are not consistent overall, but similar in that most allow "removal" of trees at company discretion.
- 99.9% easement. Generally strong, Historical urban tolerance for vegetation growth is currently the greatest issue.

- Approximately 98%. We have a few small locations that we only have an agreement to be there on some State lands. We also own a few small locations. The easement rights are pretty clear that they give the Power Authority the right to do what they deem necessary.
- Approximately 75%. Most of the easements have a strong legal basis, however, there are some that have additional restrictions which prohibit removals.
- Ninety (90) percent of our transmission lines have either an easement, land grant, or our fee owned property. The remaining ten (10) percent are either by permit or prescriptive.
- Our easements are not consistent and complete in regards to being a strong legal basis for vegetation management. It varies a great deal. Many of our older easements do not make mention of vegetation management at all. Over the years we have developed stronger language we have placed in our easements, especially in recent years, the last 10 years or so.
- Not sure I understand the question. To me an easement and ROW are the same.
- 99% are. We have some old (preTVA) easements without strong language.

4) How are consultations maintained with people and groups directly affected by management operations?
- One on one as required.
- We have degreed Foresters in house and contractors with degreed foresters on staff to represent _____ in consultations.
- Notification to easement property owners prior to projects, additional notification to the local municipality.
- Personal contact, door flyers.
- Landowner notifications thru mailings
- Personal contacts thru Real Estate Administrators
- Personal contacts with Line Inspectors
- Personal and phone contacts thru ROW Supervisor
- Occasional meetings with user groups
- We/contractors are now sending certified letters to property owners.
- Town Meetings are also held.
- For vegetation management activities, we consult with outside people and groups mainly for two reasons: 1) if we are seeking a removal of a tree (which we typically try to do with transmission line clearance) or 2) if we need access to a landowner's property to perform our work. If we have access, we do not notify a landowner prior to performing the work. The exception to this is on Forest Land, Tribal Lands, and National Monument Land. We consult with these groups prior to performing any work.
- Line Maintenance personnel usually have informal consultations out in the field with those affected. Formal consultations (Letters) come from Permitting & Land Rights.
- We try to notify the property owners when we do the work. We do not send out pre-notification.

5) What are the most common stakeholder disputes associated with vegetation management?
- Loss of property value / visual impact issues.
- The amount of clearance we obtain and the aesthetics of the vegetation through our management activities.
- Loss of screening is the most common issue, followed by dimunition of aesthetic value.
- Access and tree trimming and removal rights.
- Disgruntled from when line was initially built
- Feel no need or right to do the work

- Do not want any herbicides used
- Complain about mess or disturbance
- Complain about debris
- Questioning whether everything has to be removed on the easement.
- Some question with of easement and there are some that conveniently forget that the abutting easement is owned by the utility company.
- With private landowners, the most common disputes are: 1) The amount of pruning required to obtain the necessary clearance per cycle, 2) Refusing to approve a request to remove a tree, and 3) Line clearance pruning not being aesthetic. With Forest Land, the most common disputes are: 1) The amount of time it takes for Forest personnel to review our work plans to obtain the necessary approvals to being our work and 2) Dealing with the biologists who want to leave more trees than we would like for clearance.
- Cutting trees and leaving them on the easement. They general request they clean them up.

6) What types of research and development activities are supported by your company that directly affect vegetation management? What type of support is provided: in-kind or monetary?
- Currently nothing direct. We are a current EPRI member and support Program 57. Significant support in past through EPRI, ESSEERCO.
- Investigative study with EPRI on aerial inspection of facilities.
- We are members of the EPRI Program 57
- EPRI involvement, T&D activities with ECI and regional information gatherings
- Shrub ecology on electric transmission line rights-of-way in New York State
- Competitive hierarchies of desirable plant communities
- Long-term impacts of herbicide deposition on plant community structure and composition on power line corridors in New York State.
- Education and outreach in support of research and development
- We are a participant in EPRI's Rights-of-Way Program 57.
- Tri-State has access to and can participate in vegetation management research being conducted by EPRI (PNM, New Mexico).
- Collaborative efforts include the Lower Tri-State Fuel Treatment project in the Uncompahgre National Forest, a joint effort by Tri-State, the BLM, USFS, Colorado Division of Wildlife (CDOW), the members of the local environmental community, citizens interested in public land management, and the Public Lands Partnership (PLP). Support included the funding of cultural resource surveys in the fuel treatment area.
- Chemical control field-plot evaluations for control of tree stems, specific tree species, use of surfactants, vegetation surveys.

7) What types of training do you and your associated vegetation managers and practitioners attend each year?
- Category 6, appropriate seminars
- International Society of Arboriculture (ISA / Utility Arborist Association (UAA), Tree Line USA Conference, TVMA Conference, Texas Department of Agriculture (TDA) and in-state workshops as they occur.
- Annual Category 6 Seminar
- Arborest meetings, safety
- Category VI pesticide recertification training
- NYS Wetlands Forum
- Local seminars and State ISA Meetings.

- Annual refresher training on Freshwater Wetlands
- Each year we attend conferences: Annual International Society of Arboriculture (ISA) Conference - Utility Track; Annual Trees and Utilities; and the Western Chapter of the ISA.
- Tri-State transmission maintenance personnel involved in the design, and implementation of the Transmission Vegetation Management Program shall be qualified and trained as provided in individual position descriptions and contract language. Field maintenance crews receive training on the requirements for trimming and felling trees and brush near power lines. Contractors hired by Tri-State must be fully qualified with respect to all certifications, licenses, training and other skills required in order to safely accomplish vegetation management work on Tri-State's transmission line ROWs. Specific training includes chain saw safety, proper tree trimming technique, and safe working clearances.
- State Vegetation Management Associations, ISA, in-house training.

8) List the various types of cultural resources that you have conserved on ROWs while managing vegetation.
- NA for routine vegetation management
- Grass lands and certain types of wildlife and plant species.
- None have been identified which require alterations to the management plan.
- Wet lands, conservation department/ parks department prairie grass restoration, osprey and falcon nesting sight development
- Active Christmas tree farm
- Active orchard
- Wildlife food plots
- Active agriculture including a good pastured area
- Timing of vegetation management activities to coincide with preferred mating habits of specific bird species.
- We routinely flag and avoid both prehistoric and historic sites within our ROWs. We have precluded the use of mowing in the area of some cultural sites. Some of the towers themselves are historic properties.
- Cultural resource compliance and clearance occurs prior to vegetation management activities where applicable. For example, federal ROW grants include a process that ensures adherence with NHPA and NEPA prior to allowing us to manage our ROW. Cultural concerns are not often an issue with private ROWS.
- Archaeological sites

9) How do you monitor the implementation of your management plans?
- Line Foremen monitors crew activity, contractual retentions, PSC oversight, avoidance of fines, etc
- With periodic field audits and patrols of rights-of-way
- The Senior Forester directly prescribes and monitors ROW IVM projects. Effectiveness is assessed in order to determine if re-treatment is needed, and project completion information is logged.
- Self developed vegetation management tracking program
- It begins with a vegetation 'follow-up' the year after vegetation work is complete. Then annual line patrol are done that look at vegetation conditions as well as line conditions. Then the year prior to scheduled cycle work a vegetation inventory is completed and prescribed treatments are determined.

- Work is supervised by Company employees.
- We have 2 Utility Foresters that inspect 100% of all transmission vegetation management work. Inspection involves checking for quantity and quality of work, following contract specifications, and customer satisfaction. In addition, an Engineering Technician, who plans the work also monitors the progress of the work.
- Tri-State shall at a minimum patrol each transmission line facility either by air (helicopter) or ground annually. In addition, aerial or ground inspections may be conducted after an interruption occurrence. Routine ground patrols are conducted by Tri-State transmission line maintenance personnel who are responsible for the oversight and maintenance of the transmission facilities in their respective areas. Routine aerial (helicopter) patrols are conducted under contract by firms that specialize in this type of work. In both cases, any encroachments, including vegetation, are documented and forwarded to the appropriate line supervisor or line foreman for assessment and resolution. If an imminent threat of a transmission line outage is identified during a routine ground or aerial patrol that requires immediate corrective action (such as switching the line out of service), the threat shall immediately be reported verbally to Tri-State's Dispatch for resolution. Reports generated during routine ground or aerial inspections will describe the encroachment, including the clearance between the conductor and encroachment, and other pertinent information, such as the location of the encroachment and when the reading was taken.
- Through oversight provided by regional Right-of-Way Specialists

10) What vegetation management treatments are applied in your operations?

Mechanical (mowing, handcutting, etc.)
Always 11% Usually 67% Seldom 22% Never 0%

Chemicals (herbicides)
Always 11% Usually 56% Seldom 22% Never 0%

Cultural (plant low-growing vegetation, fertilizing, etc.)
Always 0% Usually 11% Seldom 67% Never 22%

Biological/ecological (promote low-growing plants to suppress trees)
Always 22% Usually 33% Seldom 33% Never 11%

Comments:
- Except for brush mowing on mesic/hydric soils, all of these methods are employed in a manner as to suppress taller growing species. Re: cultural – We do have approx. 375 acres mowed turfgrass, although it was planted mostly in the 60's – 70's, and no subsequent re-planting has been done.

11) What environmental factors are considered when managing vegetation?

Water resources
Always 56% Usually 33% Seldom 11% Never 0%

Wildlife
Always 33% Usually 67% Seldom 0% Never 0%

Rare, threatened and endangered species and communities
Always 67% Usually 33% Seldom 0% Never 0%

Non-native, invasives
Always 22% Usually 11% Seldom 56% Never 11%

Biodiversity
Always 0% Usually 33% Seldom 44% Never 11%

Aesthetics
Always 0% Usually 44% Seldom 44% Never 12%

Comments:
- These considerations will vary widely with the management regime.

12) Which of the following elements do you include in your written prescriptions (operational plans) for vegetation management?

Land management unit designation
Yes 67% No 11% N/A 22%

Description of current vegetation and environmental conditions
Yes 67% No 11% N/A 22%

Desired future conditions
Yes 89% No 11% N/A 0%

Definition of treatment
Yes 78% No 22% N/A 0%

Justification of treatment
Yes 44% No 56% N/A 0%

Site-specific maps
Yes 89% No 11% N/A 0%

Comments:
- We do not write a span by span prescription, rather, we provide the treatment parameters in the specification (allowable materials, methods, target lists, special instructions, etc.), and expect the contractor to provide results within those parameters.
- not all elements included in every plan or region

Please rate the following phrases with regard to their importance to your vegetation management program for transmission line rights-of-way. Use a scale from 1 to 5, with 1 being not important, 3 important, and 5 critical:

Compliance with laws
1: 0% 2: 0% 3: 0% 4: 11% 5: 89%

Accounting of ownership and tenure use rights
1: 0% 2: 11% 3: 22% 4: 22% 5: 44%

Developing community relations
1: 0% 2: 12% 3: 44% 4: 44% 5: 0%

Conserving worker rights
1: 0% 2: 22% 3: 34% 4: 22% 5: 22%

Management planning
1: 0% 2: 0% 3: 33% 4: 44% 5: 23%

Understanding pest and managed ecosystem dynamics
1: 0% 2: 12% 3: 44% 4: 44% 5: 0%

Use of tolerance thresholds in deciding to treat vegetation
1: 0% 2: 11% 3: 23% 4: 33% 5: 23%

Maintaining a broad array of vegetation treatments
1: 0% 2: 0% 3: 56% 4: 22% 5: 22%

Cost effectiveness measures as a basis for prescribing vegetation treatments
1: 0% 2: 11% 3: 33% 4: 56% 5: 0%

Site-specific implementation of treatments
1: 0% 2: 0% 3: 33% 4: 44% 5: 23%

Adaptive management and monitoring
1: 0% 2: 0% 3: 22% 4: 56% 5: 22%

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Together...Shaping the Future of Electricity

Program:

ROW: Siting, Vegetation Management, and Avian Issues

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