

Report on the Workshop for Best Practices in Vegetation Management*

Held on March 5-6, 2007
Rosen Plaza Hotel
Orlando, Florida

Sponsored by
Florida's Electric Utilities

Organized and Coordinated by
Florida Municipal Electric Association

And the
Public Utility Research Center
University of Florida

Purpose

The purpose of this workshop was to provide a forum to review and benchmark best practices in Florida utility line clearance and vegetation management to maximize the reliability of transmission and distribution assets during and after major storms. The discussion included field procedures, program design specifications and measurements, and the current state of Florida regulatory issues. The workshop, coordinated by the Florida Municipal Electric Association (FMEA), is a component of storm hardening research being sponsored and conducted by the Florida Electric Cooperative Association (FECA), Florida Municipal Electric Association (FMEA), Florida Power & Light, Florida Public Utilities Company, Gulf Power, Lee County Electric Cooperative, Progress Energy Florida, and Tampa Electric Company (collectively referred to as Florida's electric utilities), and coordinated through the Public Utility Research Center (PURC) at the University of Florida. The workshop attendance consisted of vegetation management personnel, utility engineers and management, and other personnel from municipal, cooperative, and investor-owned utilities serving customers in Florida. Additional workshop participants included staff from the Florida Public Service Commission (FPSC), FMEA, and PURC.

The idea for the workshop stemmed from the June 9, 2006 Workshop for Research in Electricity Infrastructure Hardening held in Gainesville, Florida. The June 9 workshop was the beginning of a research coordination effort launched by Florida's electric utilities in response to the Florida Public Service Commission's Order No. PSC-06-00351-PAA-EI, issued April 25, 2006, directing each investor-owned electric utility to establish a plan that increases collaborative research to further the development of storm resilient electric utility infrastructure and technologies that reduce storm restoration costs and

* This report was prepared by the University of Florida's Public Utility Research Center. Please contact Dr. Paul Sotkiewicz, Director of Energy Studies, Public Utility Research Center, University of Florida, +1.352.392.6148, paul.sotkiewicz@cba.ufl.edu, for further information.

outages to customers. Following the Workshop for Research in Electricity Infrastructure Hardening, a steering committee was formed of representatives from each sponsoring utility organization to provide direction, guidance, and a work plan on the topics to be addressed by the collaborative research effort. The steering committee's work plan is comprised of four main components: undergrounding, wind, vegetation management, and materials.

The Best Practices in Vegetation Management workshop was conducted in response to the sponsoring utility organizations' interest in vegetation management, as identified during the June 9, 2006 workshop. This report summarizes the Best Practices in Vegetation Management workshop and identifies areas of interest for further research coordination. It is organized as follows. The next two sections describe the proceedings for each day of the workshop. The last section concludes with a summary and synthesis of the dialogue and information shared at the workshop along with 10 important lessons that can be taken from the workshop. This report also contains the following appendices:

- Appendix A Workshop Participants
- Appendix B Workshop Agenda
- Appendix C Best Practices Identified at the Workshop
- Appendix D Areas for Improvement Identified at the Workshop
- Appendix E Potential Workshop Topic Ideas Identified Prior to the Workshop
- Appendix F Discussion Questions and Responses from Break-out Groups

Day One Workshop Proceedings

The workshop opened with registration and an informal luncheon at noon on Monday, March 5, 2007. Mr. Barry Moline, Executive Director of FMEA, formally opened the workshop by explaining the general purpose of the steering committee, the nature of the work and research being done by the steering committee, and the impetus to hold this workshop. Mr. Moline's presentation included information sharing about the undergrounding component of the work currently being done by the steering committee and results of Phase I of the undergrounding research. Mr. Moline also shared with the audience the impetus for the wind research sponsored by the steering committee, and the lack of understanding about actual wind speeds and wind turbulence to which trees and utility infrastructure are exposed. In sharing the work plan for vegetation management, Mr. Moline discussed why a best practices workshop was the method chosen to achieve the goal of creating a list of goals/share ideas on best practices in vegetation management towards being best prepared for future storms that may impact the state of Florida.

Dr. Mark Jamison, Director of PURC, was introduced as the facilitator for the workshop. Dr. Jamison shared the mission of PURC as an international research center. He then reaffirmed the intent of the workshop: to share information and best practices and to assist the steering committee and the public in better understanding the role, process, and need for vegetation management in storm hardening electricity transmission and distribution infrastructure. Also introduced were Dr. Paul Sotkiewicz, Director of Energy

Studies, PURC, who participated in discussions with registrants and helped draft this report; Ms. Megan Silbert, PURC, who served as the reporter for the workshop proceedings and helped draft this report; and Ms. Cheryl Anderson, Director of Training and Member Services of FMEA, who was responsible for registration and coordinating workshop facilities.

The floor was then opened for individual introductions. Representatives from each utility present shared with the group the following information: the name and location of the utility they represent, the size of their service territory, the number of customers served, the number of miles of distribution and transmission circuits, what storms affected them during the 2004 and 2005 hurricane seasons, and how they prepare for impending storms. A list of participants and the utilities they represent is presented in Appendix A. In their introductions, workshop registrants emphasized the desire to improve vegetation management practices and hoped the discussion and sharing of information would allow them to do so.

Following the individual introductions and utility background introductions, participants shared the following information about their respective utility: a brief description of their vegetation management programs; a description of storm preparation as it relates to vegetation management; indicators of success; best practices and ideas; and areas for improvement.

Vegetation management programs for transmission across transmission-owning utilities have common features as well as some variance across utilities. One common feature is the inspection and patrol of the system multiple times each year. Another common feature of these programs is the use of herbicides and trimming as needed in the right-of-way. While all transmission owning utilities maintain their systems on a cycle, the duration of the cycles has wide variability with cycles varying between two months in some areas, and up to eight years in other areas. Differences in operating environments caused by differences between rural and urban populations, or specific species of tree stands, lead to these variations in cycles.

With respect to distribution, utilities trim on cycles ranging from 18 months to six years. The most common cycle is three years. Cycles may differ based on whether the circuit is a feeder or three-phase circuit (shorter time) or a lateral or single-phase circuit (longer). Some utilities use a reliability-based trimming cycle approach rather than a prescribed time cycle. Moreover, some utilities also choose to inspect and trim vegetation on a yearly basis in anticipation of hurricane season, by June 1, on circuits that serve critical infrastructure. In addition to trimming, some utilities reported the use of herbicides and tree growth retardant (TGR), while others did not. Where possible, most utilities reported trimming trees back 10 feet from the circuit in accordance with National Electrical Safety Code (NESC) standards. One utility reported only trimming back four feet from the conductor, but this required a more frequent trimming cycle of 18 months. Finally, many utilities have programs that remove problem trees (diseased, fast growing, or too large) and replace them with trees that are more appropriate (healthy, slow growing, smaller) for placement near distribution facilities.

Measures of success are straightforward based on the number of outages and outage reliability indices such as System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), Customer Average Interruption Duration Index (CAIDI), Customer Average Interruption Frequency Index (CAIFI), and Momentary Average Interruption Frequency Index (MAIFI).

With respect to best practices, participants shared a very substantial list of ideas and practices that they believe have worked in their current programs, or would make their programs even more effective. The best practices and ideas are listed in Appendix C in the order they came up during the discussion. Prior to closing for the evening, participants were asked to indicate the two areas in the list of best practices that were most valuable to their work. The best practices and ideas chosen by participants and indicated to be of critical importance are listed below in order of importance as indicated by the number of votes, shown in parentheses, that each practice/idea received.

Best Practices Ranked by Votes Received

1. State law (referenced the law in California) giving utility right to trim/remove (26)
2. Adequate financial resources to maintain vegetation management cycles (13)
3. City partnership to work with homeowner association – city foresters understand issues (10)
4. Using herbicides to control growth on vegetation and in ground (8)
5. Directional pruning (7)
6. Stump treatment with herbicide (7)
7. Contract and bid by zones; tie to reliability indicators and share experiences among contractors (6)
8. Dead and dangerous tree program – remove before cycle (5)
9. Inspect priority circuits prior to storm season (5)
10. Conduct public education programs about vegetation management (4)
11. Inspect backbone feeders (4)
12. Trade a tree and non-problematic tree programs (4)
13. Maintain cycles (3)
14. Moving power lines to right-of-ways (3)
15. Trim circuit for critical infrastructure or critical customers (2)
16. Pre-cycle maintenance towards preventable outages and inspector reviews on circuit between cycles (2)
17. Notify neighborhoods before trimming (2)
18. More successful with customer education and involvement (2)
19. Focus on vegetation management for reliability – educate utility executives on economics (2)
20. Door-to-door customer relations (2)
21. Cycles vary with local conditions/neighborhoods (1)
22. Training programs for contractors (1)
23. Name districts responsible for maintenance (1)

As was done with best practices and ideas, participants shared a list of areas where they could improve their vegetation management. The areas for improvement are listed in Appendix D in the order they came up during the discussion. Participants were asked to indicate the one item in the list of areas for improvement that would be most valuable to their work. The areas for improvement chosen by participants and indicated to be of critical importance are listed below in order of importance as indicated by the number of votes, shown in parentheses, that each practice/idea received.

Areas for Improvement Ranked by Votes

1. Better education of customers and public (22)
2. State laws to support tree removals (18)
3. Maintenance of some circuits from station to the end of the line (3)
4. Access (3)
5. Chemical applications (3)
6. Looking at overhangs (3)
7. Tree removals – support from customers (2)
8. Tree trimming resources – build local workforces (1)
9. Training (1)
10. Reduce the number of off the right-of-way tree fall-ins (1)
11. Create a new position to support reliability (1)
12. Restructuring right-of-way (1)

We note that some ideas or practices show up as both best practices and areas for improvement. We also note that concerns were not uniform across utilities that participated in the workshop, but varied based on utility service territory characteristics. An examination of the two lists brings out two themes quite strongly. The first theme is the need or desire to have state laws to support vegetation management efforts. The second surrounds improving education of the public and even some executives regarding vegetation management, including the improvement of customer relations regarding vegetation management.

Day Two Workshop Proceedings

The second day, March 6, 2007, opened with participants breaking up into their assigned discussion groups to work on identifying best practices and areas for improvement for seven topic areas: (1) Trimming Strategies; (2) Trimming around Distribution Facilities; (3) Proactive Strategies for Hazardous Trees and Damage Reduction; (4) Strategies for Working with the Public and Government; (5) Strategies for Working with the Public; (6) Operations and Management; and (7) Relations and Operations Management. The topics of the discussion were generated by the workshop registrants in advance through electronic communication from the list of topic ideas provided in Appendix E; registrants voted via email to rank the topics by importance, and the ranking was used to identify the seven major topic areas. Each topic area posited four questions for the group. Groups worked on responding to the topic areas

during the morning session. The discussion group topics and respective discussion questions can be found in Appendix F.

Group Discussions and Dialogue

Workshop registrants participated in small roundtable discussions with members of different organizations. The discussions generated responses, shown in Appendix F to the topics also presented in Appendix F. Summation of these discussions and reports to the larger group are summarized below by topic area.

Group 1: Trimming Strategies

The group discussing this topic concluded that it is impractical to eliminate all tree-related outages during high-wind events since at high winds, trees will begin to fail. Trimming strategies are meant to handle day-to-day conditions. Programs are designed to handle wind speeds of 25-30 mph and afternoon thunderstorms.

The group also concluded public education and communication with customers, local governments, and other stakeholders regarding the importance of vegetation management is crucial.

When engaged in tree trimming, it is imperative to follow tree trimming standards such as ANSI A300 standards, to the greatest extent possible.

The group examined cycle-based and reliability-based tree trimming program methods. For both methods advantages and drawbacks were cited without any conclusion as to which method was preferable. The main trade-offs between the two methods center around the ease of implementation and understanding by customers and stakeholders (cycle based) versus lower costs and more efficient use of resources (reliability based).

Finally, the group pointed to the elimination of vegetation (tree limbs) hanging over lines and dead, diseased, or damaged trees as a priority. Overhang and unhealthy or dead trees have a greater chance of causing outages.

Group 2: Trimming around Distribution Facilities

Much like Group 1, Group 2 also concluded that it is not possible to trim trees for hurricanes, but only for everyday contingencies, and that the elimination of overhangs and subsequent tree fall-ins on lines must be a priority and goes a long way toward eliminating tree-related outages.

Similar to Group 1, Group 2 cited customer education as important. In particular, customer education is needed regarding the appropriate species of trees to plant near utility distribution infrastructure, and why certain species of trees need trimming and possibly removal.

Another issue that was brought to the forefront during the discussion was the need for continuity of tree trimming crews. Continuity would ensure consistent, high quality and adherence to standards in vegetation management for the utility and its customers. The group felt that recruitment and/or retention of crews whether they be utility staff or contractors is important.

Finally, the discussion addressed the need to collect information regarding reliability and trimming. The focus centered on current or potential problem areas in the system as well as defining priority circuits (e.g., three-phase feeders and feeders serving critical infrastructure) that should be closely monitored.

Group 3: Proactive Strategies for Hazardous Trees and Damage Reduction

The group's discussion, in addition to touching on increased inspections and removal of problem trees, focused its attention on what can be best termed as the business, organizational, and public relations side of vegetation management. Much like Groups 1 and 2, this group felt that working with affected stakeholder groups and communicating with homeowners is very important.

On the business side of vegetation management, the group concluded that it was imperative to have consistent and adequate financial resources to carry out the vegetation management mission. The underlying problem is that vegetation management budgets are easy to cut when the utility faces budgetary issues. So the group concluded that it is crucial to get the company board's approval for a vegetation management program that meets well-defined specifications.

The group also discussed tree trimming crews and workforce issues. In addition to specifying crew training as being important, similar to other group discussions, this group indicated that the changing workforce as it relates to vegetation management has made it increasingly difficult to find well-trained, qualified contractors and personnel. The group made the point that this may be the biggest problem facing the industry.

Group 4: Strategies for Working with the Public and Government

The group concluded that in working with the public and governments requires additional support from government entities and improved municipal development codes with respect to vegetation management. Part of this support can take the form of cooperation in joint efforts in communications, policy, and practices regarding vegetation management. Another area in which cooperation between government and utilities is desirable is in storm preparation and restoration. This involves working with local Emergency Operations Centers (EOCs). With respect to local ordinances, the group believes tree ordinances are appropriate.

Much like the other groups, the discussion also covered communications with customers, government, and other stakeholders. One area of emphasis was sharing consequences and results from vegetation management programs. Another area of emphasis was consistency of communication and consistency in the information being

disseminated while utilizing all media possible. Developing a common language or terminology using ANSI or OSHA terms was another point of emphasis. The common language can be used in developing ordinances and providing consistency in communication.

Group 5: Strategies for Working with the Public

The group addressed the same basic topic as Group 4, but focused more on the communications aspect. The group suggested communications with the public through all forms of media from TV to radio to print media to any other interaction with the public that can get out the message about vegetation management. The message should be consistent and repetitive over time as well. The group suggested a role for the FPSC in providing public service announcements (PSAs) to help strengthen the message.

Another message the group believed should be delivered is the need to improve line clearances and right-of-way widths to improve vegetation management effectiveness.

The group also discussed customer worries about and misconceptions of vegetation management. The group felt that personal contact between utility staff and customers was an effective way to put customers at ease and to better inform them about options when customers refuse to allow trees to be trimmed.

Group 6: Operations and Management

The primary focus of the discussion for this group was the role of vegetation management in storm preparation and storm response. The group identified preparation steps such as training, matching skills with the work that needs to be done, pre-determining storm assignments, practicing for the real event, patrolling critical infrastructure prior to each hurricane season, having support contracts in place prior to hurricane season, and pre-staging crews to be ready for the restoration process.

For the restoration process, the group identified the need to coordinate vegetation management with line work so tree crews stay ahead of line crews in the process. Moreover, the group suggested assigning a grounding crew to accompany several tree crews in case tree clearance requires lines and facilities be grounded if necessary. With regard to line crews being brought in from out of the service territory, it is suggested that pre-printed material (maps, procedures, etc) be ready for those crews and that paperwork and documentation for work by these crews be easy to complete.

Finally, as restoration is winding down, the group expressed concern that crews may be released too soon as too quick a release may impede resuming normal trimming schedules. There is also likely tree damage that has not affected lines during the storm, but may affect lines well after the storm. Extra crews could patrol for potential danger timber and limbs and clear it before it falls into lines.

Group 7: Relations and Operations Management

In its discussions, the group stated that utilities should further expand and develop the working relationship between the Florida Department of Transportation (FDOT) and county road departments in siting transmission and distribution facilities as well as improve on innovative engineering options to ensure line clearances.

With regard to storm restoration activities, the group believes every storm has its own unique story, thus restoration needs and methods may differ by storm. Restoration should identify critical infrastructure so that it can be cleared and returned to service first. At a more detailed level, the group identified practices that have worked well or can work well such as assigning grounding crews with tree crews and issuing maps of the feeder system to tree crews so they can clear feeders first and report damage to lines in advance of line crews.

In the restoration process, the group indicated that coordination between various crews working on restoration can be enhanced to ensure efficient use of restoration resources. The group also identified the need for adequate and consistent resources and supervision of those resources to ensure they are efficiently used.

Finally, the group cited the need to pursue a forensic approach to discovering what has caused tree failures. Such an approach would require a designated forensic team without any other restoration responsibility that can assess why trees failed prior to clearing lines which would provide usable data to better target vegetation management resources before a storm. A standardized method of forensic analysis should be developed to better compare data across storms and utilities.

Synthesis and Conclusion

The group discussions on March 6 mirrored many of the areas of best practices or areas requiring improvement identified on March 5. At the top of the list as areas of both best practices and needing improvement, we find the need for laws to give utilities the legal force they require to implement effective vegetation management programs to enhance reliability. Cooperation such as this with government entities was a theme that emerged in the group discussions as well.

The need for better communication and public education on vegetation management was deemed to be of significant importance in both best practices and areas for improvement. This theme also emerged as a key component for enhancing vegetation management programs and outcomes from the group discussions.

Another theme that was observed in the group discussions and that was seen as a valuable best practice was the need to adequately fund vegetation management programs so that utilities can maintain their cycles and, by extension, maintain system reliability. This theme can be seen in the group discussions relating to potential cost trade-offs between cycle-based and reliability-based programs and the need to train,

recruit, and retain highly qualified and skilled, preferably local if possible, tree crew personnel among other issues.

Other best practices and areas for improvement were also cited with respect to specific vegetation management practices such as monitoring and patrolling facilities, eliminating tree limbs that overhang power lines, and streamlining or harmonizing logistics related to storm preparation and restoration.

While there were dozens of ideas shared and dozens of best practices and areas for improvement identified, as seen in Appendices C, D, and F 10 lessons are provided below that summarize the detailed discussion during the March 5-6 workshop. These lessons are not listed in any particular order of relevance or importance as each utility faces a different situation based on the size of their customer base, location of service territory, number of circuit miles they maintain, and fraction of urban, suburban, and rural customers.

- (1) **It is impractical to eliminate all tree-related outages during hurricanes of high-wind events.** Some trees will fail at high winds, and there is no vegetation management method that can prevent this from happening.
- (2) **Every storm has its own unique story.** During 2004, hurricanes Jeanne and Frances were slow moving, albeit not as intense, storms that subjected infrastructure to a sustained pounding with heavy rains, while Wilma in 2005 was a fast moving, much higher-wind event.
- (3) **Communication with and education for the public on all aspects of vegetation management as it relates to reliable utility operations is crucial.** It is important for customers and municipalities to understand how vegetation management enhances reliability and can maintain aesthetics with the proper planning and cooperation.
- (4) **Vegetation management programs must have access to adequate and consistent financial resources.** Unfortunately, vegetation management budgets seem easy to cut as the reliability results from them may not always be immediately tangible.
- (5) **Need for training, recruiting, and retaining highly qualified, skilled tree crews.** During one group discussion, the members believed this was the biggest problem facing utility vegetation management programs.
- (6) **Eliminate overhanging tree limbs where possible to reduce outages.** The standard for line clearance is 10 feet from the line. However, branches even 10 feet above the line that fall may take the line out of service, whereas branches 10 feet to the side falling to the ground would likely do so harmlessly. Industry standards and codes discourage set footage clearance. Rather, species-specific and condition-specific clearance standards are promoted. Many utilities promote directional trimming which encourages growth away from lines.

- (7) **Monitor and patrol critical distribution facilities such as major feeders and feeders that serve critical infrastructure such as hospitals, police, and fire/rescue.** Many utilities report a constant monitoring and patrolling of these facilities and in some cases even trim around these facilities each year prior to hurricane season.
- (8) **Storm preparation and restoration logistics cannot be overlooked.** Utilities discussed how they prepare staging areas, line-up contractor tree crews; prepare maps and important contact information for out-of-town crews, and pair grounding, tree, and line crews together to help speed up restoration and make efficient use of the resources they have.
- (9) **Cooperation between utilities and government at multiple levels is important.** This cooperation can range from getting tree ordinances or trimming ordinances passed to coordinating with EOCs during storm preparation and restoration.
- (10) **A dedicated tree forensic program can help provide data to make better use of resources in the future.** It has been suggested that dedicated teams of foresters or arborists collect data on why trees are failing (e.g., dead, diseased, damaged already, high winds) and what species of trees are failing so as to better target vegetation management resources to enhance reliability to the extent possible during extreme wind events or afternoon thunderstorms.

Appendix A: Workshop Participants

| Name | Company/Affiliation |
|--|---|
| Mr. Timothy Messick | Alabama Electric Cooperative, Inc. |
| Mr. Ben Dawson Mr. John Jordan | Central Florida Electric Cooperative Central Florida Electric Cooperative |
| Mr. Donny Fugate Mr. Larry Tankersley | Choctawhatchee Electric Cooperative Choctawhatchee Electric Cooperative |
| Mr. Bob Bruck Mr. Bruce Kirby | City of Leesburg City of Leesburg |
| Mr. Perry Odom | City of Tallahassee |
| Mr. Jimmy Merritt | Clay County Cooperative |
| Mr. Brent Stubstad | Escambia River Electric Cooperative |
| Mr. Jason Richards | Florida Keys Electric Cooperative |
| Mr. Juan Amsa Mr. Bill Slaymaker Mr. John Tamsberg | Florida Power and Light Florida Power and Light Florida Power and Light |
| Mr. Daniel Q. Lee Mr. William B. McNulty | Florida Public Service Commission Florida Public Service Commission |
| Mr. Jorge Puentes | Florida Public Utilities Company |
| Mr. Robert Brewer | Fort Pierce Utilities Authority |
| Mr. Tracy Maxwell Mr. Patrick Wolf | Gainesville Regional Utilities Gainesville Regional Utilities |
| Mr. Kevin Bryant | Glades Electric Cooperative |
| Mr. Eudon Baxley Mr. Charles Nunery | Gulf Coast Electric Cooperative Gulf Coast Electric Cooperative |
| Mr. Steve Burns | Gulf Power Company |

| | |
|-----------------------|--|
| Mr. Michael Robinson | Jacksonville Electric Authority |
| Mr. Robert O'Hara | Jacksonville Electric Authority |
| Mr. Jeffrey Sizemore | Kissimmee Utility Authority |
| Mr. Bruce Thompson | Kissimmee Utility Authority |
| Ms. Diana Gilman | Lee County Electric Cooperative |
| Mr. Michael Mines | New Smyrna Beach Utilities Commission |
| Ms. Sherie Burch | Ocala Electric Utility |
| Mr. Ernie Thomas | Okefenokee Rural Electric Membership Corp. |
| Mr. Danny Thornton | Okefenokee Rural Electric Membership Corp. |
| Mr. Wayne Zimmerman | Orlando Utilities Commission |
| Mr. Van Crawford | Peace River Electric Cooperative, Inc. |
| Mr. James Fones | Peace River Electric Cooperative, Inc. |
| Mr. Miles Green | Peace River Electric Cooperative, Inc. |
| Mr. Clay Stanphill | Peace River Electric Cooperative, Inc. |
| Mr. Richard Alexander | Peace River Electric Cooperative, Inc. |
| Mr. Larry G. Bonner | Progress Energy |
| Ms. Charlene Rubano | Progress Energy |
| Mr. Randall Miranda | Progress Energy |
| Mr. John Pinney | Progress Energy |
| Mr. Dennis Spellicy | Progress Energy |
| Dr. Mark Jamison | PURC, University of Florida |
| Dr. Paul Sotkiewicz | PURC, University of Florida |
| Ms. Megan Silbert | PURC, University of Florida |
| Mr. Jeffrey Conaway | Seminole Electric Cooperative |
| Mr. Robert Yarbrough | Seminole Electric Cooperative |
| Mr. Kenneth Lacasse | Sumter Electric Cooperative, Inc. |
| Mr. Bobby Kimbro | Talquin Electric Cooperative |
| Mr. Bernard Rowan | Talquin Electric Cooperative |
| Mr. Allen Shepard | Talquin Electric Cooperative |
| Mr. William Smith | Talquin Electric Cooperative |

Mr. Luke DiRuzza
Mr. Chip Turner
Mr. John Webster

Tampa Electric Company
Tampa Electric Company
Tampa Electric Company

Mr. Mark Brown

Winter Park Electric Utility

Mr. Bobby Parker
Mr. Marlin Sexton

Withlacoochee River Electric Cooperative, Inc.
Withlacoochee River Electric Cooperative, Inc.

Appendix B: Workshop Agenda

| Monday, March 5 | |
|------------------------------|---|
| Noon – 1 p.m. | Lunch |
| 1 p.m. – 2:30 p.m. | Introductions <ul style="list-style-type: none"> • 5-10 minutes per organization • Introduce representatives • Areas/Regions served • Size of utility (# of customers and miles of distribution and transmission maintained) |
| 2:30 p.m. – 3 p.m. | Break |
| 3:00 p.m. – 5:00 p.m. | Quick overview of each utility's vegetation management and storm preparedness, planning, preparation, operational methodologies, etc. <ul style="list-style-type: none"> • Vendors used • Crew descriptions (e.g., # of people in crews) • Types of contracts • Guidelines and standards • Number of storms dealt with in the past few years • Indicators of program success (e.g., outages, goals, benchmarks, cost/mile) Synthesis |
| 5 p.m. | Adjourn (dinner on your own) |

| Tuesday, March 6 | |
|--------------------------------|--|
| 7:30 a.m. – 8:30 a.m. | Breakfast |
| 8:30 a.m. – 10:00 a.m. | Topic discussion on best practices in vegetation management <ul style="list-style-type: none"> • Groups work on Questions 1 and 2 |
| 10:00 a.m. – 10:30 a.m. | Break |
| 10:30 a.m. – Noon | Topic discussion on best practices in vegetation management <ul style="list-style-type: none"> • Groups work on Questions 3 and 4 |
| Noon – 1 p.m. | Lunch |
| 1 p.m. – 4 p.m. | Group reports and synthesis of topic discussion on best practices in vegetation management, preparation of issues for report Discussion of next steps |
| 4 p.m. | Adjourn – workshop concludes |

Appendix C: Best Practices Identified at the Workshop

(A number in parentheses indicates the number of votes from participants who believed it was in the top two most important best practices.)

1. Maintain cycles (3)
2. Adequate financial resources (13)
3. Herbicide practices (8)
4. Trade tree program/plant non-problematic trees (4)
5. Trim at critical infrastructure for critical customers (2)
6. Quality score contractors (re-do work)
7. Matching replacement trees to area (relative to live) and native
8. Contact customer on problem trees – cited 40% success rate
9. City partnership to work with homeowner association – city foresters understand issues (10)
10. State law (referenced the law in California) giving utility right to trim/remove (26)
11. Contractor yearly inspection
12. Tree board within the garden club – input on community sensitive trees
13. Move to three-year cycle
14. Take out problem trees
15. Hot spot system – recognizing species growth rates
16. Directional pruning (7)
17. Extension service workshops or fact sheets for city foresters
18. Two-year cycle for moving to right-of-way
19. Guidelines for planting around lines
20. Moving power lines to roadways (3)
21. Vertical lines
22. Stump treatment with herbicide (7)
23. Dead and dangerous tree program – remove before cycle (5)
24. Pre-cycle maintenance towards preventable outages and inspector reviews on circuit between cycles (2)
25. Track tree outages
26. Inspect priority circuits prior to storm season (5)
27. Quarterly vendor meetings including safety and training
28. Cycles vary with local conditions/neighborhoods (1)
29. Notify neighborhoods before trimming (2)
30. Auto-dater to notify about trimming
31. Monitor specific problem species
32. Training programs for contractors (1)
33. Relationship building with local foresters and tree boards
34. Match local experts with out-of-town crews
35. All crews report to vegetation management issues
36. Enlist the support of local experts with strong local rapport
37. Public education programs (4)
38. Provide better trees
39. Computer models for forecasting vegetation management needs

40. Inspect backbone feeders (4)
41. Field visit every 20,000 CMI
42. Trained staff to work with cities
43. Joint work with cities
44. More successful with customer education and involvement (2)
45. Identify root causes of tree failure – varies by species and ground conditions
46. Meet objectives rather than simply follow a rule
47. Door-to-door customer relations (2)
48. Cutting/chemical written permission
49. Join fly-overs before a storm
50. Enhanced reliability trimming – trimming back from feeders
51. Focus on vegetation management for reliability – educate executives on economics (2)
52. 18-month cycle with 4-6 ft. clearance – bid out with firm price per mile
53. Targeted tree growth regulators
54. Put easements into property titles
55. Trim distribution 5-10 ft
56. Inspect twice per year
57. Contract and bid by zones; tie to reliability indicators and share experiences among contractors (6)
58. Make cycle accountable by quarter and track by type of line
59. Tree wire
60. Crew coordination
61. New construction underground
62. Name districts responsible for maintenance (1)
63. Give post-storm crews chainsaws

Appendix D: Areas for Improvement Identified at the Workshop

(A number in parentheses indicates the number of votes from participants who believed it was the most important area for improvement.)

1. Finding local assistance; decrease outsourcing
2. Better education of customers and public (22)
3. Tree removals – support from customers (2)
4. State laws to support tree removals (18)
5. Access (3)
6. Develop better relationships with county management
7. Reviewing outage numbers
8. Revising city ordinances
9. Relationship with planning department
10. Restructuring right-of-way (1)
11. Close calls with fires
12. Inspect all circuits
13. Tree trimming resources – build local workforces (1)
14. Training (1)
15. Road closure restrictions
16. Notifications to customers of trimming schedule
17. Re-clear some sections
18. Buy real estate to have land rights – work closely with developers
19. Better coordination with transmission department
20. Better management of feeders
21. Reduce the number of off the right-of-way trees (1)
22. Create a new position to support reliability (1)
23. Training program for contractors
24. Communication
25. Maintenance of some circuits from station to the end of the line (3)
26. Trees falling on canopy roads – broken limbs; get contractors to identify broken limbs and remove
27. Chemical applications (3)
28. Looking at overhangs (3)
29. Improve customer service initiatives

Appendix E: Potential Workshop Topic Ideas Identified Prior to the Workshop

1. Clearance: how far can we go, should we go, or need to go to all but eliminate outages.
2. Contractors: who to use, who to watch, share experience, do we want to endorse/recommend contractors.
3. Building consistency in damage assessment to properly summarize and report a damage.
4. Inspection program for hazardous trees adjacent to the right-of-ways. Pursuing permission from property owners to remove hazardous trees.
5. Work with Florida Department of Transportation (FDOT) and county road departments (CRD) to provide more right-of-way for utilities so that utilities would have more clearance to vegetation on all road improvement projects and with the relocations of the utility's lines.
6. Work with county and city governments to ease the restrictions of their tree ordinances.
7. Increase public awareness of the need to improve clearance and right-of-way widths for utility lines. This might be done by newspaper articles, TV, and radio ads.
8. A quick overview of each utility's Vegetation Management (VM) program: # of crews, service area, # of customers, etc.
9. A quick overview of each utility's storm preparedness, planning, preparation, operational methodologies, etc.
10. A discussion of each utility's clearance specifications, goals for tree removal, etc.
11. Clarification and or definition of terms used within the industry.
12. Pro-active storm management including items such as Right Tree Right Place, tree ordinances and their impact on day-to-day operations, customer information, advertising and education, etc.
13. Successful restoration partnerships with local government.
14. Successful use of specialized equipment to expedite restoration.
15. Strategies to managing VM resources to stay ahead of line crew needs and restoration activities. This could minimize tree crews required.
16. How VM teams are organized and managed to maximize effectiveness.
17. How crews are utilized/managed at different stages of restoration (initial response, systematic restoration, mop-up)
18. Success stories to avoid/reduce the amount of VM damage by pro-active VM management programs, specs, communications, community support.
19. How restoration strategies change from Cat 1 to Cat 5 storm.
20. Developing and communicating a VM storm restoration best practices manual for crews outside of the service territory.
21. Standard practices for both tree and line resources.
22. Discussion on cycle-based vs. reliability-based approach to trimming - pros/cons.
23. Discussion on approaches to deal with customer refusals - best practices.
24. Discussion on increasing line clearing crew productivity - best practices.
25. Transmission: Problems encountered and root cause.
26. Transmission: NERC requirements.

27. Transmission: Additional measures (clearing to legal limit of right-of-way and additional danger tree rights on adjacent property).
28. Distribution: Problems encountered and root cause.
29. Distribution: Trimming (observations from last hurricanes) can we adjust trimming specifications.
30. Distribution: Removals – target certain species (will change based upon the part of the state that one is in); more targeted removals (species, location, obvious structural problems).
31. Distribution: Public relations/ information to customers.
32. Distribution: Lessons learned.
33. Distribution: Day-to-day programs vis-à-vis reliability.
34. Distribution: Resource allocation.
35. Vegetation management program focusing on reducing vegetation related outages during normal weather, not just in the event of hurricanes.
36. Improve clearance from conductors to the vegetation. Set minimum clearance specifications.
37. Trim and clear vegetation from the right-of-way ground to the sky except low growing shrubs, flowers, and landscape trees.
38. Danger trees in and around major feeders.
39. Maintaining a scheduled right-of-way program.
41. Mowing/herbicide program on the floor of your lines.
42. Having a plan in place in the event of a storm.
43. Danger Trees.
44. Hazard Trees.
45. Hot Spot work (i.e., size and scope).

Appendix F: Discussion Questions and Responses from Break-out Groups

Responses follow each question. Items in bold were voted upon by the larger group as most salient to the topic.

Group 1: Trimming Strategies

1. How far can we go, should we go, or need to go to all but eliminate outages?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.
 - It is impractical to try to eliminate outages related to trees during high-wind events; at some wind speeds, the trees will fail. Trimming strategies are meant to handle day-to-day conditions. Programs are designed to handle wind of 25-30 mph and afternoon thunderstorms, not for hurricanes.
 - There are limitations from easements.
 - Best practices are latent upon maturity of program.
 - Most of the outages are from trees overhanging lines (cited study saying 76% of outages caused by overhang).
 - Target dead, diseased, or damaged trees.
 - Aggressive use of herbicides
 - Public education (cited changing practice to directional pruning – used door hangers for 1,000 customers; only received 1 call)
 - Proper pruning and use of ANSI 300 standards; no topping
 - Establish working relationships with other green agencies and industries and “sell your program” to them.
2. What are the pros and cons of cycle-based trimming vs. reliability-based approach to trimming?
 - a. Create two lists: A list of pros and cons for cycle-based trimming and a list of pros and cons for the reliability-based approach.

Pros of Cycle-Based Trimming

- Customer friendly and familiarity. Customers know trimming done regularly.
- Easy to budget
- Requires less training

Cons of Cycle-Based Trimming

- Too rigid
- Does not consider reliability
- When budgets are cut, you lose your cycle.
- Differing growth rates, both species and location may not correspond to mandated cycle.
- More expensive than reliability-based trimming – very high start up costs

Pros of Reliability-Based Approach

- More effective use of resources
- **Greater flexibility**
- Can be integrated with cycle-based
- May have greater reliability
- Best “bang for buck”

Cons of Reliability-Based Approach

- Circuits may go too long without trimming; this can influence reliability.
- May become reactive-based approach when strictly followed
- Can lead to higher costs (mediocre performer historically)

3. What do utilities use for clearance specifications, goals for tree removal, etc.?
 - a. Create list. Should further data be collected and distributed?

Clearance specifications and goals for tree removal – further data collection

- **As much clearance as possible following ANSI standards**
- Customer restrictions
- Differing growth rates, geographical and species specific
- **Dead, diseased, or damaged**
- Imminent threat to facilities
- Storm related or drought weakened tree damage
- Effort should always be put forth to minimizing risk.
- Measure specifically or generally

4. What additional measures (clearing to legal limit of right-of-way and additional danger tree rights on adjacent property) are useful for transmission facilities?
 - a. Create list. Should further data be collected and distributed?

Additional measures

- **Remove overhang.**
- Identify narrow right-of-ways and build relationships.
- Maintain minimum line clearance to eliminate operations from grow-ins.
- More frequent patrols
- More diligence on danger trees

Feedback to group 1: It is all a case-by-case basis, and the role of foresters is to minimize risk.

Information gaps in group 1: N/A

Group 2: Trimming around Distribution Facilities

1. What were the observations from last hurricanes, and can we adjust trimming specifications?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices of observations from last hurricanes and trimming

- **You cannot trim for hurricanes, only for everyday problems.**
- Remove trees in right-of-way, and off the right-of-way; remove hazard trees subject to legal limits.
- **Customer education**
- **Ability to retain crews when hurricane is approaching; contract adjustments for utilities**
- **Keep the same crews over time.**
- Restrictive time of trim before the storms?

2. Should certain species be targeted for removal? How would this vary according to the areas of the state? Should removals be more targeted (e.g., by species, location, obvious structural problems)?
 - a. Create lists of pros and cons.

Pros of species-specific removal

- **Yes, there should be some species-specific removals.**
 - **Educate regarding specific tree species.**
- Removals within legal limits
- Private tree companies; we assist them when the tree is too close.
- Use OSHA guidelines and err on side of safety.
- Customer education and specific to the utility's role in removal

3. What should be the strategies for day-to-day reliability?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Strategies for day-to-day reliability

- Reduce overhang and subsequent fall-ins.
 - Where practical with access and right equipment
 - Target three-phase, backbone, and dual circuits.
- Target hazard trees.
- Differing priorities
- Target tree-based lines.
- Day-to-day reliability; issues of maintaining and retaining employees
- Can establish pay rates to be regionally competitive.
- Identify what is causing your outages.

4. What should be the size and scope of hot spot work?
 - a. Create list. Should further data be collected and distributed?

Size and scope of hot spotting

- Collect information from customers and line workers.
- If you are going to hot spot and there is an outage, should move up in priority.
- May want to bring in multiple crews; try to keep them on contract.
 - How many crews depends on scope of system and workload.
- Reliability and dispatch operations center reports

Feedback to group 2: Was there a consensus that specifications may need to be changed? (Reply): No, we cannot trim for hurricanes.

Information gaps in group 2: Systematic information system for maintenance; allow more overhang removal.

Group 3: Proactive Strategies for Hazardous Trees and Damage Reduction

1. What are the right inspection programs for hazardous trees adjacent to the right-of-ways? How should utilities pursue permission from property owners to remove hazardous trees?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices for inspecting hazardous trees

- Communication with homeowners and internally within the utility
- Consistent communication/story
- Fiscal backing/consistent financial resources
- Training of internal organizations
 - Credible decision makers who can explain “why”
 - Train techs and crews who make decisions
- Decision needs flexibility
- Trade a tree
- Separate department related to right-of-way decisions (or one individual); prevents differences in different zones

List of areas to look for improved performance

- Documentation and development of specifications for staff of removals
- All owners need to sign off (multiple owners, renters).
- Train contractors (when need permission, bad tree criteria).
- Where is priority level in the grand scheme of the utility especially the value for money?
- Follow up on every lead. Deal with the reported problems to continue with active reporting.

2. What are the success stories to avoid/reduce the amount of vegetation damage by pro-active vegetation management programs, specs, communications, community support?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices for reducing/avoiding amount of vegetation damage

- Training of staff plus a credible person in charge of the program
- Document everything – reasons targeting tree, customer communication.
- **Have company board approve the defined specs. Get technical basis first.**
- Get buy-in from constituents proactively (neighborhood associations, garden clubs).
- Adequate funding for programs
- Inspection and correction on feeders

Areas for improvement for reducing/avoiding amount of vegetation damage

- Proactive and preventative vegetation management
- Clear information and direction from FPSC
- Funding for programs
- Aggressive removal of problem trees
- Increased inspections

3. Contractors: Who to use and who to watch? What have been the experiences with various contractors? What are the endorsements and recommendations, if appropriate?
 - a. Create list. Should further data be collected and distributed?

Contractors and further information to be collected

- Look at the people working in the company not the company name
- Need experience as high requirement
- Boy Scout – honest, trustworthy, fair
- Trained in what they are doing
- Local knowledge of your system
- Good safety record and actively push safety program
- Balance of senior and apprentice
- **Changing workforce has become a problem in finding qualified contractors; tough to find local help.**

4. What are the standard practices for both tree and line resources?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices in standard practices for both tree and line resources

- Standards will differ – site specific problems: historical, rural, urban and will differ by utility.
- Standards should include a clear discussion between the contractor and the utility.
- Move the lines to accessible areas (i.e., front lot vs. back lot lines).

Feedback to group 3: There is a limit to how long you can work a tree worker

Information gaps in group 3: **Finding competent people to do the work is the biggest challenge facing this industry;** involve outside researchers to add credibility to this work. Examples were University of Florida's Institute of Food and Agricultural Sciences (IFAS) fact sheets.

Group 4: Strategies for Working with the Public and Government

1. What are the appropriate pro-active storm management policies such as Right Tree Right Place, tree ordinances and their impact on day-to-day operations, customer information, advertising, and education, etc?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.
2. What are the appropriate strategies for working with county and city governments to ease the restrictions of their tree ordinances?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices in pro-active storm management policies and working with county and city governments

- **Have an impact on municipal development codes by working closely with cities and local developer groups on planting issues.**
- Support from government entities for trimming and removals
- Consistency
- Involvement of all groups

Areas for improvement in pro-active storm management policies

- Communication
- Reaching all the groups
- Consistency of the information
- Effort to implement consistency of information – have customer relations get the message out.

Areas for improvement for working with county and city governments

- Utilize proactive media outlets to educate consumers.
- More restrictive easements with remedies (legally binding)
- Share consequences and results of vegetation management.

3. Can the industry clarify and/or provide definitions of terms used within the industry?
 - a. Suggest strategies; pros and cons

Strategies, pros and cons of the industry clarifying and/or providing definitions of industry-specific terms

- Use ANSI and OSHA terms.
- Use terms according to arboriculture standards.
- Identify terms within ordinances.
- Identify codes within municipalities and eliminate inconsistent language.
- Define what is abuse and what is not abuse--define proper trimming.
- Include government, cities, landscapers in discussion and decision making process.
- Advantages of undertaking the above points include consistency and inclusion of all groups in the process.

- The drawback of the above points is the effort required to implement communication and consistency.
4. What have been the successful restoration partnerships with local governments?
- a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices in successful restoration partnerships with local governments

- Barricading and blocking roads
- Staging equipment utilizing resources
- Clearing roads for access
- **Mock storm preparation with EOC and planners**
- Communication with residents – even without power, can use radio

Areas for improvement in successful restoration partnerships with local governments

- More joint effort in getting the message out, policies, and practices
- More preplanning
- Prearranging clean-up efforts
- **Consistency of actions/plans of action among utilities**

Feedback to group 4: N/A

Information gaps in group 4: More emphasis on EOC coordination/liaison

Group 5: Strategies for Working with the Public

1. What are the best ways to increase public awareness of the need to improve clearance and right-of-way widths for utility lines: newspaper articles, TV, and radio ads?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices to increase public awareness of the need to improve clearance and right-of-way widths for utility lines

- TV/Public TV
- Civic associations
- Demonstrations and expositions
- Planting guides
- Home owners' associations (HOAs)
- Websites
- Bill stuffers
- Personal contact
- EOC local government
- Brochures
- Re-entry plans
- Target child safety awareness

Areas of improvement to increase public awareness of the need to improve clearance and right-of-way widths for utility lines

- Working with the Department of Community Affairs (DCA) to help control and provide guidance to local ordinances
- **Local tree ordinances** that prohibit planting trees under lines
- Demonstration and placards at "do-it-yourself" (DIY) stores
- Participate in nursery shows and associations – teach the folks who sell to the public.
- **PSC can give strength in improving the understanding.**
 - PSAs from PSC

2. What are the best approaches to deal with customer refusals?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices to deal with customer refusals

- Personal contact to explain the ramifications of not trimming, explain the local trade a tree program, or even bartering with a customer to trim beyond requirements.
- Barter with the customer to go beyond may depend on the type of crew doing the work (hourly vs. piece work).
- Reconfigure the line at the utility's cost.
- Reconfigure the line and pass the cost to the customer.
- Peer pressure with neighbors

- Install isolating devices so the rest of the line will not be affected.
- Easement enforcement

Areas of improvement to deal with customer refusals

- Training in public relations for employees and contractors doing this work
- Bridge language gap.
- Offer gift card rather than replanting – also lower cost.
- Target child education so that information is passed to parents.

3. What are the best approaches for keeping the public informed?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices for keeping public informed

- (Most overlap with question 1 answered by this group.)
- Keep public informed.
- Information, information, information
- Local news
- Consistency and repetitiveness

Areas of improvement for keeping public informed

- **PSC with regular PSA campaigns**
- **Local news media getting out information on hurricane preparedness – embedded with the annual announcements**
- Messages must be consistent and repetitive.

4. What are the public's biggest worries? Biggest misconceptions?
 - a. Create list. Should further data be collected and distributed?

Biggest Worries

- Loss of power
- Aesthetics: trees will be “butchered” or removed
- Property devaluation

Biggest concerns from public – misconceptions

- Do not understand the clearance requirements and why
- No idea what the trimming costs are
- Power company does not like trees
- Do not understand the impact on other customers
- Safety issues
- What undergrounding actually entails and that it may not solve the problem

This group also stated that further data should be collected and distributed.

- Examples of problems and solutions should be recorded and reported.
- Continuous communication between utilities and between utilities and customers is necessary.

Feedback to group 5: N/A

Information gaps in group 5: Re-entry plans

Group 6: Operations and Management

1. How should vegetation management teams be organized and managed to maximize effectiveness?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices to organize vegetation management

- Develop pre-determine storm assignments.
- Practice the plan/dry run the procedures.
- Patrol CIF (critical infrastructure facility) feeders by June 1. Joint patrol between service planners and vegetation management persons
- Have support contracts in place (i.e., port-o-lets, helicopters, staging sites, tree crews, line crews).
- Bring in grounding crews to work with tree crews. 1 grounding crew to 6 tree crews.
- Coordinate vegetation management with line work to stay ahead of the line work.
- Pre-staging crews; include training and safety.

Areas of improvement to organize vegetation management

- Good supervision of the tree crews (1 GM manager per 6 crews suggested)
- VMCCR – vegetation management contract compliance representative per 50 tree resources
- Matching the skill with the work that needs to be done (i.e., bucket versus climber) Climbing skills needed especially for grounding crews.
- Clear expectations
- Train and plan in advance. Utilize manuals, job aides with pictures.
- Use local support – meter readers, etc to get some of the out-of-town crews familiar with the area.
- **Preprinted materials for crews coming from out-of-town**
 - **Simple to understand and use time sheets for contractors**

2. What are the best ways for developing and communicating a vegetation management storm restoration best practices manual for foreign crews?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices for developing and communicating a vegetation management restoration program

- Overlap from above

Areas of improvement for developing and communicating a vegetation management restoration program

- Overlap from above
- Utilize manuals, video, and pictures that are bilingual.

- For pre-printed material, vegetation management standards should be stressed especially trim standards, brush policy, and safety procedures.
 - **Share contact information with utility workers – local resources for out-of-town workers (hospitals, police and fire dispatch, utility control room dispatch, etc).**
3. How crews are utilized/managed at different stages of restoration? How they are best made productive?
- a. Create list. Should further data be collected and distributed?

List of how crews are utilized/managed during restoration

- Initial response: Pre-staged based on forecast models
 - **Link tree crews to line crews.**
 - Have crews work together.
 - **Pre-stage crews based on forecast models.**
 - Have one vegetation crew with every two line crews.
 - Be ready to use the tree crews upon arrival – have maps, etc.
 - Utilize the meter readers and local folks to get the crews out and survey damage.
 - Systematic Restoration
 - Coordinate vegetation management and line crew restoration plan.
 - Pull away from the linked crews.
 - Have daily meetings with the restoration personnel.
 - Allow vegetation management to stay ahead of crews.
 - Planner per 50 tree resources; keep focus.
 - Mop-up
 - Conduct sweeps and patrols for danger timber that may fall into lines well after the storm.
 - CCRs or patrol people ride out the line.
 - Identify locations on maps and then have tree crews resolve.
 - Make sure the crews stay long enough for the mop-up and lower priority work; do not release your resources too early in order to get back to normal work schedules as quickly as possible.
4. How to develop a plan in case of a storm? How do restoration strategies change from Cat 1 to Cat 5 storm?
- a. Create list. Should further data be collected and distributed?

(Did not have time to answer the 4th question)

Feedback to group 6: Do we seem to be losing tree climbers to bucket operators? Do we have crews we cannot use?

Yes, we have a generation of bucket babies, and no one knows how to fly anymore.

Documentation for reimbursement is very complicated.

Information gaps in group 6: Maintaining line under normal cost standards – once you release the crew, you are then financially responsible. Timing-wise, there is an initial rapid die down after the storm. The ability of utilities to charge to the storm – where is the line and what does this entail. This needs more clarity, especially at the appeal level (discussion centered on damage from storm whereby the line is still in service, but is damaged and will fail in the long run).

Group 7: Relations and Operations Management

1. How should utilities work with the Florida Department of Transportation (FDOT) and county road departments (CRD) to provide more right-of-way for utilities so that you would have more clearance to vegetation on all road improvement projects and with the relocations of the utility's lines?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Referred to the manual, large manual that does not necessarily address concerns where part of the vegetation is on private property

- Continue to further expand and develop our working relationship with FDOT and CRD on both transmission and distribution.
 - Improve on innovative engineering options (i.e., re-routing, tree wire) and permanent line clearance.
 - Temporary construction easements from FDOT - can it be declared a permanent line or maintenance easement.
2. What strategies are best for managing vegetation management resources to stay ahead of line crew needs and restoration activities? This could minimize tree crews required?
 - a. Create two lists: A list of best practices and a list of areas where utilities should look for ways to improve performance.

Best practices for managing vegetation management resources to stay ahead of line crew needs and restoration activities

- **Every storm has a unique story.**
- Transmission and distribution methods differ based upon the storm (i.e., storm that sits in one place).
 - Overall for transmission, they could plot and get a better feel for what may be impacted.
 - At distribution level, more of an issue of geography
- If inspections are not complete following a storm
 - Issue feeder maps to tree crews to clear the backbone first where crews can also report on damage in advance of line crews.
 - If line crews are available, match tree crews with line crews or keep the tree crews ahead of the line crews.
 - Make these decisions locally and predicated on type of storm.
 - As inspections are more complete, reallocate tree crew/line crew mix.
 - Plan for grounding crews to accompany tree crews for some clearance operations.
 - Many times this methodology is predicated on the storm.
- Identify critical infrastructure and clear and return it to service first.
 - Do easiest work first.
 - Outside-in methodology

Areas of improvement for managing vegetation management resources to stay ahead of line crew needs and restoration activities

- Better coordination and communication about persons working
 - Examine details of your overall storm plan at each individual utility.
 - Verbal and/or signage
- 3. How can a scheduled right-of-way program be maintained?
 - a. Create list. Should further data be collected and distributed?
- **Adequate and consistent resources and supervision**
 - Information tools and database management
- Funding qualified, available crews and tree resources
- 4. How can a utility build consistency in damage assessment to properly summarize and report damage?
 - a. Create list. Should further data be collected and distributed?

For distribution, pursue a forensic approach to discovering what caused the failure

- Dedicated forensic team
- Diagnose reasons for tree failure in advance of tree crews clearing lines.
- Needs to happen during the restoration for distribution
- **Need useable data.**

For transmission, more of an after storm forensic review

- When a tree causes problems in a storm, do a forensic analysis of the tree.
 - Need to be identified before the storm, have a programmed approach and should be part of overall forensic team; not a part of the storm recovery responsibility.

Feedback to group 7: Regarding forensics on distribution, look at the trees pre-storm – were they healthy, diseased, etc?

Discussion from a registrant about forensics; another question posed about what would be the use of the data?

Discussion of trade-offs to collecting and using the data.

Discussion of damage assessments versus forensics; utilities should be sharing information and completing the full task of restoration. There should be more standardized methodology for forensics.

Information gaps in group 7: Temporary construction easements from FDOT - can it be declared a permanent line or maintenance easement?

Unassigned Issues and Topics (In case of extra time)

1. What have been the successful uses of specialized equipment to expedite restoration?
 - a. Lease equipment from logging companies
 - b. Marsh masters
2. What are the problems encountered in transmission and what are the root causes? In distribution?
 - a. Relating it to restoration
 - b. Piling debris in the wrong places by others, especially with undergrounding
3. What are the lessons learned in distribution?
 - a. Right person at the EOC who can speak “both languages”
 - b. Maintain clearances
4. What are the lessons learned in resource allocation?
 - a. Neutral monitoring association – almost like an air traffic controller
 - b. Configuration state wide – what if a storm or storms hit in many areas

Feedback: EOC provided a lot of resources post-Hurricane Ivan

Information gaps: N/A