

# Hazard Tree Control Using GIS

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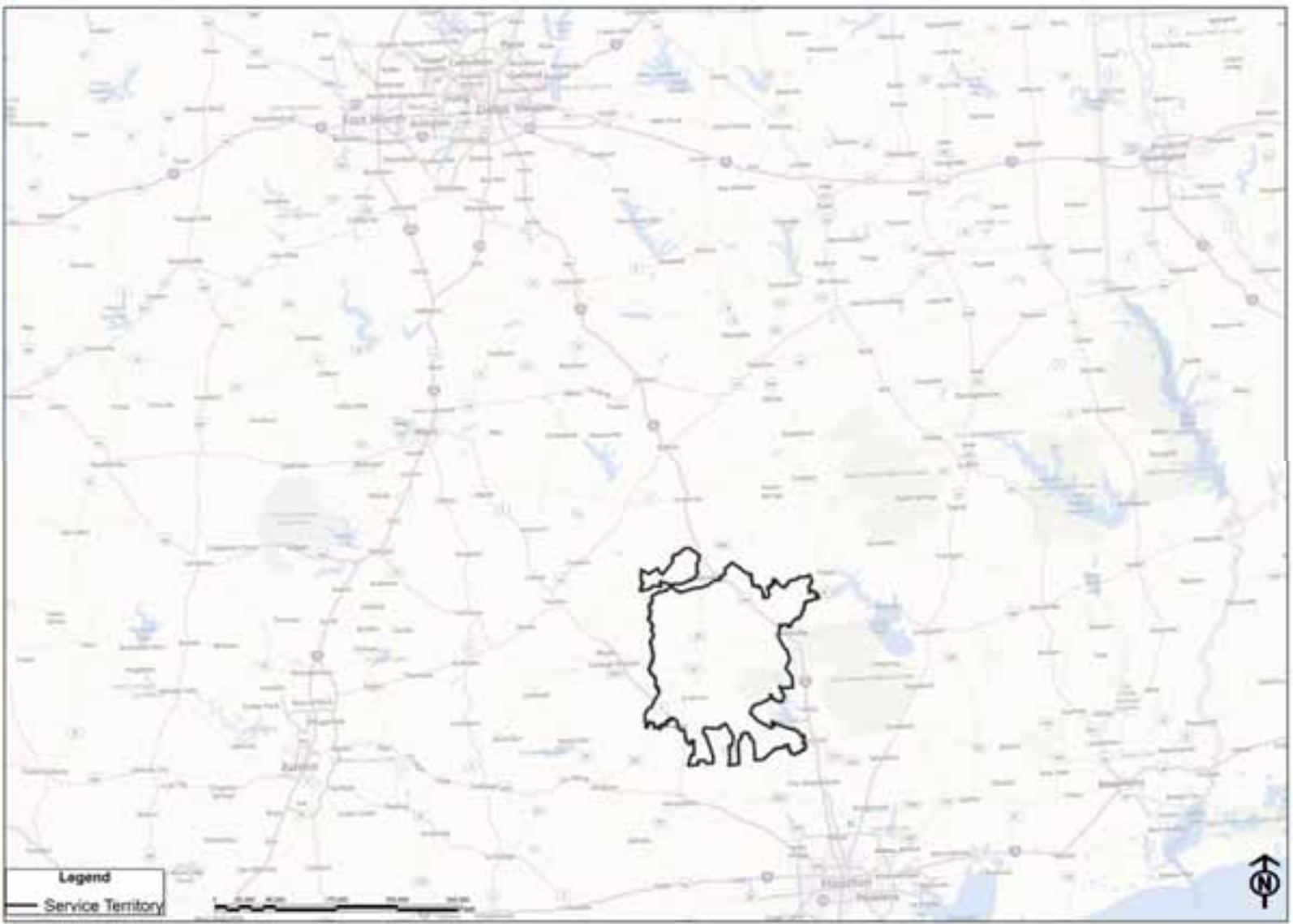
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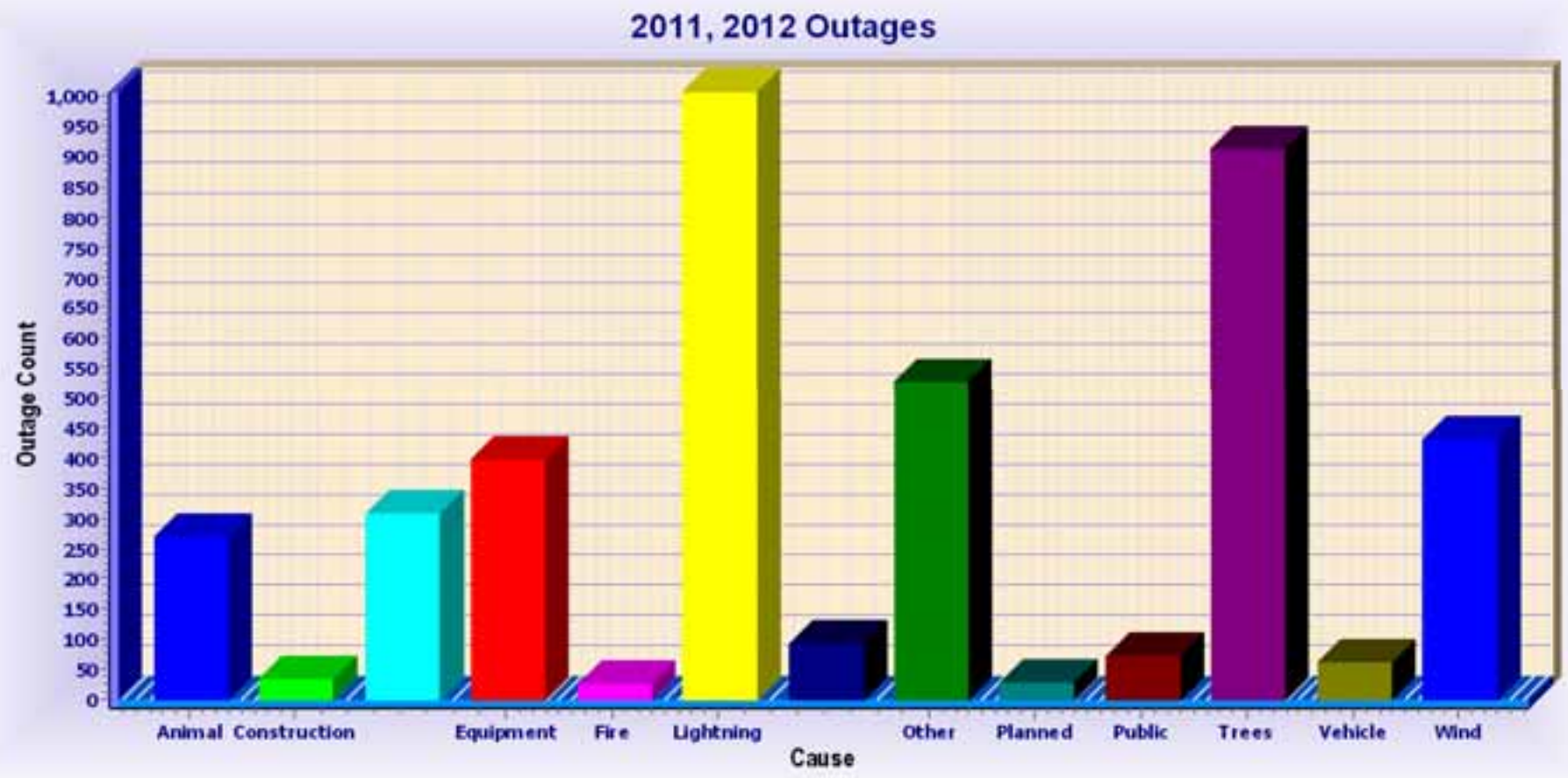
# Introduction

- Mid-South Synergy has 23000 Electric and 2500 water meters
- 2800 miles of distribution line
- Six county 1600 mile<sup>-2</sup> territory

Mid-South Synergy Service Territory



# Mid-South System Outages



# Hazard Trees Workflow

- Data Sources:
  1. Customer calls
  2. Mid-South employees
  3. ROW contractors working on lines
- Challenge:
  1. Texas drought of 2011.
    - » More dead trees, more outages
    - » Customer calls not sufficient
  2. Wildfires

# Objectives

- Workflow improvement
  1. Identify and classify Mid-South territory based on hazard tree risk
  2. Augment customer-call initiated service orders with GIS driven work packets
  3. Consolidate service orders based on location to reduce drive times
- Intensify tree removal whilst reducing outage time

# Methods and Materials

- Software
  - ArcGIS 9.3.1
  - Spatial Analyst
  - GeoEXT Import tool
  - Clearion
- Data
  - Soils Data (STATSGO)
  - Land Class data
  - Outage data

# GeoEXT Import Tool

- Imports data from any type of database into SDE
- ROW service orders imported from SEDC
  - A ROW Customer Call feature class created on the fly with the following fields:
    - Service Order Number; Member ID; Date Created; Days Old; Date Deployed to field; Days in field; etc etc



# ROW Service Orders

Attributes of ROW Service Orders

REGKEY	TELEPHON	BU SPHON	ApprosLoc	ServOrdNum	DatePlsMtd	DateTxFnl	OtherNotes	PacketNo	DaysInFiel	ImportTime	FID_2	ID	GRIDCODE	Risk
CATHERINE	7132131555	713213155	BETHEL RD 12831	00078331	9/21/2012	9/24/2012	CARLOS#1	99999	0	9/26/2012	108	10		1 Very High
HENRY	9365374417	000000000	SH 105 W AND N FM 1485	00085893	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		2 High
DAVID	9364494477	000000000	SH 105 W AND N FM 1485	00085437	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	116	11		2 High
FRED VOELKER	9364893017	000000000	SH 105 W AND N FM 1485	00073483	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
ROBERT	9365977736	000000000	SH 105 W AND N FM 1485	00083183	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
ROSE	9365976264	000000000	SH 105 W AND N FM 1485	00083184	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
JEFF	83279777181	000000000	SH 105 W AND N FM 1485	00083678	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
GREG	9364495296	832236144	SH 105 W AND N FM 1485	00085962	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		2 Medium
ALEX	9365978528	936489878	SH 105 W AND N FM 1485	00080684	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
MARK	9365974013	000000000	SH 105 W AND N FM 1485	00087029	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
CHARLES	9365977228	936672191	SH 105 W AND N FM 1485	00087084	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
FRANCES	9365978528	936489878	SH 105 W AND N FM 1485	00087092	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
GLEN	9365976990	936537939	SH 105 W AND N FM 1485	00087172	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
GARY	9364495296	000000000	SH 105 W AND N FM 1485	00087378	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
LNETTE	9365978264	000000000	SH 105 W AND N FM 1485	00088058	9/19/2012	9/20/2012	CARLOS#1	33	-4	9/26/2012	153	15		3 Medium
SHERRY	9366629577	000000000	UNION ROAD	00083381	9/18/2012	9/20/2012	SM PACKET	49	-4	9/26/2012	153	15		3 Medium
RAYMOND	9363482922	000000000	UNION ROAD	00083578	9/18/2012	9/20/2012	SM PACKET	49	-4	9/26/2012	153	15		3 Medium
DONALD	9363485541	000000000	UNION ROAD	00087019	9/18/2012	9/20/2012	SM PACKET	49	-4	9/26/2012	153	15		3 Medium
SHIRLEY	9365884518	936597309	WHITE OAK LOOP #114	00073209	9/17/2012	9/18/2012	CARLOS#1	99999	6	9/26/2012	131	13		2 High
RUBY	9368732549	000000000	CR 214 6059	00085842	9/17/2012	9/18/2012	CARLOS#1	99999	6	9/26/2012	153	15		3 Medium
KIDS/JBW	9362938834	936293883	FM 3172 AND WILLOW CREEK	00088393	9/15/2012	9/18/2012	NOT SURE	50	9	9/26/2012	58	59		2 High
HURS	9363482099	000000000	UNION ROAD	00088359	9/15/2012	9/20/2012	SM PACKET	49	-4	9/26/2012	153	15		3 Medium
TOM	9366681881	000000000	BHSU AND ROSEWALL RD	00072144	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
JEANFORD	9366628781	000000000	BHSU AND ROSEWALL RD	00072330	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
JEANFORD	9366620841	000000000	BHSU AND ROSEWALL RD	00072331	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
ROBERT TAYLOR	9362913197	000000000	BHSU AND ROSEWALL RD	00072869	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
WILLIAM	9362918340	000000000	BHSU AND ROSEWALL RD	00073508	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
RICHARD	9362953109	713240807	BHSU AND ROSEWALL RD	00073930	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
IRVIN	9366814089	000000000	BHSU AND ROSEWALL RD	00074287	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
WILLIAM	9032766401	000000000	BHSU AND ROSEWALL RD	00076528	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
MICHAEL	9362916990	936291699	BHSU AND ROSEWALL RD	00079192	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
JAMES	9362919763	936577216	FM 965	00081482	9/10/2012	9/13/2012	ASPLUNDH	27	11	9/26/2012	153	15		3 Medium
SCOTT	9367308800	000000000	BHSU AND ROSEWALL RD	00084295	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
BHSU	9362941016	936294101	BHSU AND ROSEWALL RD	00087323	9/10/2012	9/13/2012	ASPLUNDH	48	11	9/26/2012	153	15		3 Medium
DSK/LETTER	9366240480	000000000	FM 1374 5291	00088844	9/7/2012	9/10/2012	ASPLUNDH	99999	14	9/26/2012	84	85		1 Very High
BARBARA SLEDGE	7134654554	713229309	HUCKLEBERRY LN 21038	00087287	9/7/2012	9/10/2012	CARLOS#1	99999	14	9/26/2012	136	13		1 Very High
C PRUITT	9367143127	000000000	CHANDLER RD	00079899	9/7/2012	9/10/2012	ASPLUNDH	47	14	9/26/2012	153	15		3 Medium
MARK	9364369040	936291794	CHANDLER RD	00079149	9/7/2012	9/10/2012	ASPLUNDH	47	14	9/26/2012	153	15		3 Medium

# Clearion

- Vegetation Data
  1. Input
  2. Maintenance
  3. Reporting
- Trees Cut
- Full Cut/Feeder clearance
- Spraying Activities
- Mowing Activities

Main Tools

Zoom In, Zoom Out, Zoom and Pan 1:1,329, Map Navigator

Properties, Find, Identify, Map Inquiry, Selection, Start Editing

Display

Layers

- Structure
- VegClasses
- MS FEMA Feeders
- ROW Open Tickets
- Vegetation
  - VegetationPoint
  - Cycle Busters
  - Tree Removal
    - Tree Type
    - Pine
    - Oak
    - Elm
    - Hackberry
    - Sweet Gum
    - Crepe Myrtle
    - Maple
    - Walnut
    - Hickory
    - Cedar
    - Horse Apple
    - Other
    - Unknown
- Customer Note
- Spray
- FullCut
- ServiceTrim
- Mow

Weekly Activity Summary

Parameters

Start Date: 9/16/2012 12:00:00 AM

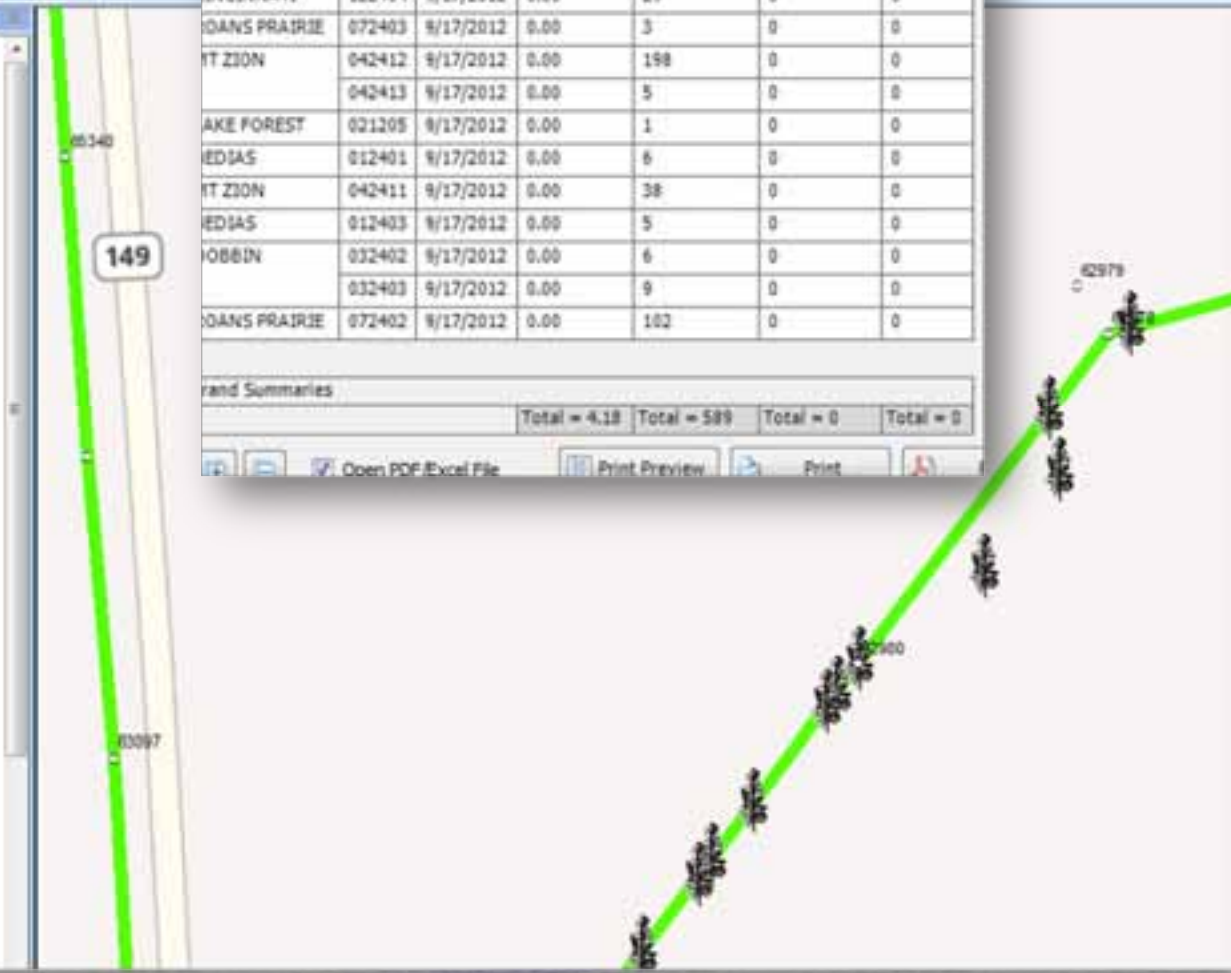
End Date: 9/23/2012 12:00:00 AM

Substation	Feeder	Week	Full Cut	Tree Removal	Cycle Busters	Spray
PRING BRANCH	172424	9/17/2012	4.18	48	0	0
IT ZION2	042421	9/17/2012	0.00	139	0	0
INCINNATI	122404	9/17/2012	0.00	29	0	0
DOANS PRAIRIE	072403	9/17/2012	0.00	3	0	0
IT ZION	042412	9/17/2012	0.00	198	0	0
	042413	9/17/2012	0.00	5	0	0
LAKE FOREST	021205	9/17/2012	0.00	1	0	0
EDSIAS	012401	9/17/2012	0.00	6	0	0
IT ZION	042411	9/17/2012	0.00	38	0	0
EDSIAS	012403	9/17/2012	0.00	5	0	0
HOBBS	032402	9/17/2012	0.00	6	0	0
	032403	9/17/2012	0.00	9	0	0
DOANS PRAIRIE	072402	9/17/2012	0.00	102	0	0

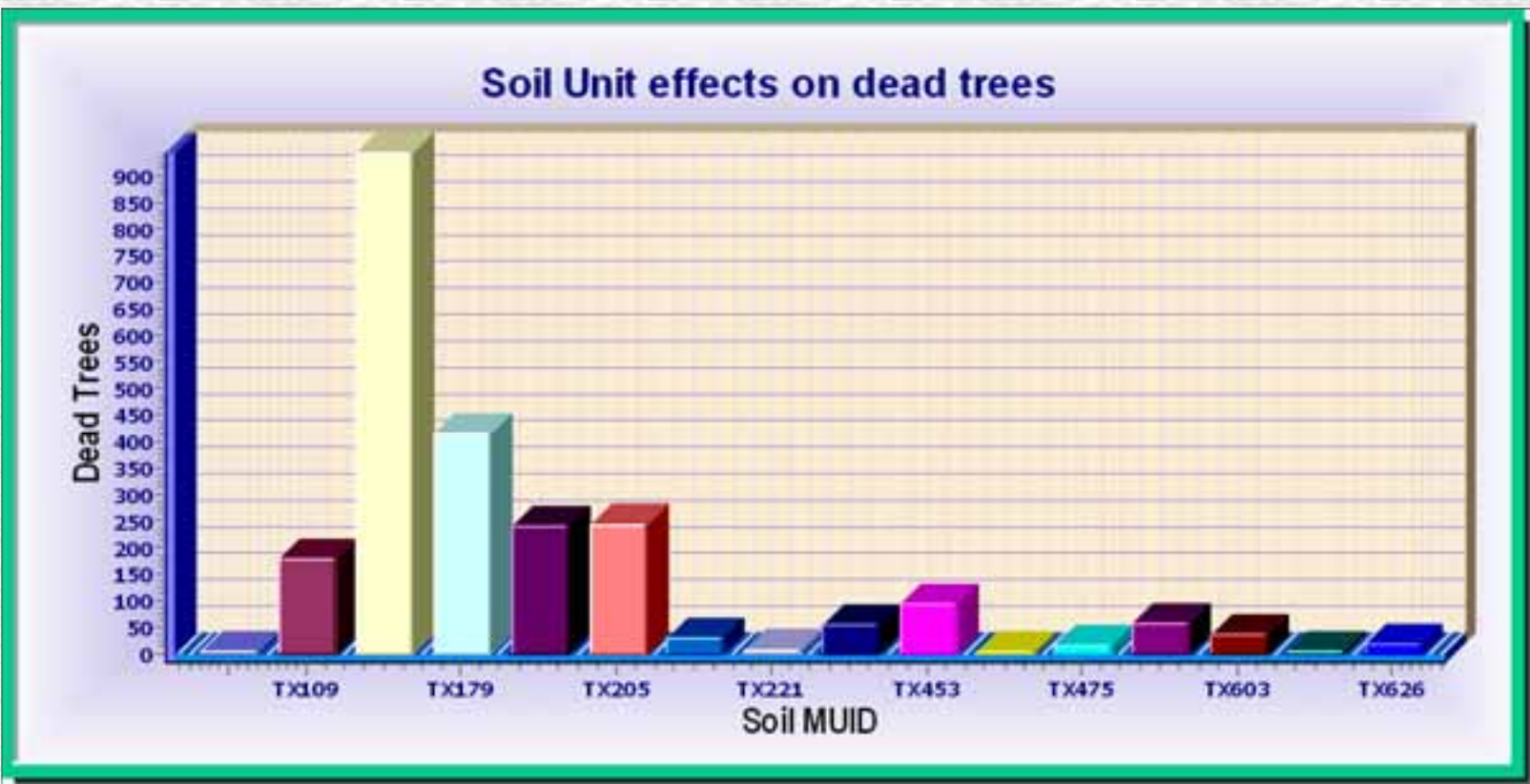
Grand Summaries

Total = 4.18	Total = 589	Total = 0	Total = 0
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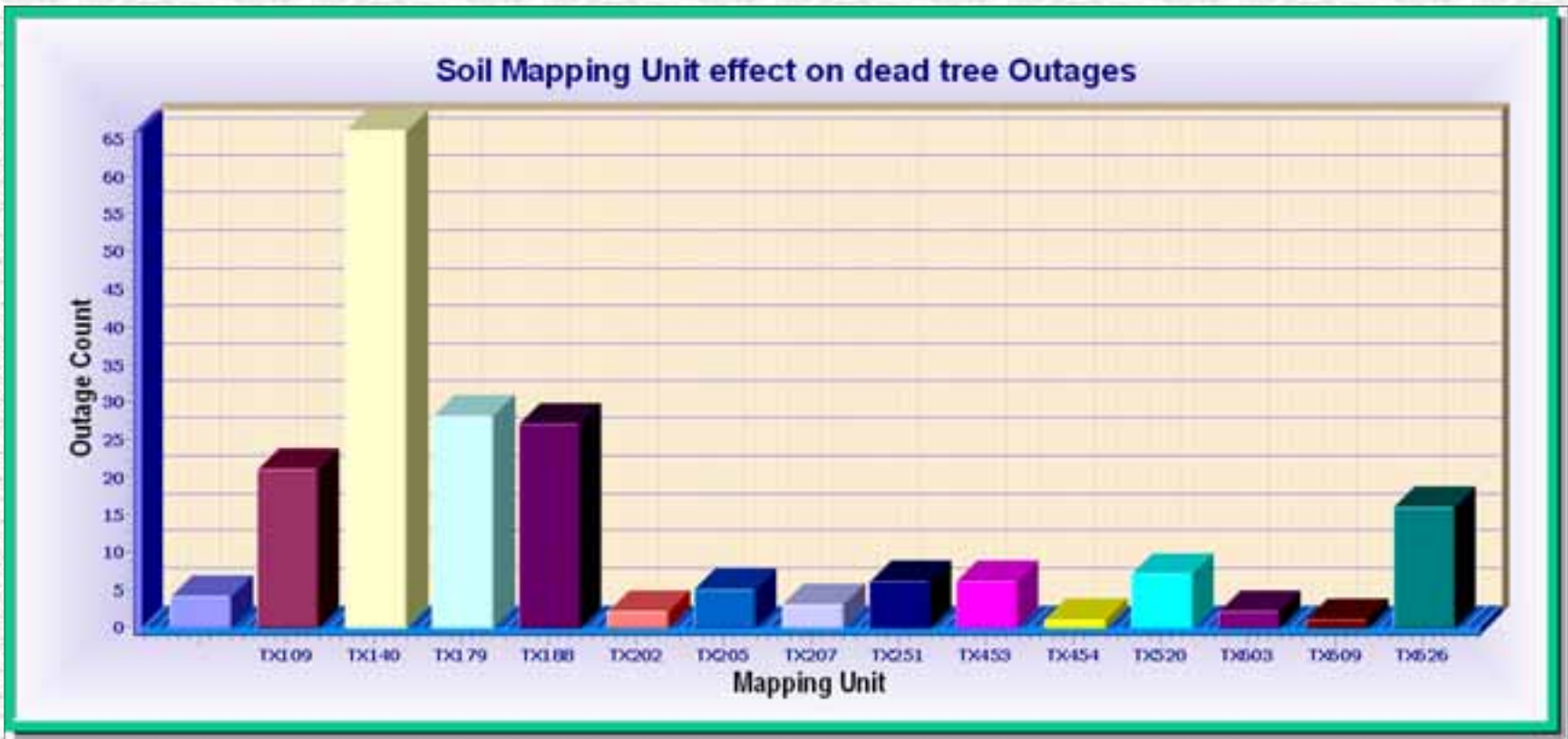
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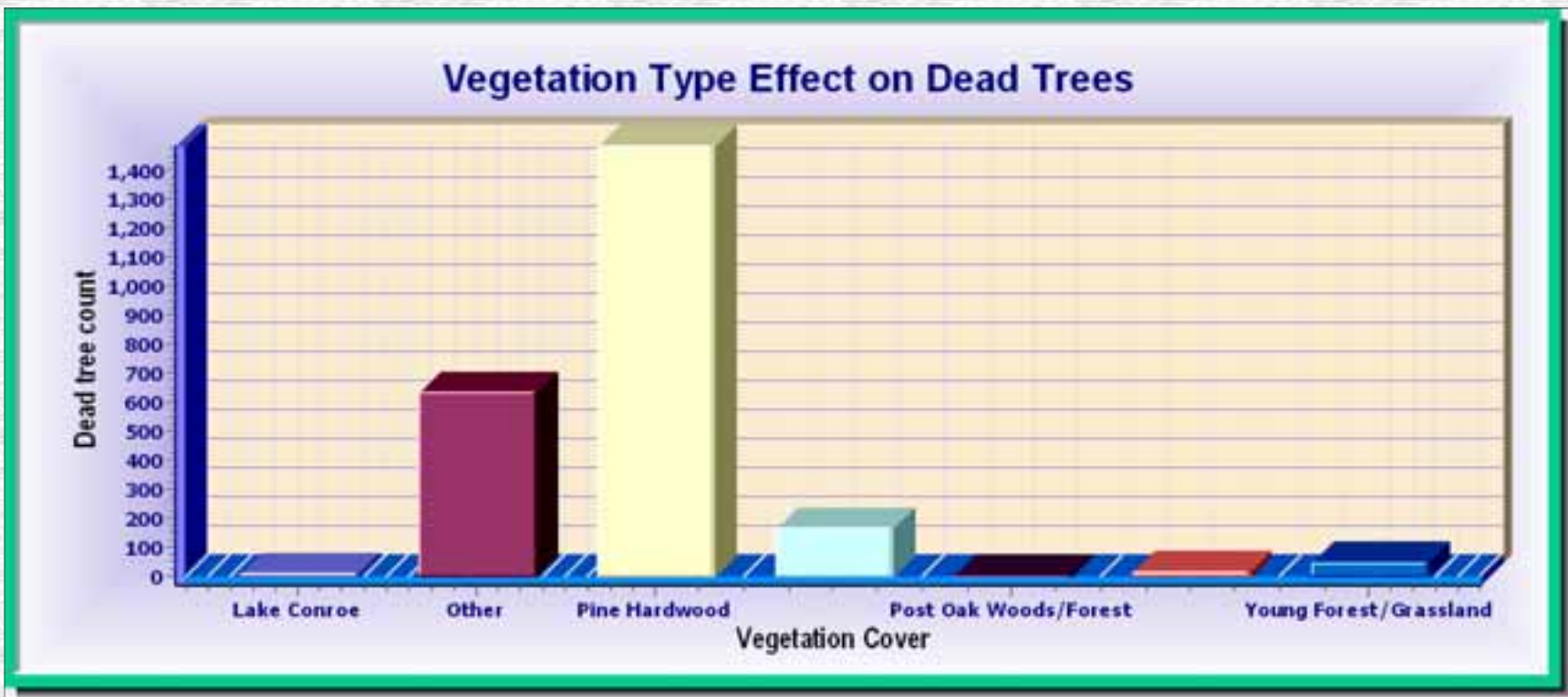
# WOA Factor 1 - Soil Type



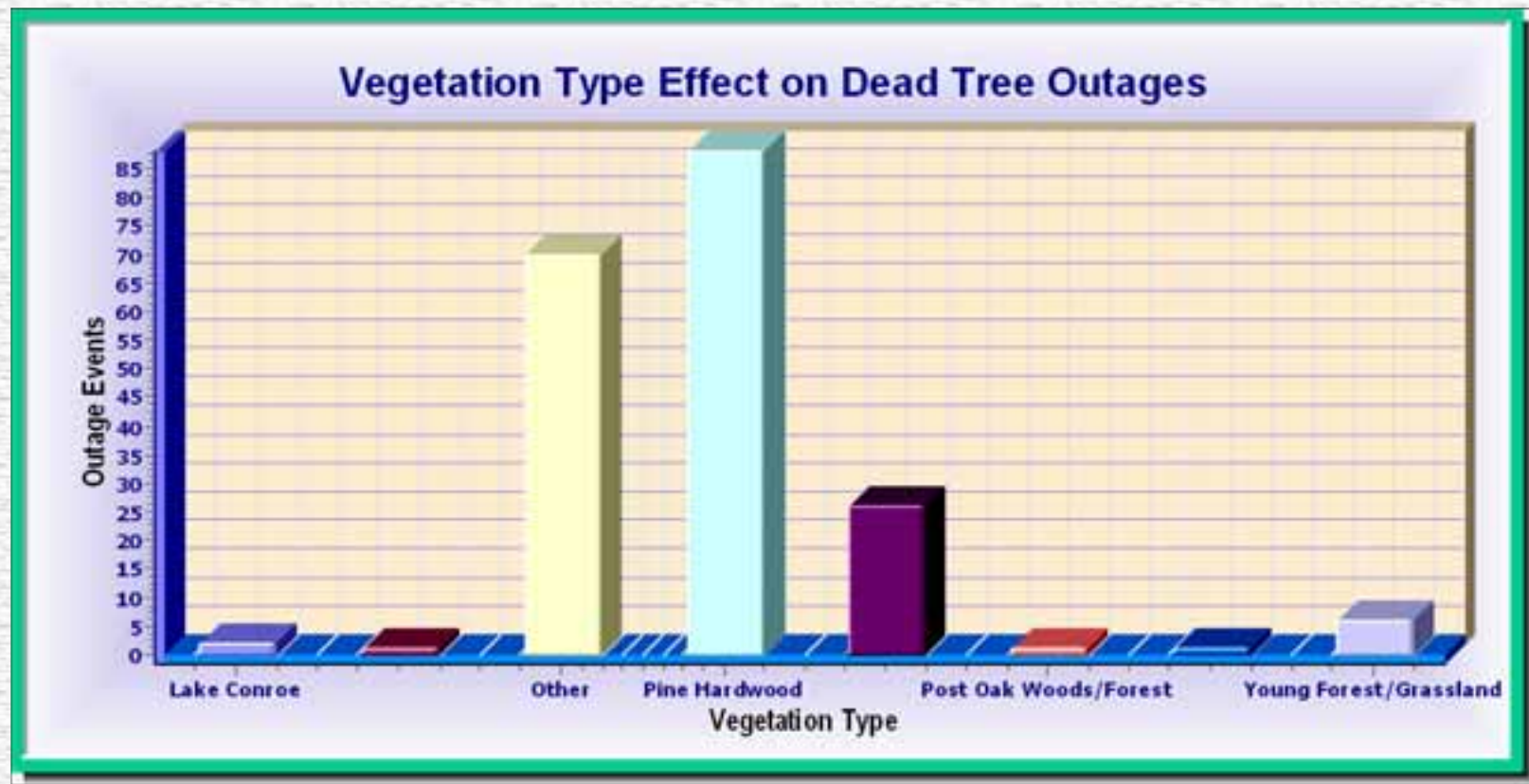
# Soil Type



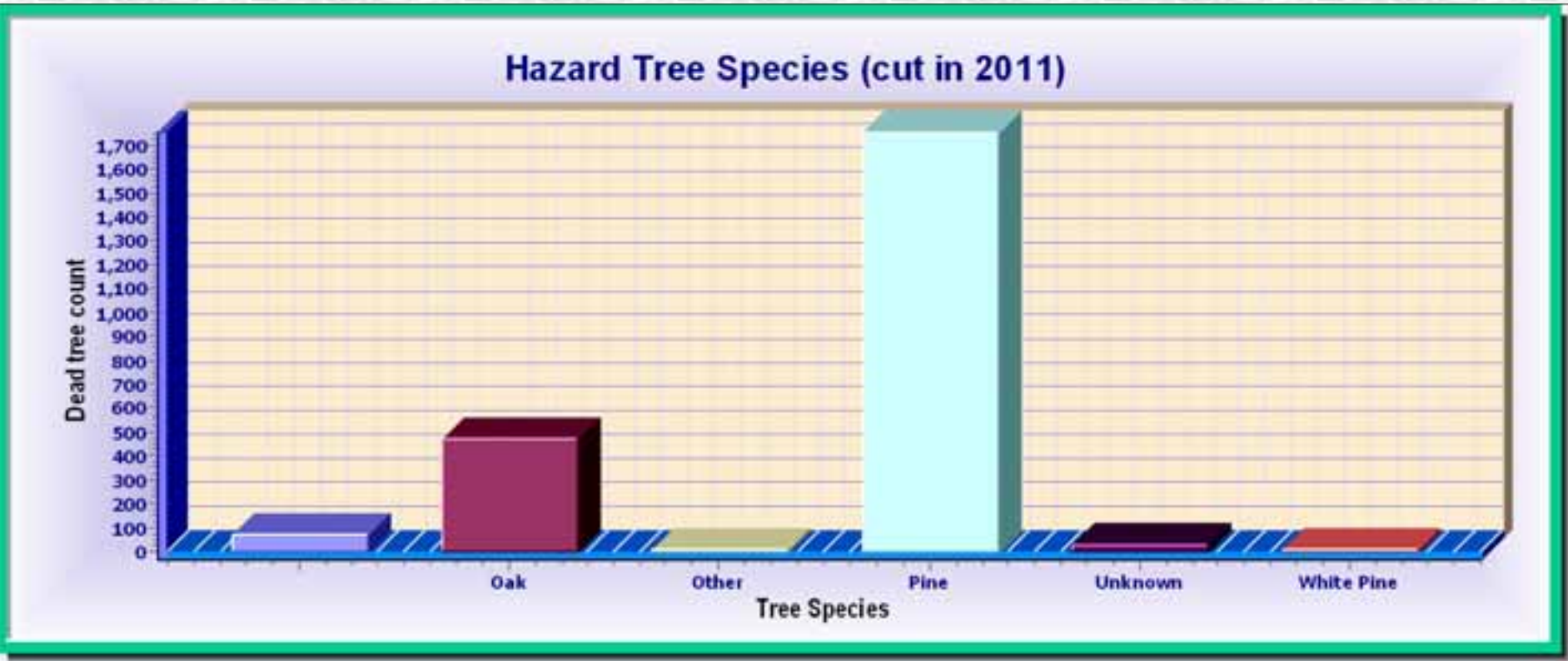
# WOA Factor 2 – Veg. Type



# Vegetation Type

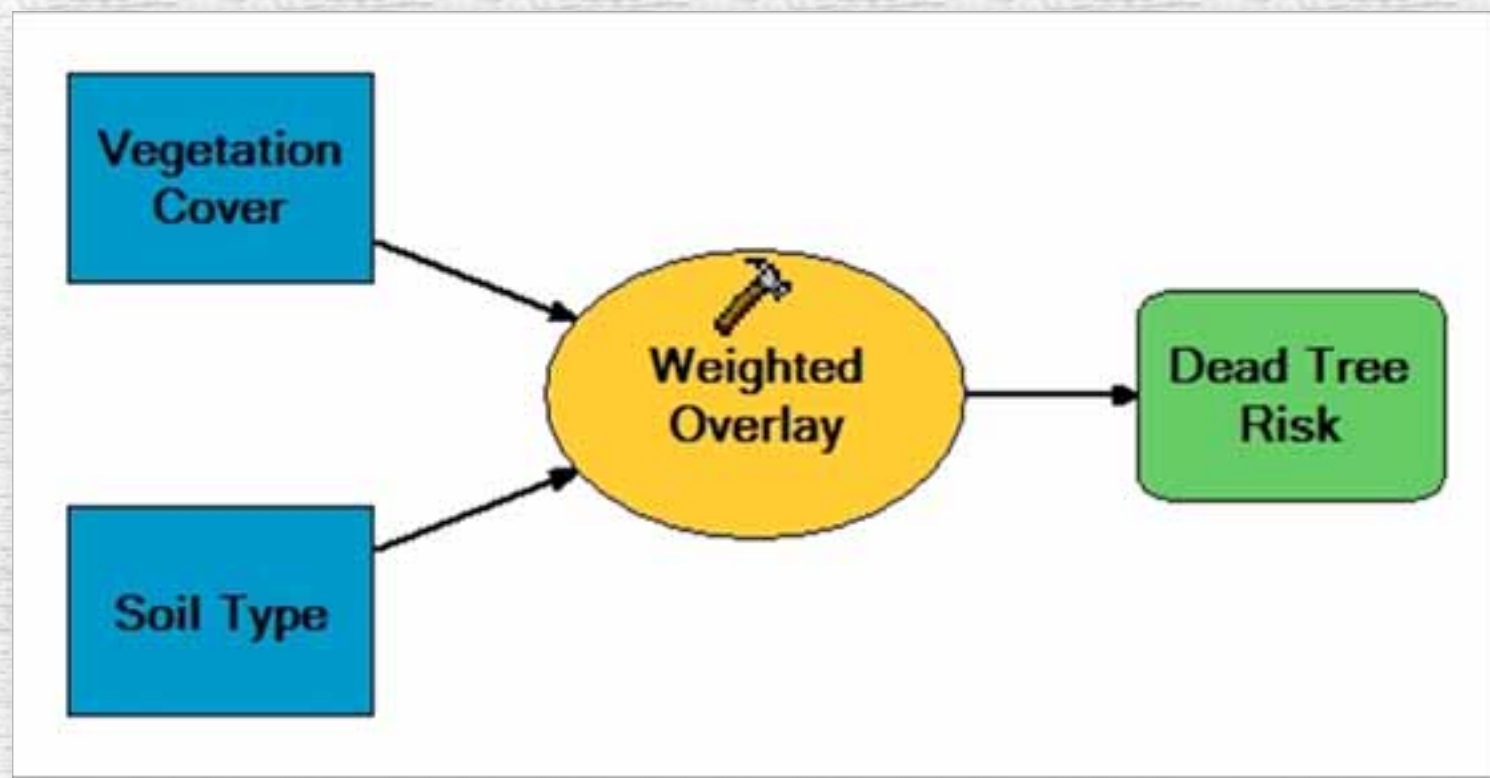


# Vegetation Type





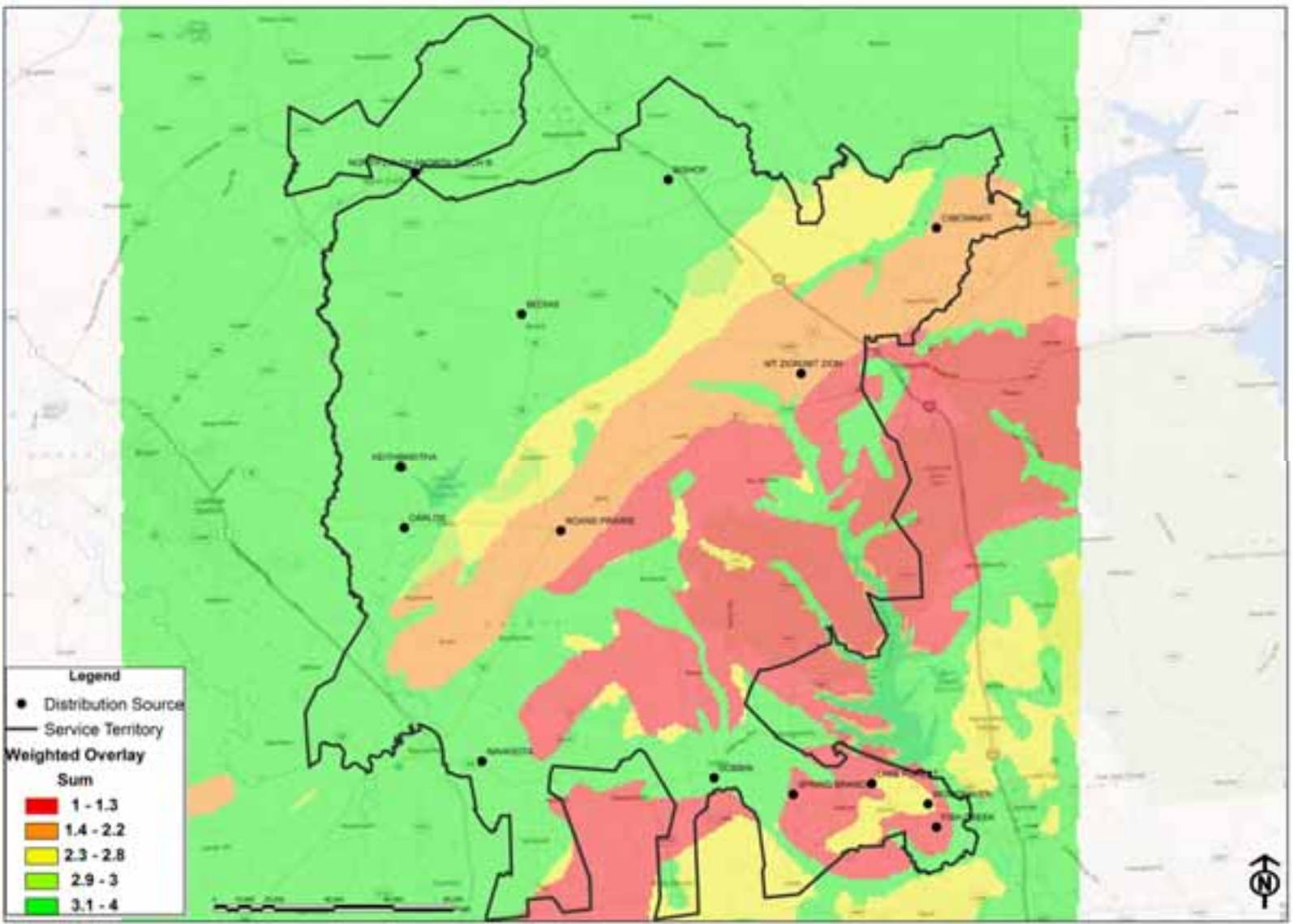
# Weighted Overlay Analysis



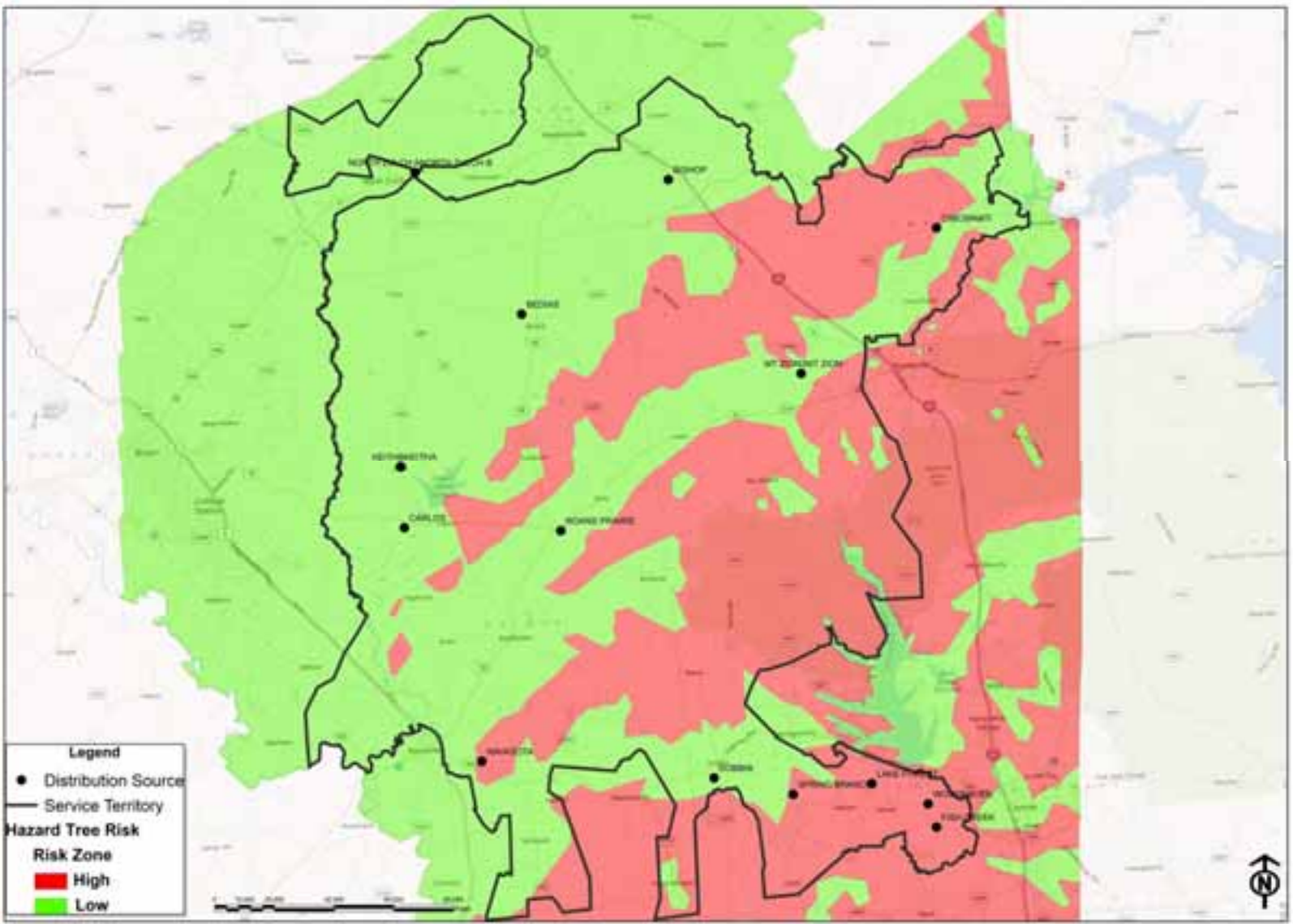
# Results

- Hazard tree risk zones
- Hazard trees cut
- Vegetation related outages
- Comparison of 2011 and 2012

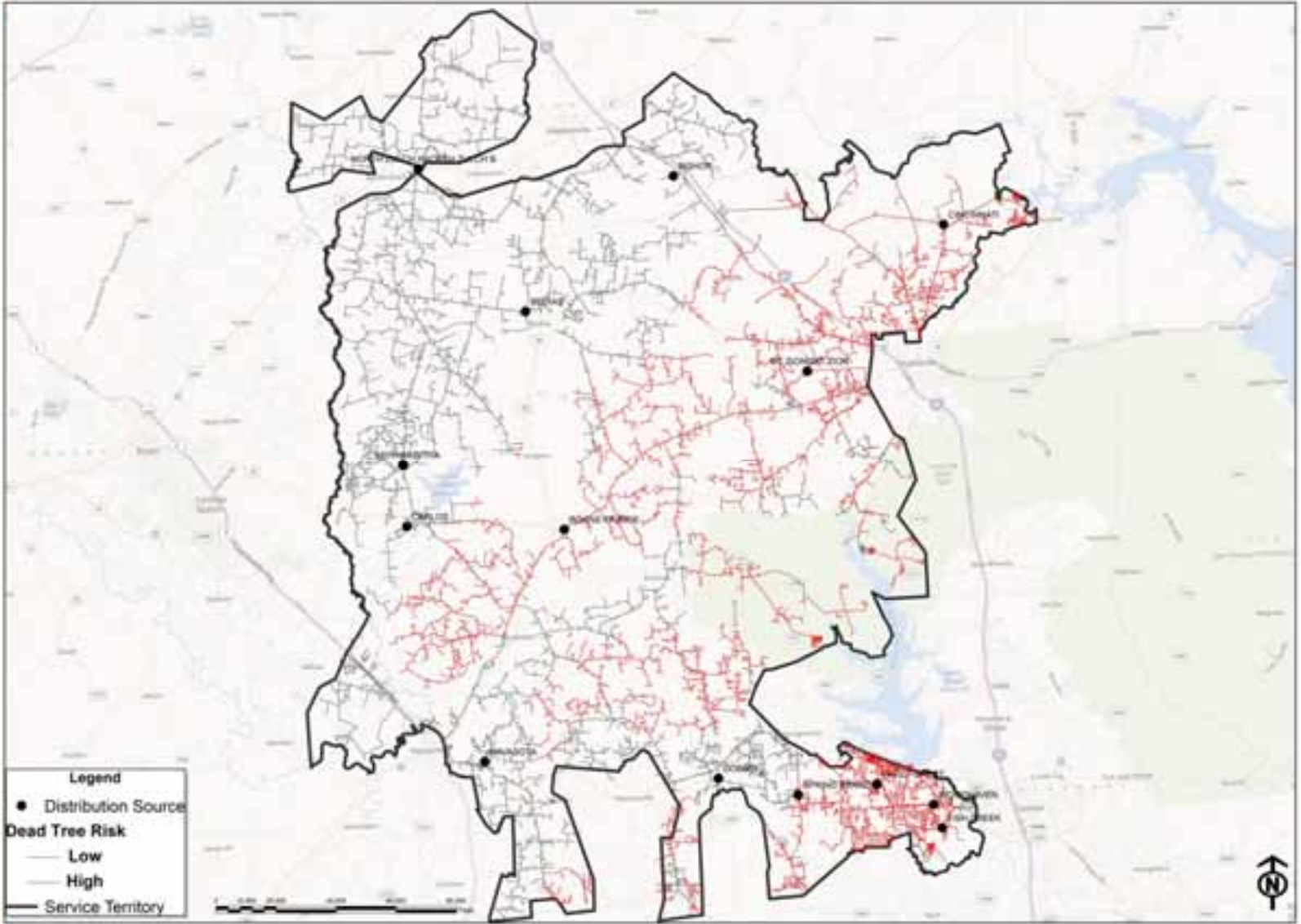
Weighted Overlay Result



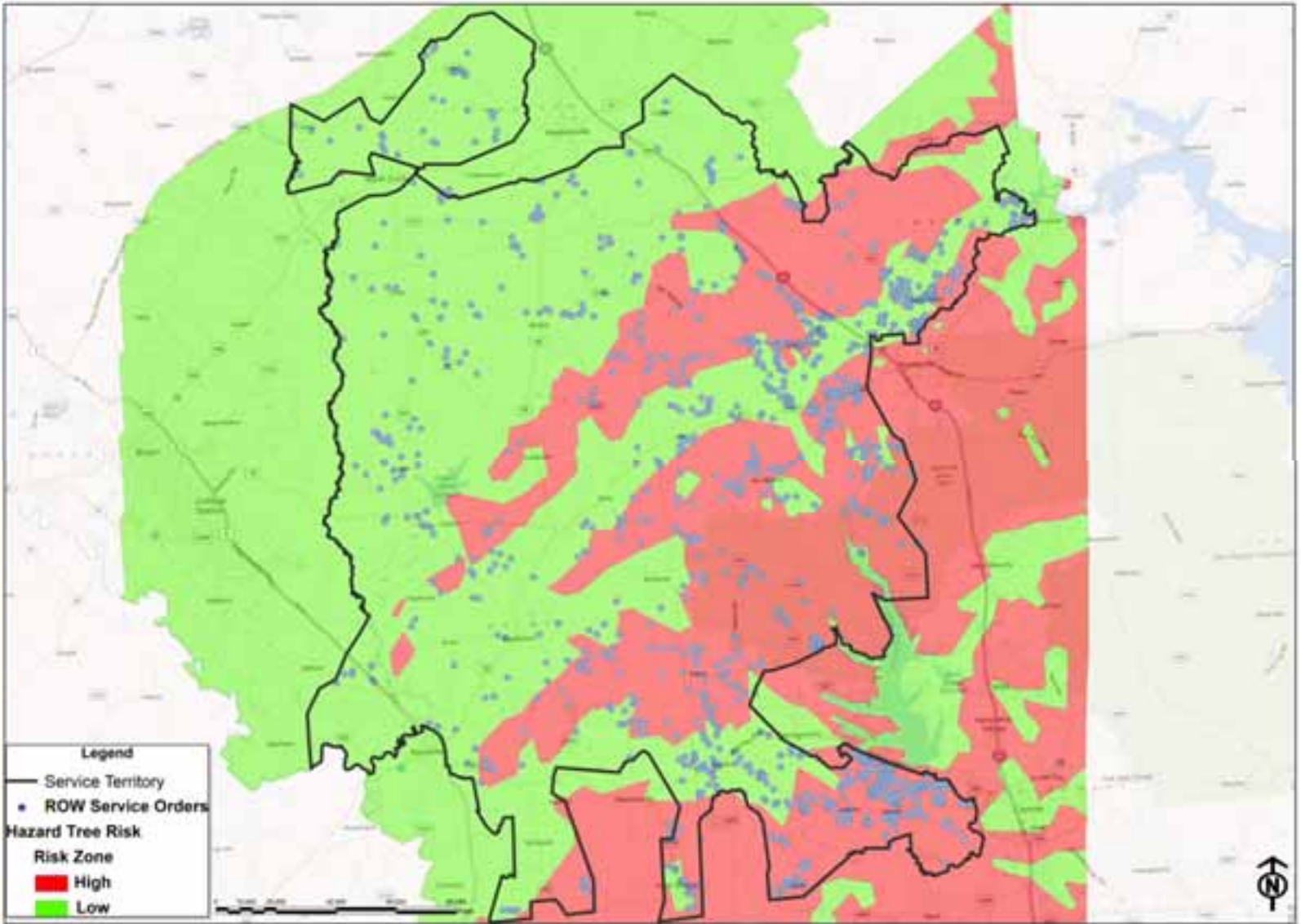
Hazard Tree Risk Zones in Mid-South Territory



Mid-South Feeder Hazard Trees Susceptibility



**Service Orders Generated From Customer Calls**



# New Workflow

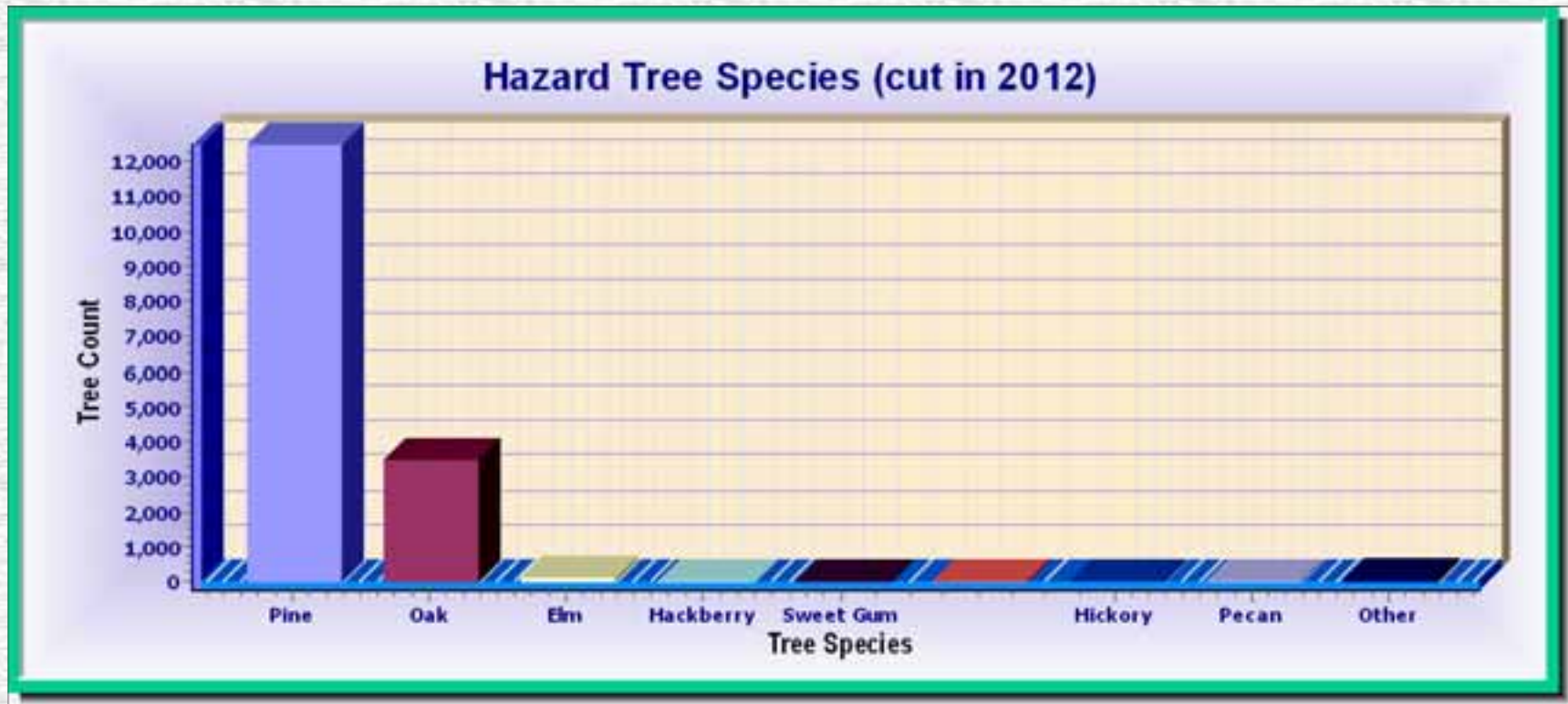
- GIS generates dead tree work for crews based on risk zones
- GIS groups customer-initiated service orders by area
- Feeder priority based on:
  1. Risk Zone
  2. Number of phases
  3. Vegetation related outage-density

# Hazard Trees Cut in 2012

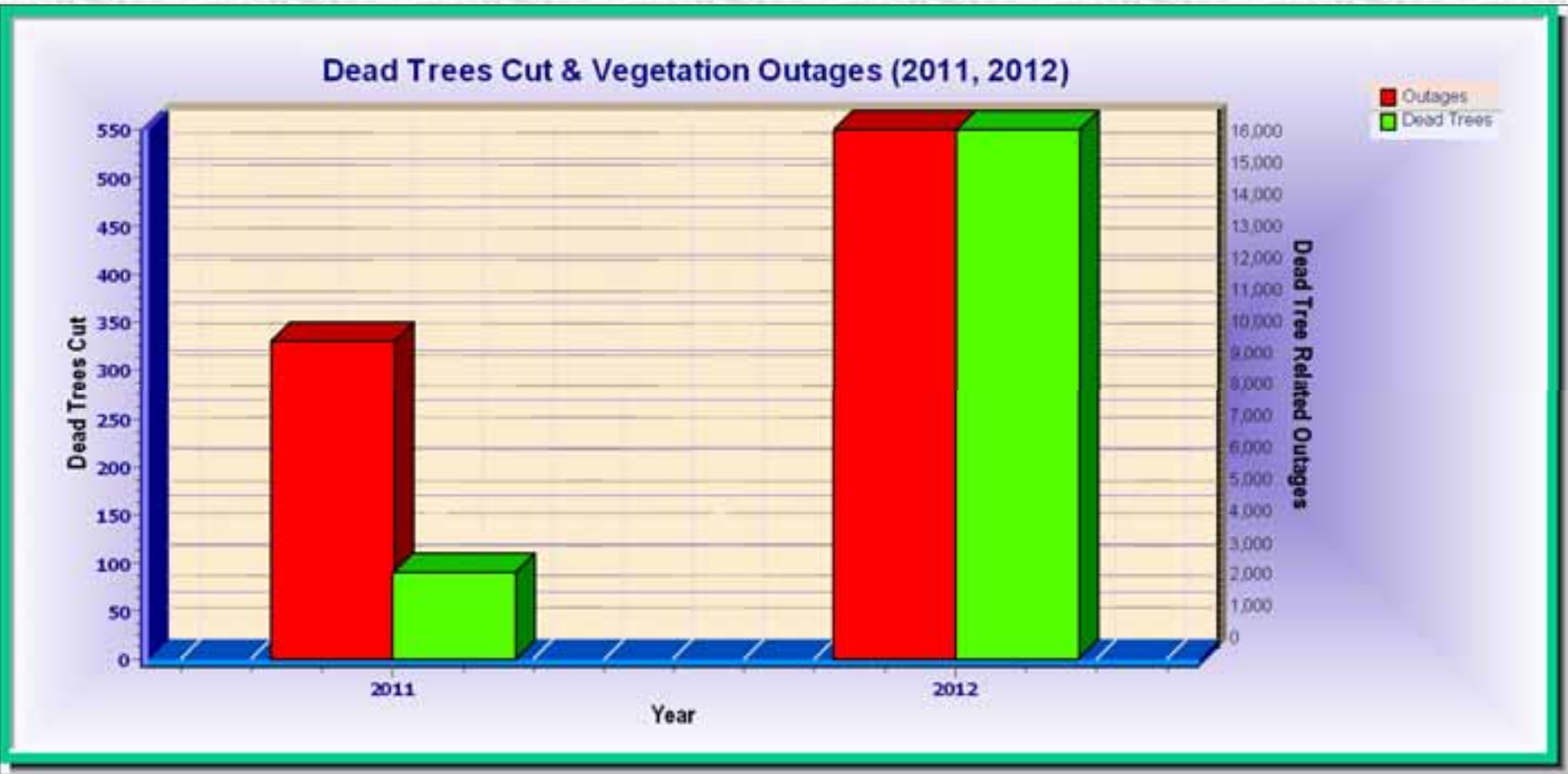




# Hazard Trees Cut in 2012



# 2011 Vs. 2012



# Discussion - Outages

- 7 times more trees cut in 2012
- Only 1.5 times more vegetation outages in 2012
- Without the new workflow, outages could have been more.....

# Conclusion

- Workflow was improved:
  - GIS now central to the hazard tree program
  - Don't have to wait for a customer call
  - Don't have to wait for an outage
  - Drive time reduced by grouping service orders, hence crew productivity improved
  - Crew productivity now measured in GIS by how many days they are taking in the field on a service order

# Conclusion

- Almost 17000 dead trees removed from the system in 2012, *Vs. ~ 3000 in 2011:*
  - Outages could have been worse
  - Reduction of fire hazard
  - Reduction of risk to utility line damage
  - Vegetation outages for 2013 may be way less due to trees removed this year

# Thank you

## Contact Info:

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