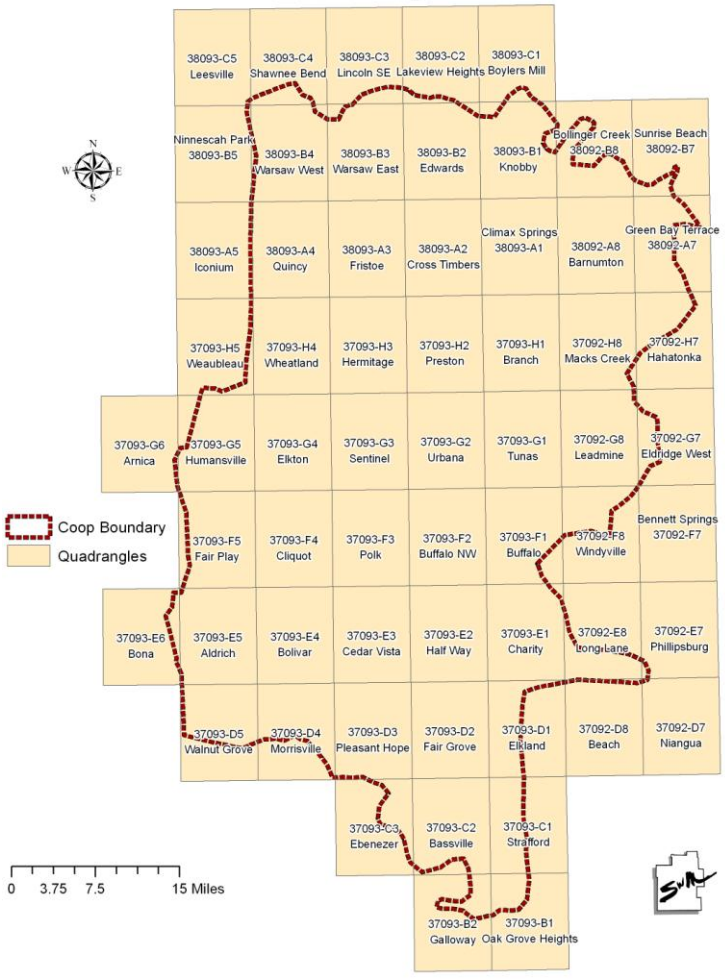
Section 1: Introduction

Southwest Electric Cooperative (SWEC) was established in October of 1939 and has been providing electric service to the rural areas of west-central Missouri ever since. SWEC is headquartered in Bolivar, Missouri, and provides service to rural customers in eleven counties in Missouri. SWEC is a private, independent electric utility owned by the members it serves. The cooperative is organized under Rochdale principles and is comprised of nine board districts within its service area. The cooperative does not have a formal mission statement but operates under the following slogan as overarching policy:

"*Southwest Electric Cooperative is dedicated to providing the best, most reliable service possible for our members*."

SWEC's service are covers nearly the entirety of Polk and Hickory counties and extends into portions of the surrounding counties of Dade, Dallas, Benton, Camden, Laclede, Webster, Greene, Cedar and St. Clair. The cooperative owns 5,333 miles of service line within these counties. Figure 1 depicts the boundaries of the cooperative in relation to USGS local quadrangles within the state of Missouri. *(Map sources: www.usgs.gov, Association of Missouri Electric Cooperatives, Southwest Electric Cooperative.)*

Figure 1: SWEC Service Area Quadrangle USGS Map Code

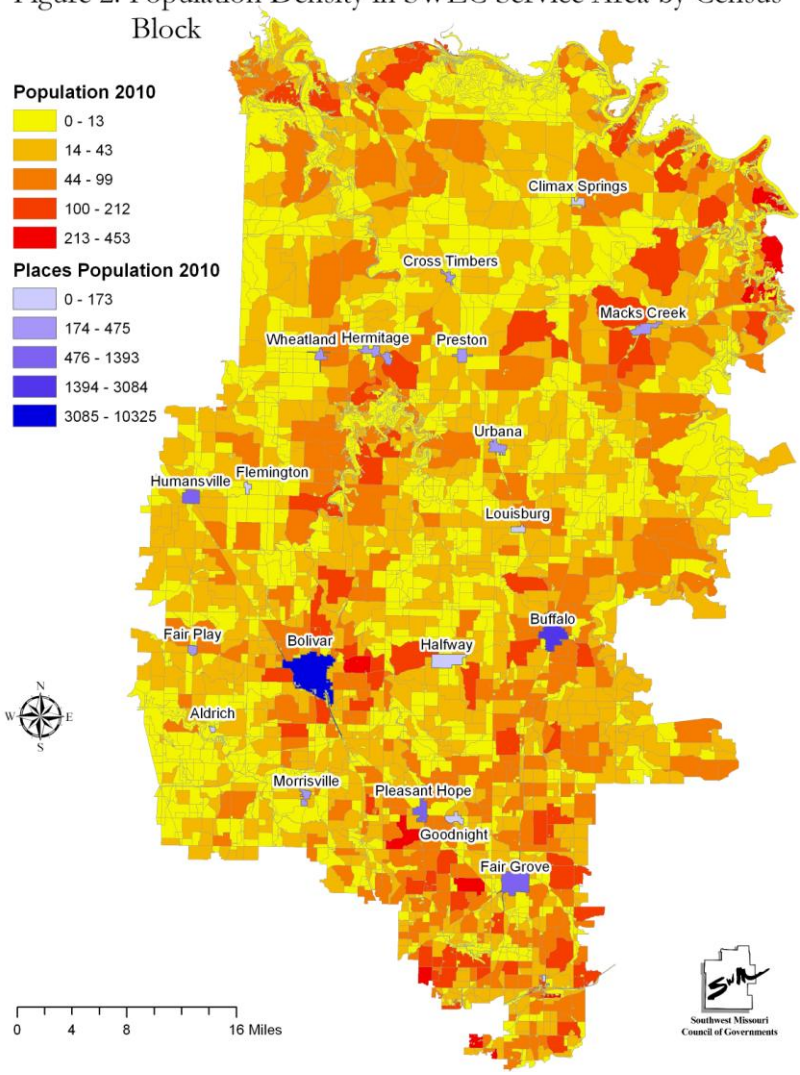


The customer base of SWEC currently exceeds 39,435 members. Residential customers account for 92.9% (36,644) of its memberships while commercial customers make up the remaining 7.1% (2,791) Table 1.1 provides the summary of overhead meters by county.

Table 1.1 Meters by Missouri County			
County	**Number of meters**	**County**	**Number of meters**
Hickory	6,355	Polk	7,964
Dade	10	Camden	10,667
Dallas	4,531	Laclede	13
Benton	5,532	Cedar	58
Webster	71	St. Clair	8
Greene	4,531	Total	39,435

The average monthly customer usage for SWEC is 1,233 kilowatt-hours (kWh). Annual total usage of SWEC customers in 2010 was 582,000,000 kWh of service. Population density for the cooperative service area is depicted in Figure 2 (*Map source: U.S. Census 2010*).

Figure 2: Population Density in SWEC Service Area by Census Block



Section 2: Planning process:

Through a partnership between the Association of Missouri Electric Cooperatives and the Missouri Association of Councils of Government, the Southwest Missouri Council of Governments was contracted to facilitate a hazard mitigation planning process for SWEC. The initial meeting between the two entities was held on January 18, 2011 as part of a regional kick-off meeting for Southwest Missouri. This informational meeting provided the basic responsibilities for each agency and allowed for initial discussion concerning the project timelines, data collection and other pertinent topics.

Three additional planning meetings were held at the SWEC offices in Bolivar, Missouri or the Ozark Electric headquarters in Mt. Vernon, Missouri during the period from July through October. Table 1.2 summarizes the attendees and topics of each meeting. Meeting minutes are available in the chapter appendix.

Table 1.2	**SWEC Planning Meeting Synopsis**	
Meeting Date	**Attendees, Title, Organization**	**Topics of discussion**
July 27, 2011	Ken Raming, Ozark Electric Billy Hunt, Southwest Electric Gary Stiles, Southwest Electric Brent Gamble, Southwest Electric Bill Shiveley, Southwest Electric Garry Lee, Southwest Electric Jim Chadd, Southwest Electric Bill Cheek, SMCOG Dave Faucett, Community Planner, SMCOG Jane Hood, Associate Director, SMCOG	Coop business structure Customer information Critical facilities information Asset inventory by type and location Data collection assignments
August 24, 2011	Billy Hunt, Southwest Electric Brent Gamble, Southwest Electric Dave Faucett, Community Planner, SMCOG	Data collection review Current mitigation strategies Establishment of goals, actions, and objectives
October 10, 2011	Ken Raming, Ozark Electric Billy Hunt, Southwest Electric Brent Gamble, Southwest Electric Garry Lee, Barry Electric Jim Chadd, Barry Electric Tom Houston, Webster Electric Dave Faucett, Community Planner, SMCOG	Method of prioritization Prioritization of goals, actions, and objectives

Public Involvement

All public hazard mitigation plans require measures to include public involvement in the planning process. Public involvement in the SWEC hazard mitigation plan was encouraged through a variety of methods. SWEC posted their local chapter on the company's website, inviting both cooperative members and the general public to provide comment. Print copies of the chapter were also made available upon request through the local office. Comments from neighboring jurisdictions were also solicited using the standardized AMEC letter which was mailed to the appropriate contacts, including:

- Benton County Commission,
- Camden County Commission,
- Cedar County Commission,
- Dade County Commission,
- Dallas County Commission,
- Hickory County Commission,
- Greene County Commission,
- Laclede County Commission,
- Polk County Commission,
- St. Clair County Commission,
- Webster County Commission,
- Local emergency management directors, and
- Local Red Cross chapter.

SWEC does not provide service to any critical facilities (hospitals, emergency services, etc.), higher education institutions, or large industrial centers. Additionally, SWEC's mitigation plan was included in the public comment period for the combined AMEC plan.

Section 3: Asset inventory

Southwest Electric Cooperative has a wide variety of assets by type. Real estate owned by the company includes office buildings, warehouses, garages, and other outbuildings throughout the service area. Thirty-nine vehicles provide access to customers and infrastructure. SWEC does not own any electric generation or transmission infrastructure. Table 1.3 provides information concerning total asset valuation.

Table 1.3	Southwest Electric Asset Inventory Valuation Summary	
Asset	**Total Replacement Cost**	**Cost Breakdown**
Total SWEC Assets	$344,307,549.62	Buildings and vehicles - $8,911,497 Overhead assets - $316,809,216 Underground assets - $9,384,587 Substation assets - $2,670,000
Distribution Lines	$89,417,057 OH $1,077,726 UG	OH Single-phase lines - $37,356,617 OH Three-phase lines - $52,060,441 UG Primary lines - $1,077,726
Supporting Infrastructure	$227,392,158 OH $8,306,861UG	OH Meters - $20,236,313 UG Meters - $195,287 Poles - $144,011,333 OH Transformers - $36,440,707 UG Transformers - $8,111,575 Guys/Anchors - $9,451,160 Regulators - $2,575,664Oil-Circuit Reclosures - $2,451,371 Capacitors - $199,123 SecServ - $6,930,689 Fiber - $643,861Lights - $4,451,936
Substation Assets	$2,670,000 27 substations (3 subs have two transformers each)	Breakdown of Substation Equipment: Transformer - $12,000 Outbound Modulation Unit - $10,000 Control Receiving Unit - $10,000 Inbound Pickup Unit - $3,000 CT (feeder level detection) - $5,000 OCR - $18,000
Office Buildings	$4,479,000.00	
Warehouses	$768,400	
Vehicles	$3,664,097	Includes trailers and miscellaneous equipment
Source: Internal SWEC Accounting and Insurance records, 2011		

Ensuring quality distribution to its customers, Southwest maintains not only distribution lines, but also the supporting infrastructure as well. Table 1.4 includes a list of asset types, emergency replacement cost per unit or mile, the asset inventory by county of service, and total infrastructure numbers.

Table 1.4	SWEC Asset Inventory by Service County				
Asset	**Emergency Replacement Cost per unit or mile**	**Number of units or miles/feet: HICKORY**	**Number of units or miles/feet: DADE**	**Number of units or miles/feet: DALLAS**	**Number of units or miles/feet: BENTON**
Meter OH Meter UG	$429.09/unit $867.94/unit	7,722 OH 0 UG	9 OH 0 UG	5,605 OH 15 UG	7,090 OH 0 UG
Pole	$1,285.54/unit	18,295	51	18,545	14,309
OH SP line	$9,926.40/mile	624.80 mile	2 mile	667.2/mile	441.6 mile
OH TP line	$55,334/mile	156.20 mile	0.5 mile	166.8 mile	110.4 mile
UG Primary	$46,675/mile	857 ft	0	1,754 ft	1,430 ft
Transformers	$1,069.05 OH $2,502.80 UG	5,296 OH 113 UG	9 OH 0 UG	4,710 OH 128 UG	4,473 OH 295 UG
Guys/anchors	$141.10/unit	10,975	34	11,770	10,444
SecServ	$17,265/mile	61 mile	512 ft	55.6 mile	56.3 mile
Regulators	$9,264.98/unit	44	0	50	29
OCR	$1,313/unit	357	0	327	267
Fiber	$6,198.72/mile	46 miles	0	4.6 mile	0
Lights	$372.36/unit	1,884	4	1,634	1,510
Capacitors	$465.24/unit	76	0	59	39
Total Replacement Value by county		OH $51,839,425 UG $290,384	OH $134,579 UG $0	OH $51,310,900 UG $348,780	OH $40,356,604 UG $750,928
Asset	**Emergency Replacement Cost per unit or mile**	**Number of units or miles/feet: POLK**	**Number of units or miles/feet: CAMDEN**	**Number of units or miles/feet: LACLEDE**	**Number of units or miles/feet: GREENE**
Meter OH Meter UG	$429.09/unit $867.94/unit	9,504 OH 176 UG	12,222 OH 0 UG	19 OH 0 UG	4,831 33 UG
Pole	$1,285.54/unit	29,643	18,192	124	12,374
OH SP line	$21,120/mile	1,060.8 mile	539.2 mile	5.2 mile	405.6 mile
OH TP line	$55,334/mile	265.2 mile	134.8 mile	1.3 mile	101.4 mile
UG Primary	$46,675/mile	11.85 mile	6.34 mile	0	4.09 mile
Transformers	$1,069.05 OH $2,502.80 UG	7,933 OH 881 UG	6,617 OH 1,097 UG	822 OH 0 UG	4,097 OH 727 UG
Guys/anchors	$141.10/unit	17,934	14,535	64	869
SecServ	$17,265/mile	84.7 mile	99.3 mile	728 ft	43 mile
Regulators	$9,264.98/unit	78	41	0	36
OCR	$1,313/unit	98	448	1	364
Fiber	$6,198.72/mile	43 mile	10 mile	0	1,426 ft
Lights	$372.36/unit	2,926	2,522	2	1,421
Capacitors	$465.24/unit	110	81	0	63
Total Replacement Value by county		OH $82,122,031 UG $2,910,823	OH $54,288,278 UG $3,041,491	OH $1,183,375 UG $0	OH $34,233,709 UG $2,039,078

OH = overhead UG = underground SP = Single phase TP = Three phase
OCR= Oil Circuit Re-closure
*AMR Modules and meter loops included in the replacement cost of OH Meters
Source: Internal SWEC Accounting and Maintenance records

Table 1.4	SWEC Asset Inventory by Service County (Continued)				
Asset	**Emergency Replacement Cost per unit or mile**	**Number of units or miles/feet: WEBSTER**	**Number of units or miles/feet: CEDAR**	**Number of units or miles/feet: ST. CLAIR**	**Total number of units or miles:**
Meter OH Meter UG	$429.09/unit $867.94/unit	78 OH 1 UG	69 OH 0 UG	12 OH 0 UG	47,161 OH 225 UG
Pole	$1,285.54/unit	170	273	48	112,024
OH SP line	$21,120/mile	4.8 mile	10.4 mile	1.76 mile	3,763.36 mile
OH TP line	$55,334/mile	1.2 mile	2.6 mile	.44 mile	940.84 mile
UG Primary	$46,675/mile	0	284 ft	0	23.09 mile
Transformers	$1,069.05 OH $2,502.80 UG	61 OH 0 UG	60 OH 0 UG	9 OH 0 UG	34,087 OH 3,241 UG
Guys/anchors	$141.10/unit	153	173	31	66,982
SecServ	$17,265/mile	3,296 ft	2,597 ft	952 ft	401.42 mile
Regulators	$9,264.98/unit	0	0	0	278
OCR	$1,313/unit	2	3	0	1,867
Fiber	$6,198.72/mile	0	0	0	103.87 mile
Lights	$372.36/unit	29	22	2	11,956
Capacitors	$465.24/unit	0	0	0	428
Total Replacement Value by county		OH $476,987 UG $867.94	OH $736,807 UG $2,334	OH $126,520 UG $0	OH $316,809,216 UG $9,384,587
OH = overhead UG = underground SP = Single phase TP = Three phase OCR= Oil Circuit Re-closure *AMR Modules and meter loops included in the replacement cost of OH Meters *Source: Internal SWEC Accounting and Maintenance records*					

Section 4: Identified Hazards and Risk Assessment Methodology

Natural hazards in southwest Missouri vary dramatically with regard to intensity, frequency, and the scope of impact. Some hazards, like earthquakes, happen without warning and do not provide any opportunity to prepare for the threat. Other hazards, such as tornadoes, flooding, or severe winter storms, provide a period of warning which allows for public preparation prior to their occurrence. Regardless, hazard mitigation planning can lessen the negative of any natural disaster regardless of onset time. The following natural hazards have been identified as potential threats for the service region of the Southwest Electric Cooperative:

- Tornadoes
- Severe Thunderstorms, Hail, and High Winds
- Flood
- Severe Winter Weather
- Earthquakes
- Dam Failure
- Wildfire
- Severe land subsidence (Sinkholes)

Likewise, a number of hazards may be eliminated from consideration in this local plan due to the state's geographic location including tsunamis, hurricanes, coastal storms, volcanic activity, avalanche, and tropical storms. Additionally, a number of hazards may be eliminated specifically for SWEC because of asset types and geographic location in the state of Missouri. Those hazards eliminated for the SWEC service region include:

- Drought
- Heat Wave
- Landslides
- Levee Failure

Although drought can potentially impact northwest Missouri, water availability does not directly impact the delivery of electric service to SWEC customers. Similarly, heat wave has been eliminated. Though it may result in additional usage and potentially tax the system, heat waves do not usually cause infrastructure damage to cooperative assets. The results of a heat wave in the SWEC service area may be considered cascading events rather than damage caused directly by the hazard itself. Landslides have been eliminated based upon local soil structure categorization by the USGS. In addition levee failure has been excluded due to the fact that there are no levees in the SWEC service area.

For the purpose of this risk assessment, the identified hazards for the SWEC service area have been divided into two categories: **historical and non-historical hazards**.

> **Historical Hazards** are those hazards with a measurable previous impact upon the service area. Damage costs per event and a chronology of occurrences are available. The associated vulnerability assessments utilize the number of events and cost of each event to establish an average cost per incident. For SWEC, hazards with historical data include tornadoes, severe thunderstorms/high wind/hail, flood, severe winter weather, wildfire and sinkholes.
>
> **Non-historical Hazards** are hazards with no previous record of impact upon the local service area. As such, the associated vulnerability assessments for each of these hazards will have an occurrence probability of less than 1% in any given year, but the extent of damage will vary considerably. For SWEC, hazards without historical data include earthquakes and dam failure.

Probability of Occurrence

In determining the potential frequency of occurrences, a simple formula was used. For historical events, the number of recorded events for the service area was divided by the number of years of record. This number was then multiplied by 100 to provide a percentage. This formula was used to determine future probability for each hazard. For events that have not occurred, a probability of less than 1% was automatically assigned as the hazard cannot be excluded from the possibility of occurrence. Likewise, when discussing the probable risk of each hazard based upon historical occurrences, the following scale was utilized:

- Less than 1% chance of an event occurrence in any given year.
- 1-10% chance of an event occurrence in any given year
- 10-99% chance of an event occurrence in any given year
- Near 100% chance of an event occurrence in any given year

The number of occurrences was further refined to focus on damage-causing events. Those occasions which had reported damages were divided by the total number of recorded events to obtain a percentage of total storms which result in infrastructure damage. (Formula: Number of damage-causing events / total number of events = Percentage of occurrences which cause damage.)

Potential Extent of Damage

Vulnerability Assessment matrices for each hazard are included on the following pages. These worksheets detail loss estimates for each hazard affecting the cooperative's service area. Loss estimates were calculated using the asset summary created by internal SWEC accounting records. Each hazard has a unique impact upon the service area, requiring each hazard to utilize a different valuation amount depending upon the level of impact. Non-historical hazards assume damage to all general assets. For Historical Hazards, assets were divided into two groups based upon historical impact which were utilized in the hazard damage analysis:

- Overhead infrastructure assets and buildings
    - Used for Tornado damage assessments
    - Valued at $322,056,611
- Overhead infrastructure assets only
    - Used for:
        - Severe Thunderstorm / High Wind / Hail
        - Flood
        - Severe Winter Weather
    - Valued at $316,809,216

In addition, historical hazards with recorded damages were used to identify an average cost per event. (Formula: Total cost of damages / total number of events = Average damage cost per event.) When discussing the extent of potential damages for all hazards, the following scale was utilized:

- Less than 10% potential damages to total cooperative infrastructure
- 10-25% potential damages to total cooperative infrastructure
- 25-50% potential damages to total cooperative infrastructure
- More than 50% potential damages to total cooperative infrastructure

Regardless of hazard categorization, the following matrix (Table 1.5) will be utilized to identify the potential damage extent and likelihood of occurrence for each natural hazard type.

Table 1.5 **Sample Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: _____**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

In many instances, natural hazard events occur without causing significant damage to the cooperative's infrastructure. The more significant impact of natural hazard episodes comes in the form of reported customer outages. The infrastructure may not be significantly harmed by an ice storm, but may result in prolonged and widespread outages in the cooperative's service area. In considering the potential impact of a hazard, loss of function provides a more concise picture for comparison of events and geographic regions of the state. In addition to system damage, each hazard will be evaluated on the average number of reported or estimated outages per event occurrence. (Formula: Average number of outages reported / Total number of customers = Average percentage of outages reported per event).

Table 1.6 **Sample Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: _____**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

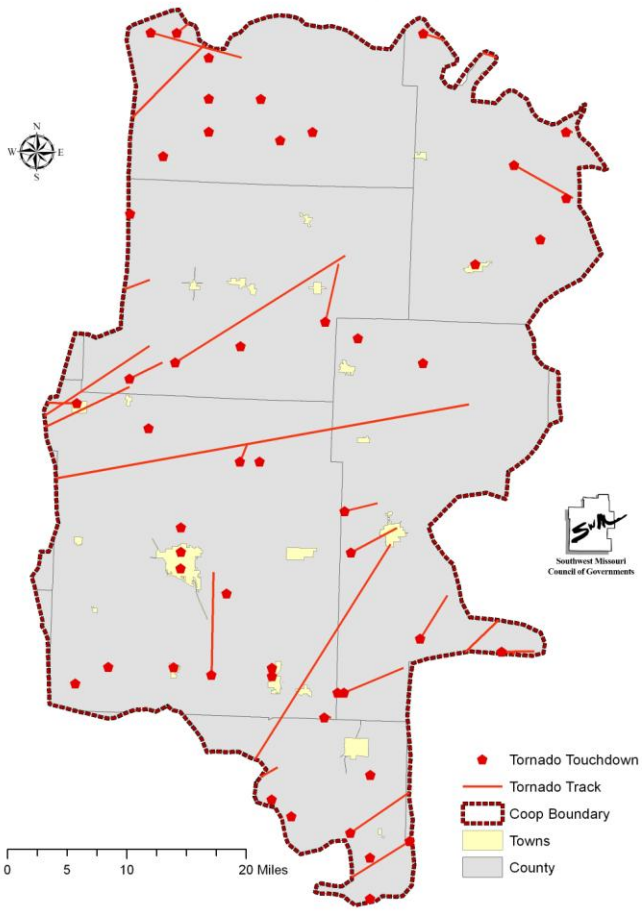
Section 5: Risk Assessment

A) Historical Hazards:

Tornadoes

In the last 60 years, 59 tornadoes have been reported within the Southwest cooperative boundaries. Figure 3 provides a pictorial representation of all recorded tornado touchdown sites and recorded path. *(Data for map collected from NOAA.)*

Figure 3: Tornadoes in the SWEC Service Area, 1951-2010



Historical hazard records contain tornado occurrences from 1951 – 2010, however there is a data insufficiency in cooperative records concerning damage estimates for specific tornado events prior to 2000. For the purpose of this assessment, the years for which records exist for both data sets have been used.

From 2000-2010, SWEC's service area within the state of Missouri has experienced a total of fourteen tornado outbreaks. Ten of those fourteen outbreaks resulted in outages or damages. Using the previously described methodology, the probability of a tornado event in the SWEC service area in any given year is 100% (14 events / 10 years = 140%). Estimated cooperative material damages associated with each of these events were compiled by SWEC staff. Ten of the fourteen outbreaks impacted cooperative assets or service, resulting in a 71.4% probability that any given tornado outbreak will produce an impact (10 / 14 = 71.4%). Table 1.7 provides a summary of event dates, EF-scale ratings, damage cost estimates and outages reported.

Table 1.7	SWEC Tornadic Event Summary		
Date of event	**EF Scale rating**	**Damage estimates**	**Outages Reported**
2/25/2000	F-0	0	120
10/10/2001	F-1	0	45
5/4/2003	7 Tornadoes, F-0 to F-3	$307,727	109
3/12/2006	6 Tornadoes, F-0 to F-3	$82,575.65	0
10/17/2007	F-0	0	379
1/7/2008	5 Tornadoes, F-0 to F-3	0	1,013
1/8/2008	F-0	0	2
5/8/2009	F-1/ F-2	$606,313	0
11/24/2010	F-0/ F-1	0	222
12/31/2010	F-0	0	159
Data provided based on internal SWEC records which reflect cost from the referenced event year.			

Based upon the last ten years of historical event records, the average tornado to affect the cooperative will include an EF-0 to EF-1 rating, causing an average damage cost of $99,662 per event ($996,615/ 10 events = $99,662). This averaged amount accounts for less than 1% of SWEC's total overhead assets and building valuation ($99,662 / $322,056,611 = 0.03%). Table 1.8 demonstrates the probability of occurrence in conjunction with the potential extent of damage.

Table 1.8 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Tornado**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

An average of 205 customers reported outages during recorded tornadoes since 2000. When compared with the total number of customers served by SWEC, it can be projected that 0.52% of all customers may report outages during any given tornado event. Table 1.9 demonstrates the probability of occurrence in conjunction with the potent extent of impact upon local customers.

Table 1.9 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Tornado**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Severe Thunderstorms, High Wind, and Hail

From 2000 - 2010, Southwest Electric's service area has experienced a total 169 hail events and 98 thunderstorm/high wind events. Therefore, the probability of a hail event in the SWEC service area in any given year is near 100% (169 events / 10 years = 1,690%) while the probability of a thunderstorm/high wind event in any given year is also near to 100% (98 events / 10 years = 980%). Estimated material damages associated with each of these events were compiled by SWEC staff.

A data insufficiency exists between historical records and cooperative records for hail events. It may be possible that hail events have caused damages to the system and outages; however, the SWEC records do not contain any records associated with hail events. For the purpose of the risk assessment for hail events, the probability of damages and outages due to hail are difficult to assess.

Based upon historical records, the probability of a hail event occurrence is at least equal to or greater than 100% and it is safe to assume that damages and outages have resulted from the impact of hail. However, it is unlikely that average damage costs resulting from hail would equal 10% or greater of the total overhead value of Southwest Electric assets. It would be equally unlikely that average reported outages due to hail from 2000 – 2010 would total 10% or greater of total Southwest Electric customers.

Table 1.10 provides information for thunderstorm/high wind events, including date, damages, and outages from 2000 - 2010. Sixty-two of the ninety-eight Thunderstorm/High Wind events resulted in damage to cooperative assets, resulting in a 63.2% probability that any given thunderstorm/high wind occurrence will produce damage. (62 / 98= 63.2%)

Table 1.10	SWEC Thunderstorm/High Wind Event Summary				
Event date	Damage estimates	Outages reported	Event date	Damage estimates	Outages reported
4/20/2000	$15,000	2,207	11/5/2005	$35,500	1,257
6/4/2000	$750	180	4/2/2006	$750	421
8/7/2000	$1,500	95	4/22/2006	$0	1
9/11/2000	$300	3	5/3/2006	$550	112
11/1/2000	$750	37	6/22/2006	$0	1
4/11/2001	$5,000	242	7/19/2006	$0	1
5/20/2001	$1,250	599	8/6/2006	$300	97
6/1/2001	$300	5	8/11/2006	$250	120
6/3/2001	$10,000	2,137	3/1/2007	$600	143
6/14/2001	$3,000	843	4/24/2007	$0	1
7/10/2001	$75,000	3,017	6/7/2007	$8,000	976
7/12/2001	$36,000	1,186	6/18/2007	$0	2
8/9/2001	$5,000	277	9/30/2007	$11,000	730
8/29/2001	$1,800	775	5/24/2008	$0	1
5/7/2002	$4,000	600	5/25/2008	$250	10
5/8/2002	$1,050	400	5/30/2008	$8,500	1,453
7/10/2002	$0	2	6/2/2008	$1,000	43
7/22/2002	$750	385	6/6/2008	$15,000	1,006
8/24/2002	$0	4	6/15/2008	$250	8
3/13/2003	$0	82	6/19/2008	$0	1
3/19/2003	$0	2	7/22/2008	$0	2
7/9/2003	$300	971	8/5/2008	$0	1
7/12/2003	$250	617	11/6/2008	$475	263
7/28/2003	$0	17	3/8/2009	$800	348
8/1/2003	$300	5	4/9/2009	$750	56
8/2/2003	$750	232	5/8/2009	$35,000	10,100
8/27/2003	$0	1	5/13/2009	$10,000	284
9/26/2003	$2,250	95	6/10/2009	$10,050	2,391
11/18/2003	$300	4	6/16/2009	$9,500	1,439
5/30/2004	$1,000	365	8/19/2009	$1,500	114
6/12/2004	$300	5	4/23/2010	$1,750	162
10/29/2004	$1,500	261	4/24/2010	$1,070	371
6/9/2005	$300	586	5/12/2010	$2,140	536
6/10/2005	$4,000	538	6/16/2010	$7,000	663
6/13/2005	$10,000	654	6/19/2010	$500	226
7/10/2005	$2,550	196	7/11/2010	$11,000	2,708
7/23/2005	$0	393	9/2/2010	$650	343
8/31/2005	$2,250	919	10/26/2010	$2,340	679
9/13/2005	$2,250	825			
Data provided based on internal SWEC records which reflect cost from the referenced event year.					

Based upon historical records, the average thunderstorm/high wind event to affect the cooperative will cause an average damage cost of $5,907 ($366,225 / 62 events = $5,907). This averaged amount accounts for less than 1% of SWEC's overhead asset valuation ($5,907 / $316,809,216 = .0018%). Table 1.11 demonstrates the probability of occurrence in conjunction with the potential extent of damage for both hail and thunderstorm wind events.

Table 1.11 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Thunderstorm/High Wind/Hail**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

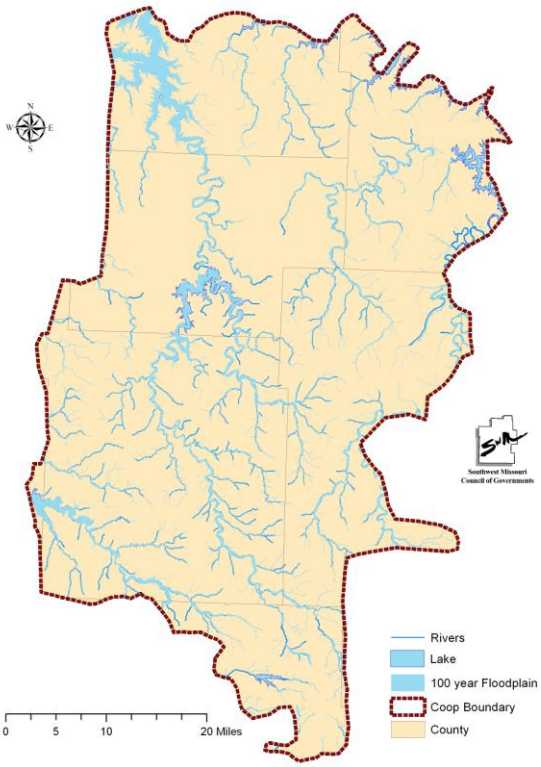
An average of 755 customers reported outages during recorded thunderstorm and high wind events since 2000. When compared with the total number of customers served by SWEC, it can be projected that 1.9% of all customers may report outages during any given thunderstorm or high wind event. Table 1.12 demonstrates the probability of occurrence in conjunction with the potent extent of impact upon local customers for both hail and thunderstorm wind events.

Table 1.12 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Thunderstorm/High Winds/Hail**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Flood

Riverine and flash flooding is a potential threat to the existing infrastructure of the Southwest Electric Cooperative. Approximately 7.5% of the SWEC service area is located in the 100 year floodplain. Figure 4 below depicts the 100 year floodplain in relation to the cooperative's boundaries. Much of what is depicted as the 100 year floodplain in Figure 4 is actually lake area. Portions of the Lake of the Ozarks, Truman Lake, Stockton Lake and the entirety of the Pomme De Terre Lake are located in the SWEC service area. *(Map sources: FEMA HAZUS-MH; FEMA National Flood Hazard Layer; Missouri Office of Administration, and Association of Missouri Electric Cooperatives.)*

Figure 4: SWEC 100 Year Floodplain



From 2000-2010, SWEC's service area has experienced 123 flooding events. Therefore, the probability of a flood/ event affecting SWEC's service area is near 100% (123 events / 10 years = 1,230%). Estimated material damages associated with each of these events were compiled by SWEC staff. Table 1.13 summarizes flood event dates by month, damage cost estimates, and reported outages. Two of the 123 occurrences caused damage to cooperative assets, resulting in a 1.6% probability that any given flood occurrence will produce damage. (2 / 123 = 1.6%)

Table 1.13	**SWEC Flood Event Summary**	
Event date	**Damage estimates**	**Outages reported**
9/2/2010	$650	343
11/24/2010	$5,000	222
Data provided based on internal SWEC records which reflect cost from the referenced event year.		

Flood events vary widely based upon numerous factors including, but not limited to, rate and duration of precipitation. Based upon historical records, the average flood event to affect the cooperative will cause an average damage cost of $2,825 ($5,650 / 2 events = $2,825). This averaged amount accounts for less than 1% of SWEC's overhead asset valuation ($2,825 / $316,809,216 = 0.00089%). Table 1.14 demonstrates the probability of occurrence in conjunction with the potential extent of damage.

Table 1.14 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Flood**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	≥100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

An average of 282.5 customers reported outages during recorded flooding events since 2000. When compared with the total number of customers served by SWEC, it can be projected that 0.72% of all customers may report outages during any given flooding event. Table 1.15 demonstrates the probability of occurrence in conjunction with the potent extent of impact upon local customers.

Table 1.15 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Flood**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Severe Winter Weather

From 2000-2010, Southwest's service area has experienced a total of twenty-three severe winter weather events, including significant snowfall and ice storms. Therefore, the probability of a severe winter weather event in the Southwest service area in any given year is near 100% (23 events / 10 years = 230%). Thirteen of the twenty-three events resulted in either outages or damages. Estimated material damages associated with each of these events were compiled by SWEC staff. Table 1.16 provides a summary of event

dates, types, associated damage estimates, and reported outages. Three of the twenty-three occurrences caused damage to cooperative assets, resulting in a 13.0% probability that any given severe winter weather occurrence will produce material damage. (3 / 23 = 13.0%)

Table 1.16	**SWEC Severe Winter Weather Event Summary**		
Event date	**Event type**	**Damage estimates**	**Outages reported**
3/2/2002	Winter Storm	0	1
1/2/2003	Winter Storm	0	47
3/4/2003	Winter Storm	0	1
12/10/2003	Heavy Snow	0	1
1/25/2004	Ice Storm	0	448
11/30/2006	Winter Storm	0	643
1/12/2007	Ice Storm	$5,010,982	18,175
12/9/2007	Ice Storm	0	641
12/10/2007	Ice Storm	$361,970	5,000
2/21/2008	Ice Storm	$41,707	208
1/26/2009	Winter Storm	0	2
12/24/2009	Winter Storm	0	8
3/20/2010	Winter Storm	0	105
Data provided based on internal SWEC records which reflect cost from the referenced event year.			

Based upon these historical records, the average severe winter weather event to affect the cooperative will cause an average damage cost of $1,804,886 ($5,414,658/ 3 events = $1,804,886). This averaged amount accounts for less than 1% of SWEC's total overhead asset valuation ($1,804,886 / $316,809,216 = 0.56%). Table 1.17 demonstrates the probability of occurrence in conjunction with the potential extent of damage.

Table 1.17 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Severe Winter Weather**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

An average of 1,945 customers reported outages during recorded severe winter weather events since 2000. When compared with the total number of customers served by SWEC, it can be projected that 4.9% of all customers may report outages during any

given severe winter weather event. Table 1.18 demonstrates the probability of occurrence in conjunction with the potent extent of impact upon local customers.

Table 1.18 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Severe Winter Weather**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Wildfire

The incidence of wildfire in the SWEC service area presents a unique risk assessment. Wildfire events have occurred in each of the eleven counties. According to the Missouri Department of Conservation, Benton, Camden, Cedar, Dade, Dallas, Greene, Hickory, Laclede, Polk, Webster and St. Clair counties have experienced wildfires between 2004 and 2008. Table 1.19 summarizes the incidences of wildfire within the eleven counties. The SWEC service boundary covers no county of service in its entirety and very small portions of several.

Table 1.19 Wildfire summary by county

County	# of Wildfires, 2004-08	Average Annual # of Wildfires	Likelihood (1-5)	Acres Burned	Average Annual Acres Burned	Total Buildings Damaged	Vulnerability
Benton	352	70.4	3	8,333.11	1,667	20	Medium-high
Camden	739	147.8	5	18,454.31	3,691	19	High
Cedar	132	26.4	1	1,358.5	272	2	Medium-low
Dade	165	33	2	1,617.8	324	3	Medium
Dallas	178	35.6	2	10,055	2,011	0	Medium-high
Greene	211	42.2	2	920.31	184	8	Medium-low
Hickory	86	17.2	1	1,842.5	369	0	Medium-low
Laclede	250	50	2	6,777.54	1,356	6	Medium-high
Polk	145	29	1	882.75	177	3	Medium-low
Webster	203	40.6	2	2,238.07	448	3	Medium
St. Clair	217	43.4	2	6,634.7	1,327	4	Medium-high
Totals	2,678	535.6	1-5	59,114.59	11,826	68	Medium-high

Source: Missouri State Hazard Mitigation Plan, 2010

It is not realistic to assume that the total number of wildfires in Table 1.20 occurred within the SWEC service area. In order to calculate the probability of a wildfire event in the SWEC service area, the proportions of SWEC service area out of the total square miles in each county were applied as weights to the total number of fires in each county and then summed producing a value of 862.67 total fires from 2004-2008 (352(.406) + 739(.397) + 132(.011) + 165(.008) + 178(.776) + 211(.249) + 86(.979) + 250(.005) + 145(.991) + 203(.006) + 217(.007) = 862.67). This formula begs caution as it is based on the simple assumption that all wildfires are evenly distributed throughout each county. Using this value, the probability of wildfire occurrence in any given year is near 100% (862.67events / 4 years = 21,566.75%).

Like earthquakes and dam failure, wildfires have had no measurable impact upon the SWEC service area. To date, the estimated 862.67 fires have burned a total of 21,569 acres, for an average of 25 acres affected per event. The total acres burned were calculated using proportions as weights applied to acres burned in each county. SWEC sustained no damage related to wildfires in its service area during this time period. Cooperative assets are located throughout the service area rather than being located at a single central site. With an average of 25 acres per fire in the service area, it is unlikely that infrastructure damage would exceed 5% based upon asset location and unlikeliness of an uncontrollable wildfire. This initial assessment assumes a limited impact upon electric distribution infrastructure of less than 10% (Table 1.20). Further study will be required to create a model for damage assessments related to wildfire.

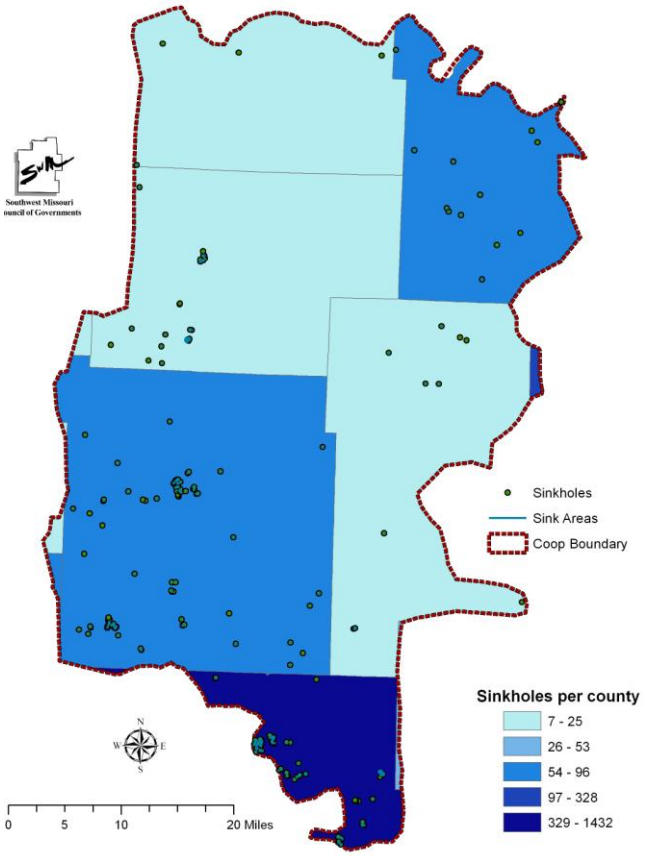
Table 1.20 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Wildfire**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

No customers have reported outages during recorded wildfires between 2004 and 2008. When compared with the total number of customers served by SWEC, it can be projected that less than 10% of all customers may report outages during any given wildfire event. Table 1.21 demonstrates the probability of occurrence in conjunction with the potent extent of impact upon local customers.

Table 1.21 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Wildfire**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Severe Land Subsidence (Sinkholes)

Figure 5: SWEC Region Sinkholes



Southwest Electric service area is underlain primarily by carbonate rocks containing mainly limestone and some dolomite bedrock. These types of bedrock are extremely sensitive to water dissolution along joints and fractures within the rock. Areas along natural drainage paths tend to be more susceptible to sinkhole formation as well, due to increased water flow into the subsurface. There are 206 known sinkholes within the Southwest Electric service area. Figure 5 shows the location of the sinkholes within Southwest Electric's service area. *(Map sources: SWEC GIS data www.msdis.missouri.edu.)*

Formation of sinkholes can and will affect Southwest Electric. However, there are no documented instances of sinkhole impact in cooperative records. Since sinkhole formation occurs on a localized scale, property damage is negligible depending on structures immediately within or adjacent to the sinkhole area. However, for the purposes of this assessment, sinkholes and their associated impacts cannot be eliminated from the realm of possibility. In order to allow

for a risk assessment, the probability of this event has been included as less than 1%. Table 1.22 depicts the vulnerability of Southwest Electric assets to the hazard of sinkholes based on probability of occurrence and extent of damage. Due to the localized nature of sinkhole impacts it is estimated that less than 1% damage will occur to the system due in the event of sinkhole formation.

Table 1.22 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Sinkhole**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

Determining the potential extent of impact in terms of reported outages due to sinkhole formation is difficult to pinpoint; however, is very unlikely such an event would result in more than 10% of customers in the system reporting outages. Table 1.23 depicts the impact measured in reported outages combined with the probability of occurrence.

Table 1.23 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Sinkhole**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

B. Non-historical Hazards

Earthquakes

The closest source of earthquake risk in southwest Missouri is the NeMaha Fault, which runs roughly from Oklahoma City, Oklahoma north to Lincoln, Nebraska. In 1993, the NeMaha fault produced an earthquake rating a 2.9 on the Richter Scale of Earthquake Intensity. Additional quakes took place February 11, 1995 (3.1 rating); July 16, 2004 (3.5 rating); March 23, 2003 (3.1 rating). More recently, an earthquake rating 3.6 was recorded on December 17, 2009. Although a relatively quiet fault system, the NeMaha fault has the potential to produce a damaging earthquake, impacting the Southwest Electric Cooperative.

The region is also subject to effects of the New Madrid Fault located in extreme southeast Missouri, which has, according to many experts, the potential to produce the largest earthquakes in North America. Undoubtedly, this fault has the potential to affect the SWEC service area in its entirety. In addition, there have been several small, virtually undetectable earth movements in the region in recent history, which may or may not be attributed to the aforementioned fault lines or other, very small faults located nearby.

While the NeMaha fault is geographically closer and geologically active, C.E.R.I. records demonstrate the limited impact of said earthquakes, with no quakes to date exceeding a 5.5 on the Modified Mercalli Scale. Its cascading effects have been largely restricted to more localized regions, but even then the damage caused has been minimal. By contrast, the New Madrid fault has the potential to cause damage throughout the state of Missouri, including the SWEC service area. Scientists from the U.S. Geological Survey (USGS) and the Center for Earthquake Research and Information (CERI) at the University of Memphis have estimated the probability of a magnitude 6.0 or greater earthquake from the New Madrid Fault is 25-40 percent through the year 2053. The probability of an earthquake increases with each passing day.

The projected earthquake intensity ratings for the cooperative region changes based upon the Modified Mercalli Scale. Given a New Madrid earthquake with a 6.7 rating, the region would experience Level V intensity characteristics. In the event of an earthquake with a 7.6 rating, the region would experiences Level VI intensity characteristic while an earthquake with an 8.6 rating would most likely cause Level VII intensity characteristics.

In the event of an earthquake with a 7.6 rating, the SWEC service area would most likely experience minor building damage as well as damage to the electrical distribution system. This damage, however, would most likely be relatively minimal and localized when compared with the southeast corner of the state. Distribution lines overhead and underground could become disconnected or severed, and transformers could be damaged. Though the probability of occurrence is very small, the potential extent of damage could significantly impact both the cooperative and its customers as demonstrated in Table 1.24.

Table 1.24 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Earthquake**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

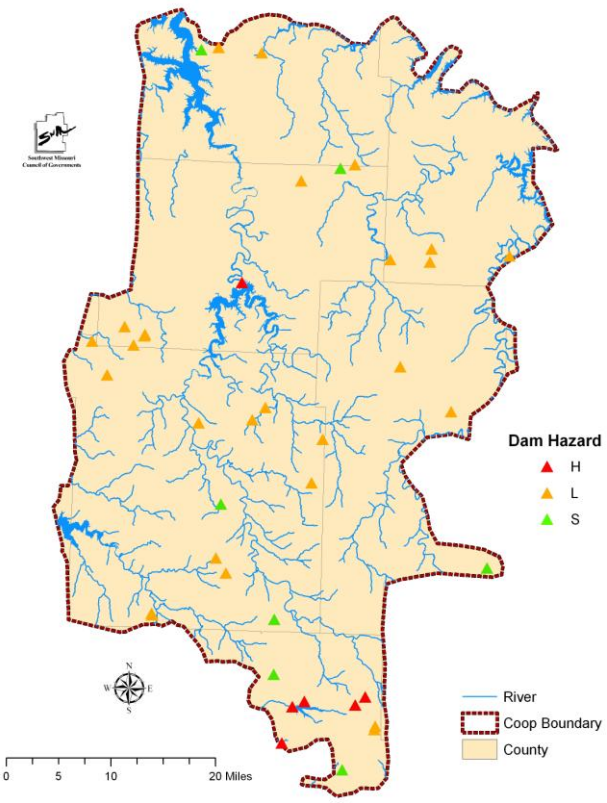
Based upon information from CERI, FEMA, and SEMA, it may be estimated that 3,943 customers could report outages related to an earthquake event. When compared with the total number of customers served by SWEC, it can be projected that 10% of all customers may report outages during any given seismic event. Table 1.25 demonstrates the probability of occurrence in conjunction with the potent extent of impact upon local customers.

Table 1.25 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Earthquake**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Dam Failure

Like earthquakes, dam failures have had no measurable impact upon the SWEC service area to date. According to Missouri DNR's Dam Safety Division, 40 dams currently exist within the cooperative boundaries: 4 in Benton County, 4 in Camden County, 3 in Dallas County, 9 in Greene County, 7 in Hickory County and 13 in Polk County. Of these dams, one in Benton County, one in Camden County, two in Greene County, and one in Polk County are regulated by the state due to the fact that they are non-agricultural, non-federal dams which exceed 35 feet in height. Figure 6 shows the locations of all known dams located within Southwest's service area. *(Map sources: www.msdis.missouri.edu; www.dnr.mo.gov/env/wrc.)*

Figure 6: SWEC Region Dam Network



26 dam failures have occurred within the state of Missouri over the past 100 years. However, no such event has occurred within or near the cooperative's boundaries. However, for the purposes of this assessment, dam failure and its associated impacts cannot be eliminated from the realm of possibility. In order to allow for a risk assessment, the probability of this event has been included as less than 1%. (Table 1.26)

Table 1.26 **Southwest Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Dam Failure**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

Determining the potential extent of dam failure is currently impossible due to a lack of data concerning inundation zones. Further study concerning existing dams and their impact is required to make a more comprehensive assessment of potential damages. This initial assessment assumes a limited impact upon downstream electric distribution infrastructure of less than 10% for both infrastructure damage and service interruption. (Tables 1.27).

Table 1.27 **Southwest Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Dam Failure**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Section 6: Mitigation strategies

Previous efforts at mitigation

For organizations like SWEC, mitigation is considered to be part of prudent business operations. In order to ensure the delivery of a quality product and minimize service interruptions, a number of mitigation strategies are continually utilized. Routine maintenance and upgrades to existing equipment are completed as part of daily tasks. Vegetation management is utilized to limit the cascading effects of natural hazards. Safety and reporting information are disseminated to the public through various types of media. Mutual aid agreements and partnerships create relationships which provide for future support in the event of a natural disaster.

Additionally, mitigation is considered prior to any expansion of service into special hazard areas. Before any service is build, it is first "staked out" in coordination with local builders and property owners. This process, completed by the Line Superintendent and contracted engineers, identifies and addresses foreseeable hazards and safety issues before any new service lines area constructed. USDA-RUS specifications regarding operation and safety are utilized in every step of the process. Steps are taken to practically minimize the exposure of equipment to loss due to foreseeable hazards, particularly flooding. Customers who reside in the floodplain are not charged for repairs or losses associated with flooding unless they purposefully destroy or restrict the cooperative from protecting their distribution system assets.

Existing and potential resources

As stated above, mitigation is a key component of good business practices. Southwest Electric Cooperative includes mitigation strategies as part of regular work activities to ensure service with minimal interruptions. Funding for these activities is provided through the cooperative's normal budgetary process for maintenance.

In order to expand mitigation efforts beyond normal maintenance, it is likely that SWEC will need to seek outside funding sources. These may include private, state, or federal programs which provide grant and loan funding. Upon passage of this plan, SWEC will be eligible for funding through FEMA in the following categories:

- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program
- Pre-Disaster Mitigation Program
- 406 Stafford Act

Development of goals, objectives, and actions

Establishing mitigation goals, objectives, and actions for a business entity requires a slightly different approach than public agencies. Certainly, a number of similarities exist; both entities must consider which hazards most commonly occur and have the greatest potential for causing disruption to members or residents. They must also consider which types of actions will maximize benefits and minimize costs, how mitigation strategies will be implemented, who will enforce implementation, and how the overall plan will be maintained and updated.

The SWEC mitigation planning committee, with assistance from SMCOG staff, worked to identify goals, actions, and objectives which addressed hazard mitigation issues. The committee first identified ongoing mitigation strategies as well as potential strategies which seek to improve service and limit disruptions resulting from natural hazards. Action items were then analyzed for common characteristics and summarized to create seven objectives. Likewise, these seven objectives were grouped into similar categories and used as the basis for the three overarching goals. Table 1.28 provides a simple synopsis of the goals and objectives before prioritization.

Traditionally, the STAPLEE (Social, Technical, Administrative, Political, Legal, Environmental, and Economic) method is used to prioritize mitigation actions. These categories, however, do not necessarily align with the private sector in the same way they are applicable to governmental agencies. A number of action items could be included with multiple goals and objectives, for example. As a result, the committee chose to use a different method to prioritize their mitigation strategy.

Table 1.28	SWEC goals and objectives
Identified Goals	**Identified Objectives**
Goal 1: Minimize the number and length of service interruptions due to the impact of natural hazards	**Objective 1:** Continue with an aggressive vegetation management program within right of way
	Objective 2: Continue regular maintenance and inspection programs
Goal 2: Protect the health and safety of the public	**Objective 1**: Continue to provide safety information to the general public through webpage newspapers, and public presentations
	Objective 2: Develop and Improve lines of communication with emergency management agencies
Goal 3: Minimize future infrastructure losses due to natural hazard events	**Objective 1:** Continue existing inspection and maintenance programs
	Objective 2: Research and develop plans for future infrastructure improvements
	Objective 3: Determine expected wind and ice loading on system and plan accordingly

After identifying ongoing and potential action items, the committee created three priority tiers:

- **First tier** actions focus on physical infrastructure protection and improvements which ensure continued, quality service and seek to reduce power outages. These types of actions are the highest priority of SWEC.
- **Second tier** actions create and maintain working relationships to reduce and prevent the impact of power outages. These include improvements to safety and reporting information, mutual aid agreements, and other efforts which seek to expand and improve both customer service and disaster planning.
- **Third tier** actions identify potential projects for other system improvements. These include mapping efforts, technological improvements, and research related to the expansion of mitigation efforts.

Actions within each tier may be funded through regular budgetary methods or identified outside sources. Tables 1.29, 1.30, and 1.31 provide lists of action items by tier as well as the goals and objectives identified with each.

Table 1.29 Prioritized Mitigation Actions for Southwest Electric Cooperative – Tier 1			
Tier 1			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit score*
Research and employ when feasible the use of organic or ecologically neutral herbicides for use in vegetation management programs	Goal 1/Objective 1 Goal 1/Objective 2	Ongoing Effort	Low Cost Low Benefit Score: 3
Install additional poles to support transformers, as mid-span poles or to shorten spans to no greater than 300 feet	Goal 1/Objective 2 Goal 3/Objective 2	Dependent on Additional Funding	High Cost High Benefit Score: 7
Install large gauge guy-wires to improve structural support and prevent cascading failures from tension overload	Goal 3/Objective 2	Dependent on Additional Funding	High Cost Medium Benefit Score: 4

Table 1.29 Prioritized Mitigation Actions for Southwest Electric Cooperative – Tier 1			
Tier 1			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit score*
Provide looped distribution service or other redundancies to critical facilities and key communication infrastructure	Goal 3/Objective 2	Dependent on Additional Funding	High Cost High Benefit Score: 7
Elevating pad-mounted transformers and other components above Base Flood Elevation (100 year floodplain)	Goal 3/Objective 2	Dependent on Additional Funding	High Cost Low Benefit Score: 1
Replace damaged poles with higher-rated poles of the same or different material or laminated coatings	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Dependent on Additional Funding	High Cost Medium Benefit Score: 4
Upgrade conductor to Wind-Motion Resistant (e.g., T2 ACSR)	Goal 3/Objective 2 Goal 3/Objective 3	Dependent on Additional Funding	High Cost Low Benefit Score:1
Continue to employ and develop GIS technology and application to identify system failures and reduce response times for outages	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Ongoing Effort	Medium Cost Medium Benefit Score: 5
Maintain looped distribution service and other redundancies to critical facilities and/or communications infrastructure	Goal 1/Objective 2 Goal 3/Objective 1	Dependent on Additional Funding	High Cost Medium Benefit Score: 4
Examine options for burying power lines to/from remote sources as additional power backup	Goal 3/Objective 2 Goal 3/Objective 3	Dependent on Additional Funding	High Cost Medium Benefit Score: 4
Continue work programs to create looped substations to mitigate outages when substations go off line	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Completed as Funding Allows	High Cost Medium Benefit Score: 4
Use Mechanical Breakaway systems for key areas	Goal 3/Objective 2	Dependent on Additional Funding	High Cost Low Benefit Score 1
Elevate or bury interstate or major highway crossings spans	Goal 3/Objective 2	Dependent on Additional Funding	High Costs High Benefits Score 7
Install vibration dampeners and air foils to prevent galloping of conductor spans during high wind events	Goal 3/Objective 2 Goal 3/Objective 3	Dependent on Additional Funding	Low Cost Low Benefit Score 3
Improve inspection for discovering latent failures	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Completed as Funding Allows	Medium Cost High Benefit Score: 8
Install Load Control Devices	Goal 3/Objective 1	Completed as Funding Allows	High Cost Low Benefit Score: 1

Table 1.30 Prioritized Mitigation Actions for Southwest Electric Cooperative – Tier 2			
Tier 2			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit Score*
Research and develop plans for streamlined communications for outage events resulting from natural hazards	Goal 2/Objective 1 Goal 3/Objective 1	Ongoing Events	Low Cost Medium Benefit Score: 6
Ensure that critical and vulnerable facilities served are provide outreach and education on best practices for generation use alternate wiring, and transfer switching that are compatible with standard specifications and design and power transmission delivery	Goal 2/Objective 1 Goal 3/Objective 1	Complete as Funding Allows	Medium Costs Low Benefit Score 2
Develop an automated outage reporting portal for emergency managers and public safety officials to improve communication and improve response capability to restore outages	Goal 3/Objective 2	Dependent on Additional Funding	Medium Cost Low Benefit Score: 2
Coordinate with local emergency managers to be included in emergency stakeholder groups and exercise participation	Goal 2/Objective 1	Completed as Funding Allows	Low Cost Low Benefit Score: 3
Create and keep a contact list available of important community and emergency management personnel	Goal 2/Objective 1	Ongoing Effort	Low Cost Medium Benefit Score: 6
Provide safety and reporting information to the general public through company websites, social media, local newspapers, presentations and publications	Goal 2/Objective 1 Goal 2/Objective 2	Ongoing Effort	Low Cost High Benefit Score: 9

Table 1.31 Prioritized Mitigation Actions for Southwest Electric Cooperative – Tier 3			
Tier 3			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit*
Develop improved data management systems to track property damages and outage due to natural hazards	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Dependent on Additional Funding	Medium Cost Low Benefit Score: 2
Develop more robust data management systems to monitor and record outages and damages directly related to natural hazards	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Completed as Funding Allows	Medium Costs Medium Benefits Score: 5
Review existing easement requirements and laws	Goal 1/Objective 1 Goal 1/Objective 2 Goal 3/Objective 1	Ongoing Effort	Low Cost Medium Benefit Score: 6
Enforce existing easements and expand inferior easements through cooperative efforts and eminent domain	Goal 1/Objective 1 Goal 1/Objective 2 Goal 3/Objective 1	Ongoing Effort	High Cost Medium Benefit Score: 4
Collect GPS data and attribute information for functionality and code standards for components of existing infrastructure	Goal 1/Objective 2 Goal 3/Objective 1 Goal 3/Objective 2	Ongoing Effort	Medium Cost Medium Benefit Score: 5

Section 7 – Plan Implementation and Maintenance

Plan incorporation

The goals, objectives, and actions of the previous section identify both ongoing efforts at mitigation and potential methods for expanding efforts. The plan is in the process of being reviewed by the Board of Directors as part of the company's operations policy. This mitigation plan necessitates involvement from every SWEC employment level as the organization strives to ensure quality service to their customers.

Other Local Planning Mechanisms

Beyond the SWEC plan, few planning mechanisms exist at the local level. The Missouri counties of Greene, Webster, Benton and St. Clair each have a FEMA-approved Natural Hazard Mitigation Plan in place. County emergency management directors have Local Emergency Operations Plans which seek to mitigate the same hazards for residents. These same counties are also included in the Regional Transportation Plan (RTP) as well as a Comprehensive Economic Development Strategy (CEDS). SWEC's plan can be easily incorporated into these local plans and allow for coordination across agencies in the event of an emergency.

SWEC is located within the rural portions of nine third-class counties which are prohibited from enforcing building codes and zoning by the state of Missouri. Greene and Camden counties are first-class counties have planning and zoning as well as comprehensive plans in place. SWEC does not provide service to any municipality within these counties. The only opportunity for coordinating the plan with Comprehensive Plans, Capital Improvement plans and Building Codes exist in only two counties of service.

Plan Maintenance

Southwest will conform to the requirements established by the Association of Missouri Electric Cooperatives (AMEC) for monitoring, evaluating, and updating the plan.

Continued Public Involvement Opportunities

Southwest will conform to the requirements established by the Association of Missouri Electric Cooperatives (AMEC) for continued public involvement. Opportunities for public comment will continue to be offered through various media outlets, the cooperative's website, and the physical office of SWEC.