NorthWestern Energy
Delivering a Bright Future

March 1, 2016

Mr. Will Rosquist
Administrator
Montana Public Service Commission
1701 Prospect Avenue
PO Box 202601
Helena, MT 59620-2601

RE: 2015 Annual Electric Reliability Report

Dear Mr. Rosquist:

With this letter, NorthWestern Energy (NWE) submits the 2015 Reliability Report in compliance with Administrative Rules of Montana 38.5.8619 Annual Electric Reliability Report, effective on July 29, 2005. The data provided in this report includes the information requested in ARM 38.5.8619 and utilizes the *IEEE Guide for Electric Power Distribution Reliability Indices (IEEE Std. 1366-2012)* for definition of major events and the appropriate reliability indices. Similar to the previous four years, additional transmission line reliability information is attached to the report.

Please contact me to answer any questions concerning this report. My contact information is as follows:

Bill Bowden
Technical Advisor, Senior
NorthWestern Energy
11 East Park Street
Butte, Montana 59701
(406) 497-2211
william.bowden@northwestern.com

Sincerely,

Bill Bowden

Bill Bowden, P.E.
Technical Advisor, Senior

Enclosure: 2015 Annual Electric Reliability Report

NorthWestern® Energy

2015
-Montana-
Electric Distribution/Transmission
Annual Reliability Report

March 2016

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EXECUTIVE SUMMARY

This report provides information and insights into NorthWestern Energy's (NWE) 2015 Electric Distribution and Transmission System reliability indices for the Montana region, in accordance with the guidelines outlined by the Administrative Rules of Montana (Rule 38.5.8619). The indices included are **SAIDI** (**S**ystem **A**verage **I**nterruption **D**uration **I**ndex – in minutes), **CAIDI** (**C**ustomer **A**verage **I**nterruption **D**uration **I**ndex – in minutes), **SAIFI** (**S**ystem **A**verage **I**nterruption **F**requency **I**ndex – in frequency) and **Outage Counts**. By the IEEE standard definitions, these indices are for "sustained interruptions" meaning they lasted longer than five minutes.

System indices are given for the NWE Montana operating region and are also broken down into the eight operating areas of the state: Billings, Bozeman, Butte, Great Falls, Havre, Helena, Lewistown, and Missoula. As with the previous years' annual reports, the Institute of Electrical and Electronics Engineers (IEEE) Standard 1366-2012 will again be followed. This standard is directly related to the use of a statistically based definition for classification of Major Event Days (MEDs) – also commonly referred to as the 2.5 Beta Method. Major Event Days are days in which the regional SAIDI exceeds a statistically derived threshold value and represent days in which the electric system experienced stresses beyond normal operating conditions (such as a severe weather storm) and often requiring additional crews be brought into the area for repairs.

The InService mobile work force and outage management system was implemented by NWE during the fall of 2014. This provides more accurate and timely outage reporting. Outage customer counts and times are derived from the GIS, call logging, and automated systems, eliminating the earlier manual outage reporting system and its inherent approximations. Both IEEE and the Department of Energy reports indicate that SAIDI numbers normally increase with this improved accuracy, but with the whims of nature, this may be difficult to determine for some time. The IEEE reliability standard (1366-2012) does not define the 24 hour day and many of the utilities involved in the IEEE benchmark survey have gone to something other than midnight-to-midnight. Some will "roll" the 24 hours to more accurately capture the full impact of a storm day (and possible MED). This option was implemented by NWE in 2015.

NorthWestern Energy has an active relationship with the IEEE Power and Energy Society Reliability Working Group to ensure a consistent and accurate portrayal of our utility's ability to report and benchmark reliability indices. MEDs are identified through a monthly process for each region and can be included or excluded per the data requested. This report will provide all information, including and excluding MEDs, for all three indices to better demonstrate and analyze normal versus emergency conditions. In 2015, there were five Major Event Days**.** By comparison, there was one MED in 2009, one in 2010, none in 2011, two in 2012, two in 2013 and none in 2014. Please see table below listed in descending SAIDI Minutes. For the Montana region, it took 6.31 SAIDI minutes in 2015 to declare an MED. Historically in Montana, a larger MED event could be 20 SAIDI minutes or more.

Date/Time MED Started	SAIDI Minutes	Cause
8/11/2015 0:10	81	Extreme wind storm hit the Missoula area
11/17/2015 11:00	22	Extreme wind storm affected the entire Montana region.
7/4/2015 12:11	13	Strong wind/rain storm in the Great Falls and Havre areas
3/28/2015 14:54	8	Strong wind and substation problem
8/10/2015 0:10	8	Extreme wind storm hit the Missoula area

Table 1: Major Event Days (2015)

Due to the very large SAIDI contribution of the August 11 MED, it was also determined to be a "Catastrophic Day." It takes seven times the MED threshold, or 44.17 SAIDI minutes to declare a "Catastrophic Day."

Transmission related reliability data and graphs have been added as an annex to the report again this year.

1. GENERAL

1.1 Reliability indices calculation

The calculation of SAIDI and CAIDI, (in minutes) and SAIFI (in outages per customer) are based on the following IEEE formulas:

$$SAIDI = \frac{sum\ of\ all\ customer\ outage\ durations(minutes)}{total\ number\ of\ customers\ served}$$

$$SAIFI = \frac{total\ number\ of\ customers\ experiencing\ outages}{total\ number\ of\ customers\ served}$$

$$CAIDI = \frac{sum\ of\ all\ customer\ outage\ duration(minutes)}{total\ number\ of\ customers\ experiencing\ outages} = \frac{SAIDI}{SAIFI}$$

In laymen's terms, SAIDI represents the average outage in minutes for each customer served. SAIFI is the average number of interruptions that a customer would typically experience in a year. CAIDI is the average outage duration any given customer would experience. CAIDI is also typically thought of as the average restoration time.

1.2 Additional Notable Events

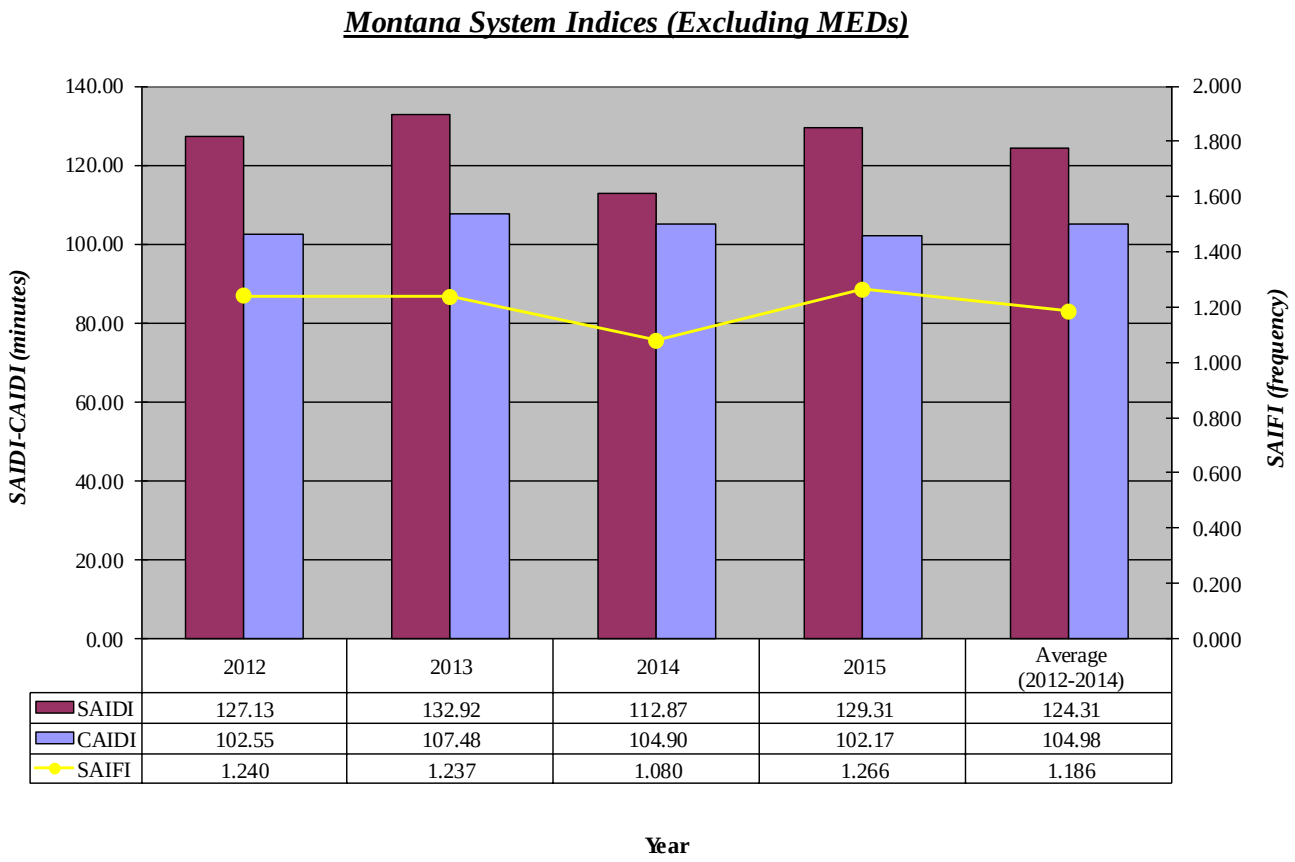
There were three days with a "Customer-Minutes Interrupted" (CMI) number greater than one million (an MED for 2015 required 2.21 million CMI). Please see table below, listed in descending CMI. These storm events, while not being MEDs, added significantly to the SAIDI minutes for 2015. For comparison, there were four days in 2014 with over a million CMI.

Date	CMI	Divisions impacted	Majority Causes
10/11/2015	1,390,687	Bozeman, Butte, Great Falls, Helena, Missoula	Wind, Equipment Failure, Tree In Line
7/23/2015	1,261,371	Butte	Tree In Line, Wind, Lightning
8/13/2015	1,055,416	Hamilton, Missoula	Human Error/Accident, Tree In Line

Table 2: Additional Notable Events (2015)

Further details on these events are provided in the operating area discussions below.

2. MONTANA SYSTEM RELIABILITY



	2012	2013	2014	2015	Average (2012-2014)
SAIDI	127.13	132.92	112.87	129.31	124.31
CAIDI	102.55	107.48	104.90	102.17	104.98
SAIFI	1.240	1.237	1.080	1.266	1.186

Figure 2.1 Montana system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

The figure above displays NorthWestern Energy's Montana region indices for the years 2012-2015. Region indices shown for 2012 to 2015 data (excluding MEDs) are from year-end audited data (excluding MEDs). Please note that SAIDI and CAIDI are given in minutes and SAIFI is given in the frequency of occurrence.

As can be seen by **Figure 2.1**, 2015 SAIDI and SAIFI were higher than 2014, while CAIDI improved slightly. Also, all three indices in 2014 were lower than the previous three-year averages. In 2015, NWE saw a high number of wind storms, most dramatically a mid-August extreme wind storm in the Missoula area over a three day period, but also a high number of storms in Great Falls and Havre.

Contributing factors to the decrease reliability will be discussed as each of the operating divisions of the Montana region are examined and in the report conclusion. Data and figures are presented that characterize the system reliability both including and excluding MEDs to demonstrate the effect MEDs had on the system reliability in previous years.

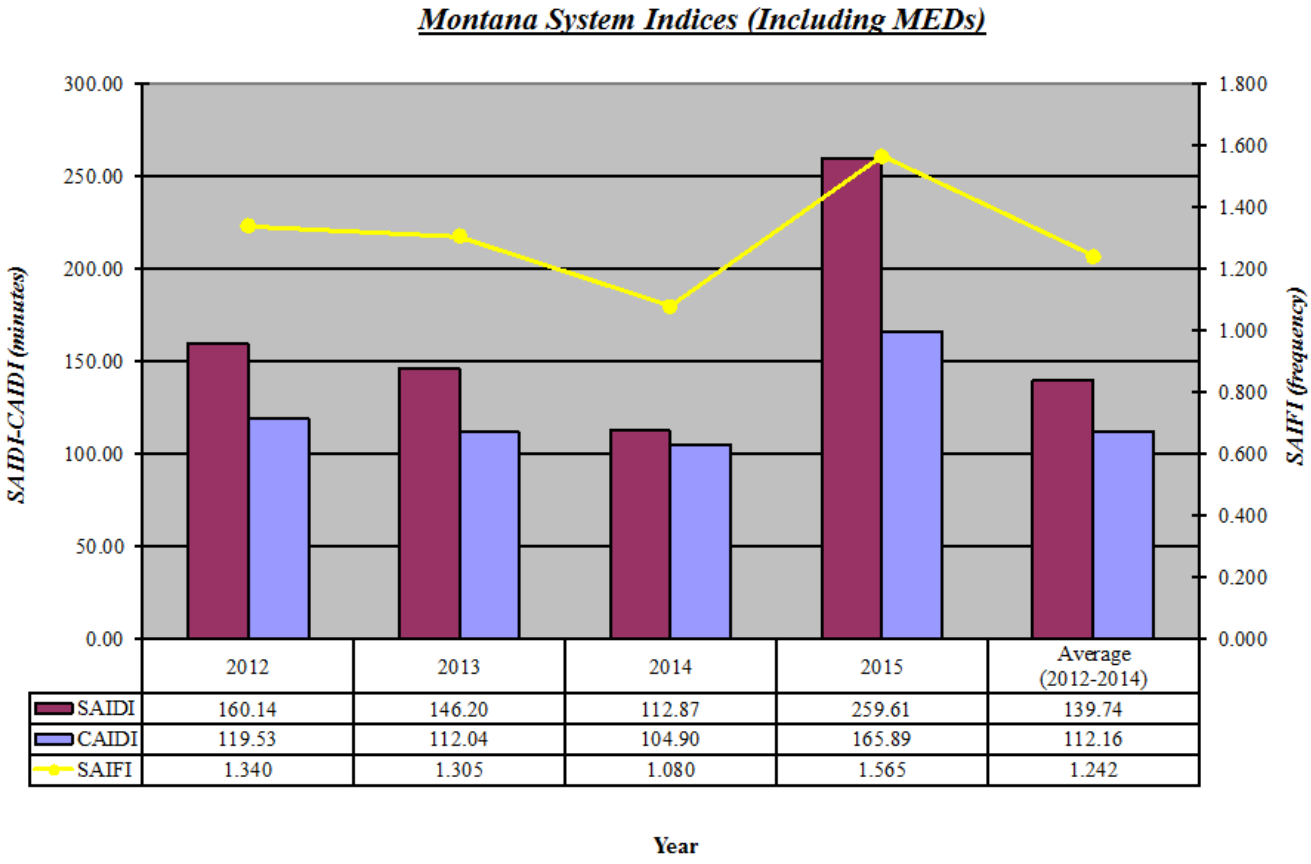
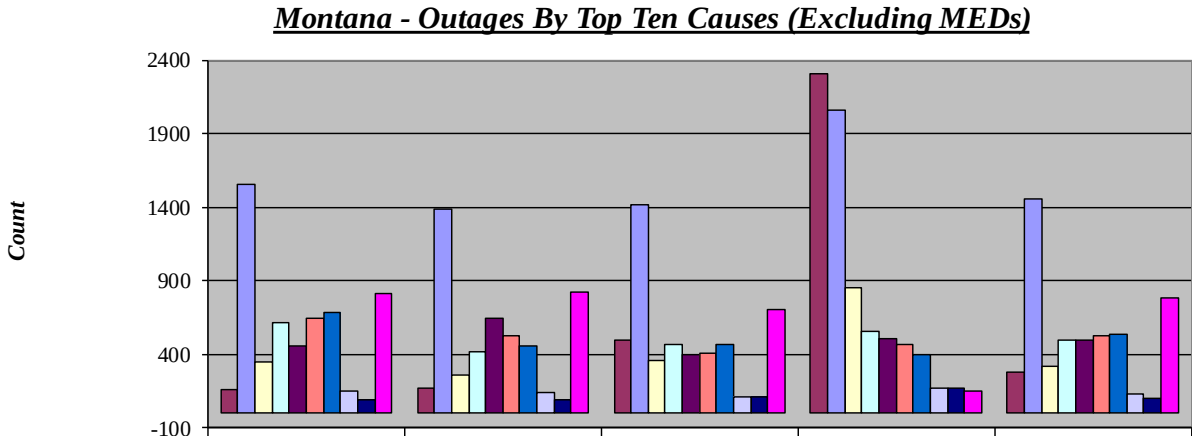


Figure 2.2 Montana system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.

SAIDI increases 131 minutes as shown in 2015 when the five MEDs are included in the reliability index. Also, CAIDI and SAIFI increase noticeably.

Outages by cause (excluding MEDs) are shown in **Figure 2.3**.

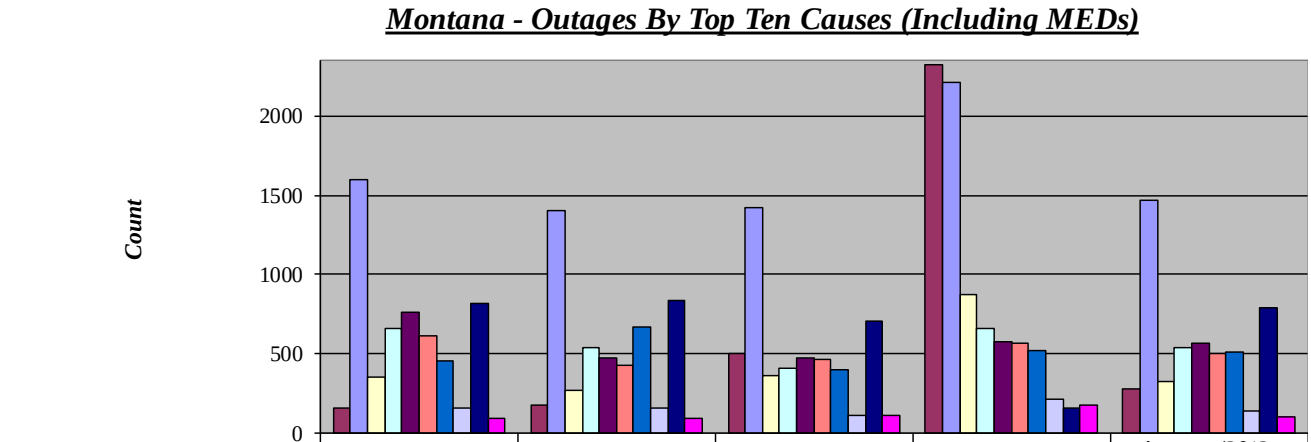


	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	159	171	502	2306	277
System - Equipment Failure	1558	1386	1419	2061	1454
Animal - Other Bird	348	260	358	857	322
Animal - Squirrel	615	422	465	557	501
Nature - Lightning	456	644	394	505	498
Nature - Tree In Line	642	527	411	467	527
Nature - Wind	686	460	472	400	539
Nature - Limb In Line	155	141	107	175	134
Public - Vehicle Hit	93	90	112	169	98
Unknown	815	825	708	152	783
MT REGION TOTAL	6646	5859	6105	8758	6202

Figure 2.3 Montana system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

The outage causes represented in this table are the top ten major contributors for customer outages on the NorthWestern Energy Electric Distribution and Transmission system. Overall outages reported increased 43% to 8758. A significant increase was expected due to the more accurate data collected by the Outage Management System (OMS) that entered service in the fourth quarter of 2014. For example, outage counts for scheduled maintenance increased noticeably. In the past, small planned outages, where the crew notified the customers of the pending outage were not well documented but they are now. Scheduled Maintenance increased by 1804 outages. This increase is due to the previously mentioned OMS and the increased work as part of the DSIP program. This had a significant impact of 9.9 minutes or 4.17% of Montana Region SAIDI. It is now one of the top ten outages causes in each division/district in Montana.

The top ten outage counts increased from 5157 in 2014 to 7656 in 2015. Nature related outages such as wind, lightning and snow/ice went down by 605 outages. Overall Equipment Failure outages increased 642. Equipment Failure is the most common of the unscheduled outage causes due to its broad and all-inclusive category nature. Outages can be related back to Equipment Failure in many different ways and it is the responsibility of the operations personnel to correctly identify the cause.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	159	173	502	2330	278
System - Equipment Failure	1598	1402	1419	2210	1473
Animal - Other Bird	348	263	358	875	323
Nature - Tree In Line	660	540	411	658	537
Nature - Wind	760	475	472	571	569
Animal - Squirrel	616	425	465	561	502
Nature - Lightning	456	670	394	517	507
Nature - Limb In Line	158	154	107	210	140
Unknown	821	834	708	156	788
Public - Vehicle Hit	93	90	112	172	98
MT REGION TOTAL	6845	5966	6105	9384	6305

Figure 2.4 Montana system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

The graph and table above show outage causes with MEDs. As stated above, the five Major Event Days reported were due largely to strong windstorms which accounted for 170 outages in the wind category. Most of the outage categories in 2015 have increased when comparing them to 2014 numbers. A portion of this increase was due to the OMS implementation as well as the catastrophic day in the Missoula area.

3. BILLINGS SYSTEM RELIABILITY

For Billings, SAIDI and CAIDI increased in 2015. SAIFI decreased slightly. The increase in SAIDI and CAIDI was expected due to the OMS implementation. SAIDI and SAIFI are less than their three-year averages. Storm problems were about the same from 2014 and although equipment outage counts were up, the SAIDI impact was lower. Larger outages for the year were caused by equipment failures in the Billings Meridian and Shiloh substations. Squirrels and Other Birds still cause a large number of outages, and tree problem outages are down considerably, most likely due to increased trimming efforts.

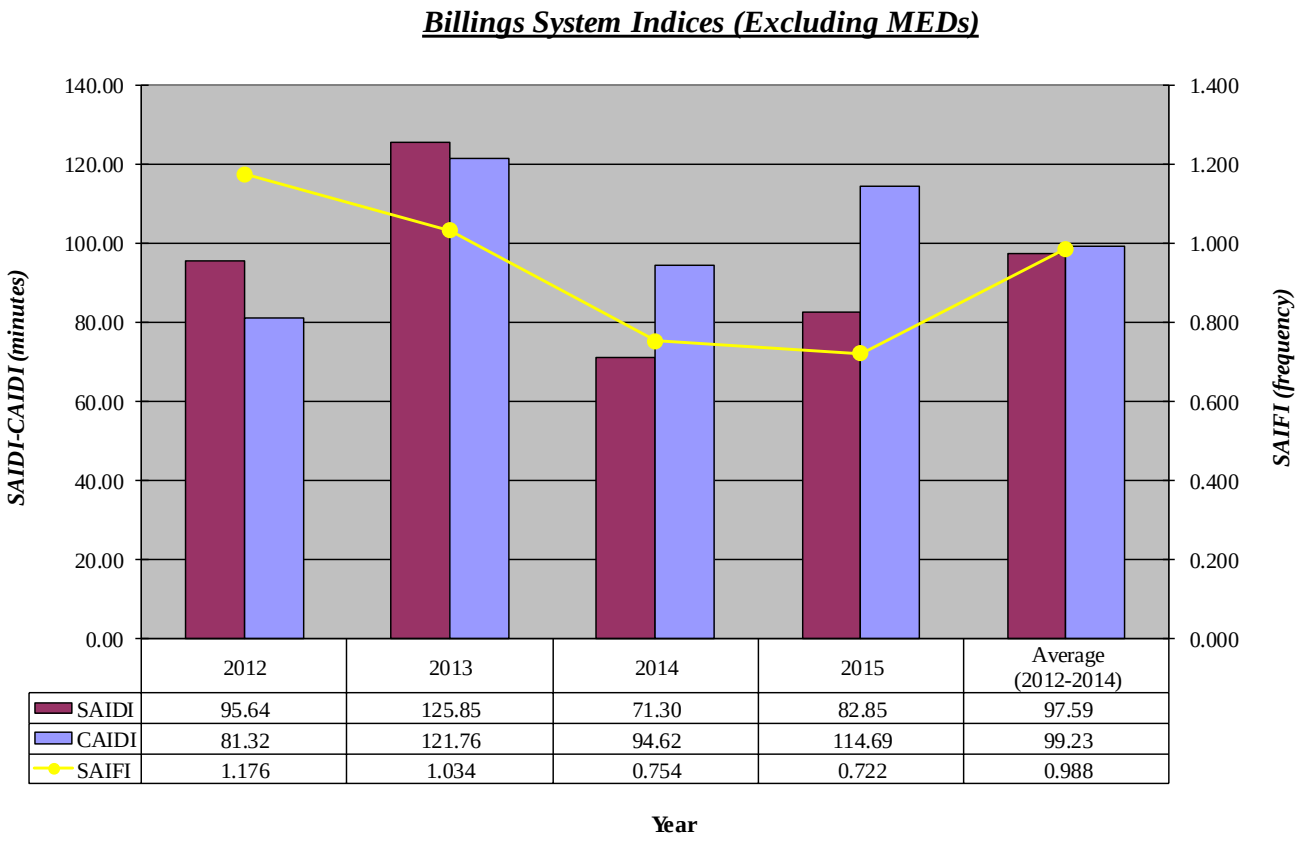


Figure 3.1 Billings system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

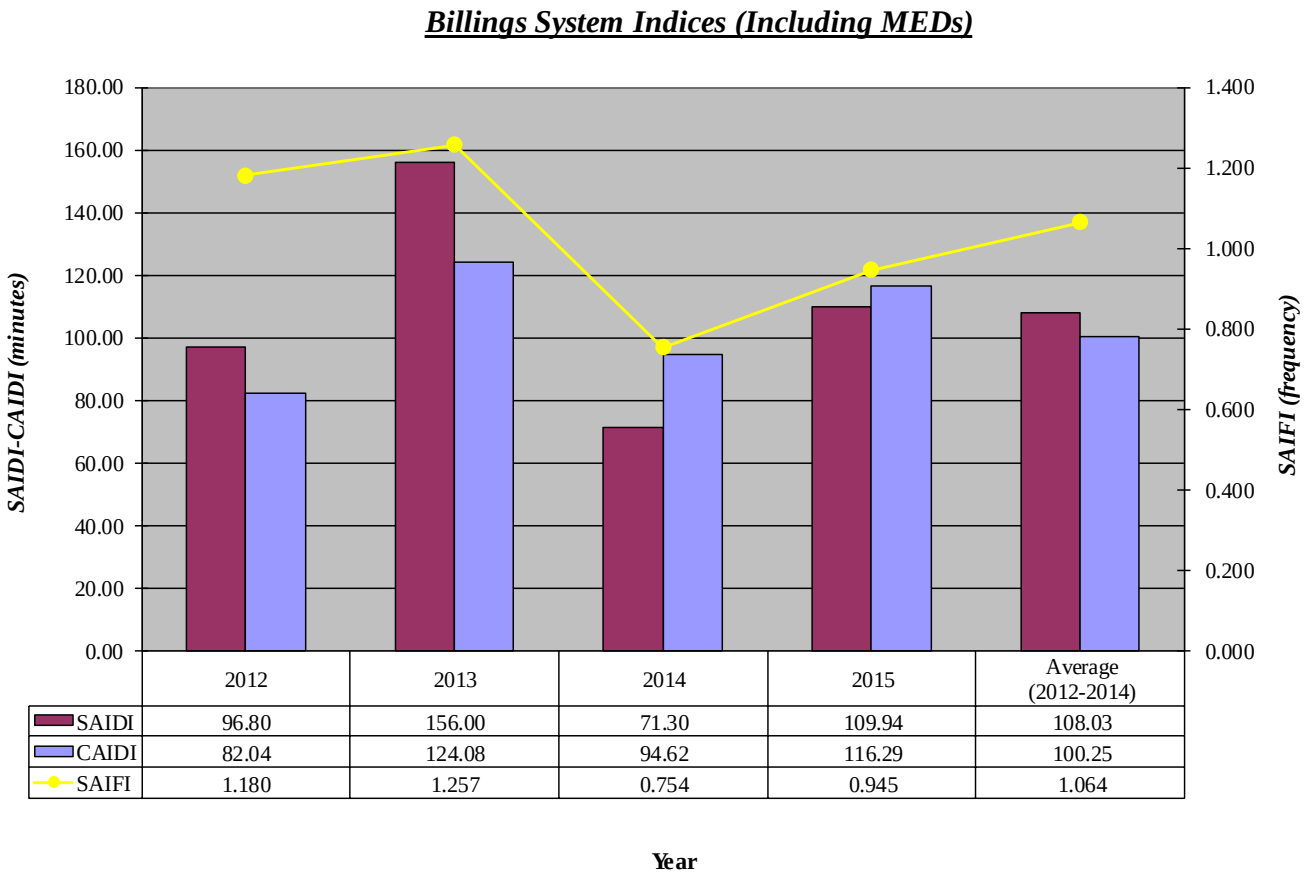
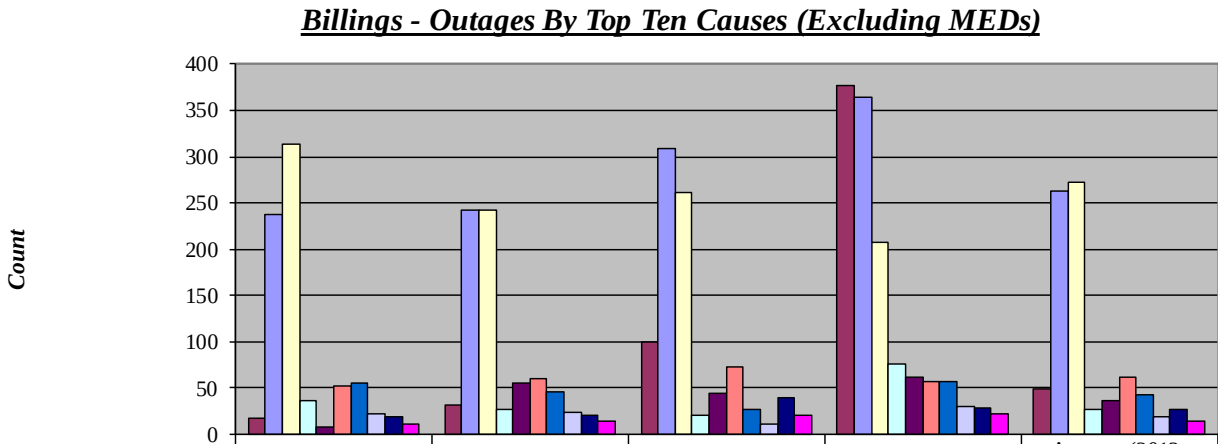
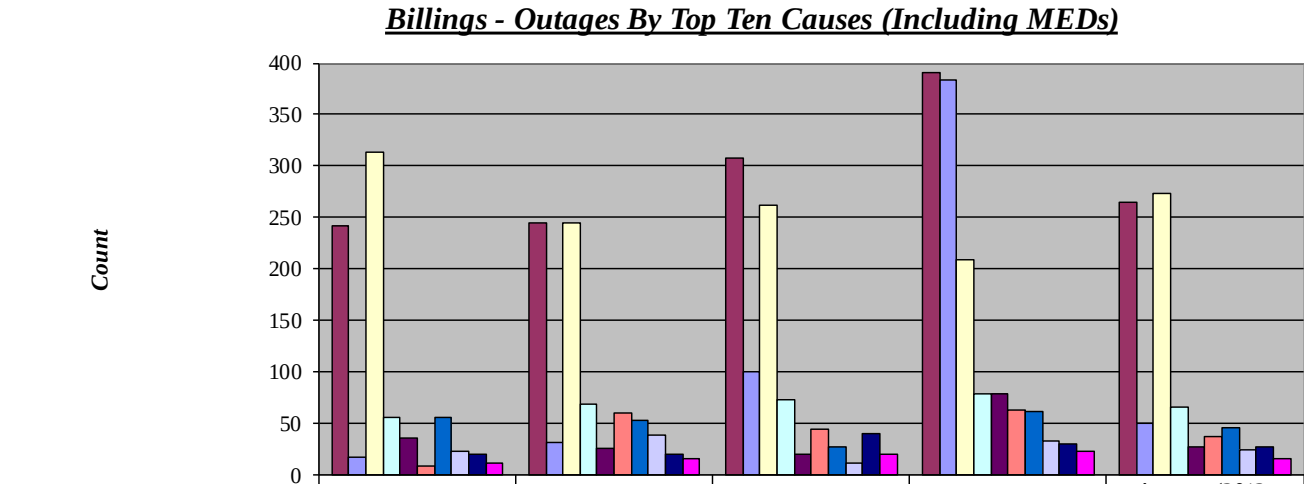


Figure 3.2 Billings system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	17	31	100	377	49
System - Equipment Failure	237	242	308	364	262
Animal - Squirrel	313	242	262	207	272
Animal - Other Bird	36	26	20	76	27
Nature - Lightning	8	55	44	62	36
Nature - Wind	52	60	73	57	62
Nature - Tree In Line	55	46	27	57	43
Nature - Limb In Line	22	24	11	30	19
Public - Vehicle Hit	19	20	40	28	26
System - Human Error/Accident	10	14	20	22	15
DIVISION TOTAL	1,027	1,024	1,167	1,384	1,073

Figure 3.3 Billings system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	242	245	308	390	265
System - Scheduled Maintenance	17	31	100	384	49
Animal - Squirrel	313	244	262	208	273
Nature - Wind	55	69	73	79	66
Animal - Other Bird	36	26	20	78	27
Nature - Lightning	8	59	44	62	37
Nature - Tree In Line	55	52	27	61	45
Nature - Limb In Line	22	38	11	32	24
Public - Vehicle Hit	19	20	40	29	26
System - Human Error/Accident	11	15	20	22	15
DIVISION TOTAL	1,042	1,068	1,167	1,449	1,092

Figure 3.4 Billings system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

4. BOZEMAN SYSTEM RELIABILITY

Bozeman division indices for 2015 saw significant a increase in SAIDI and CAIDI from 2014 but a decrease in SAIFI. Like Billings, a portion of these increases were expected by the OMS implementation. Larger events in the area were a vehicle hitting a guy wire causing Jackrabbit Ckt. # 72 to trip and a wind storm, during an MED, tripped out a transmission line resulting in loss of service to all customers fed from the Harrison/Pony Substation. Equipment failure outage counts were essentially unchanged, but tree and animal related outage counts increased appreciably.

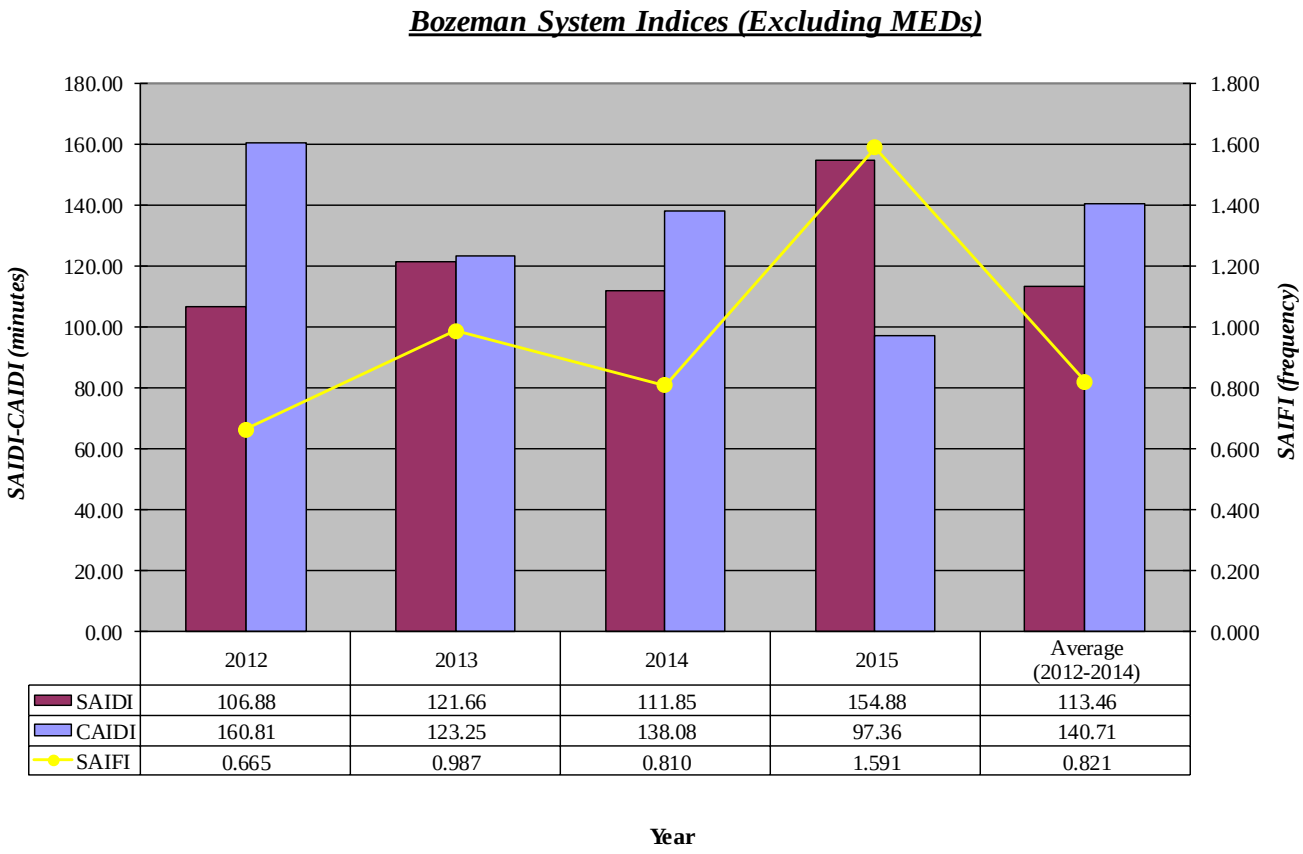


Figure 4.1 Bozeman system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

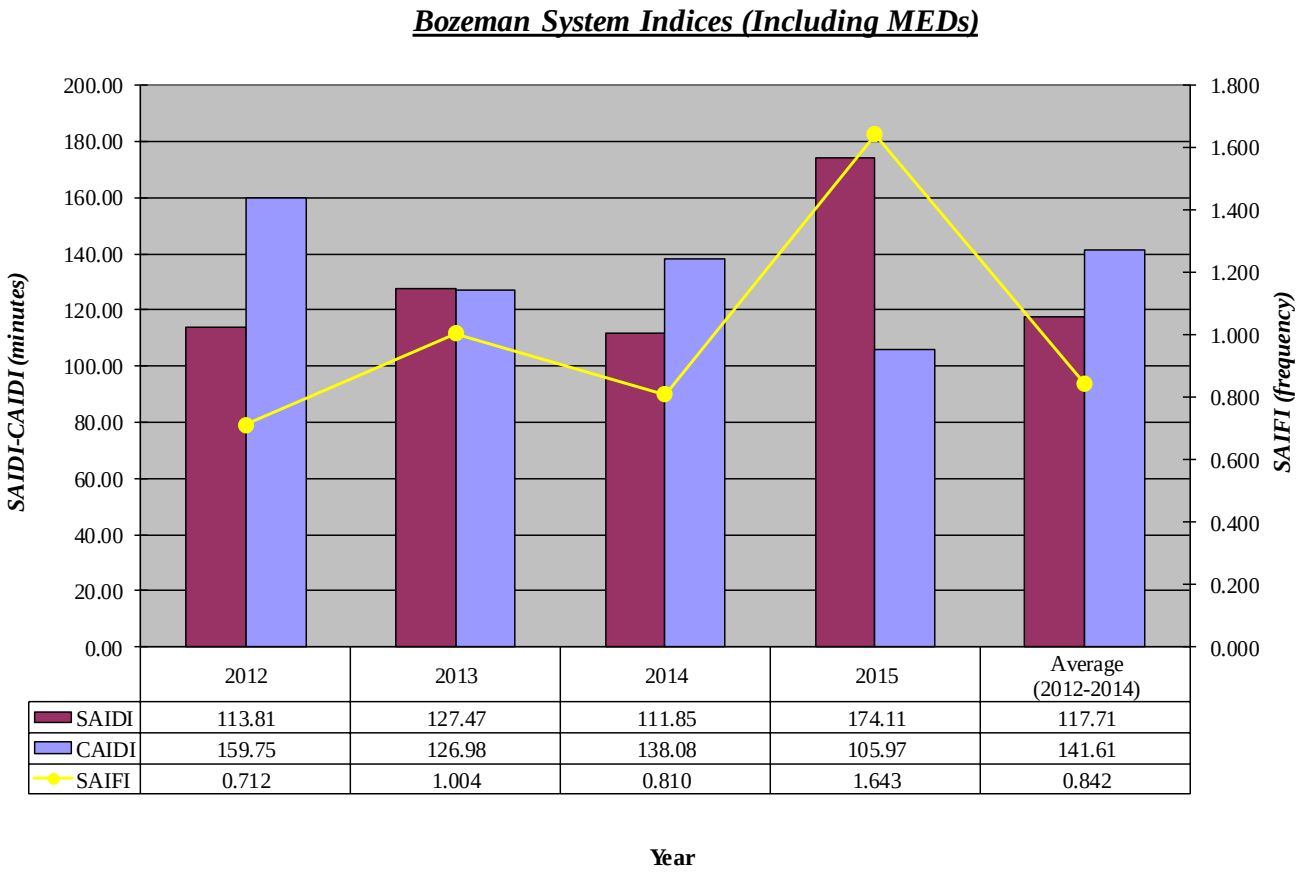
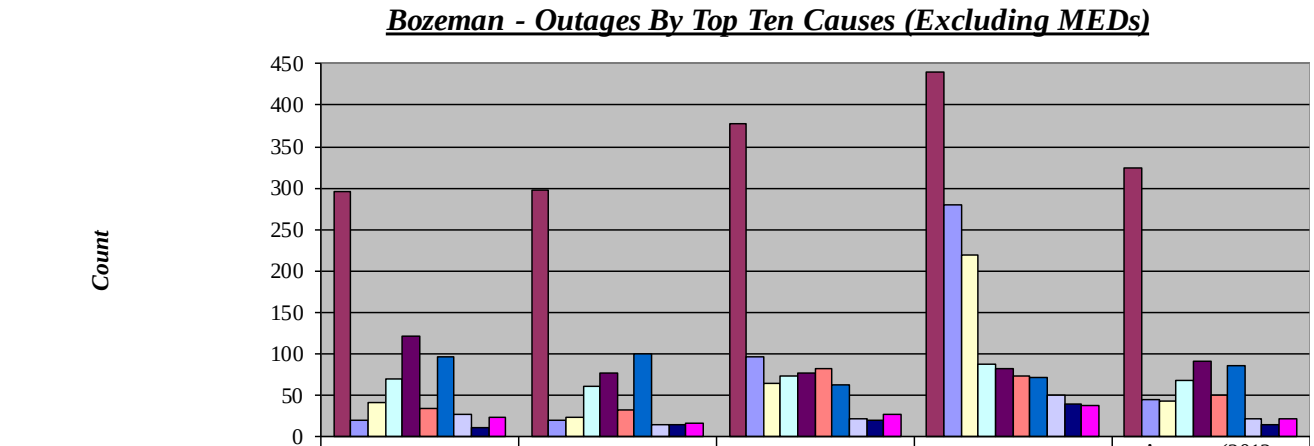
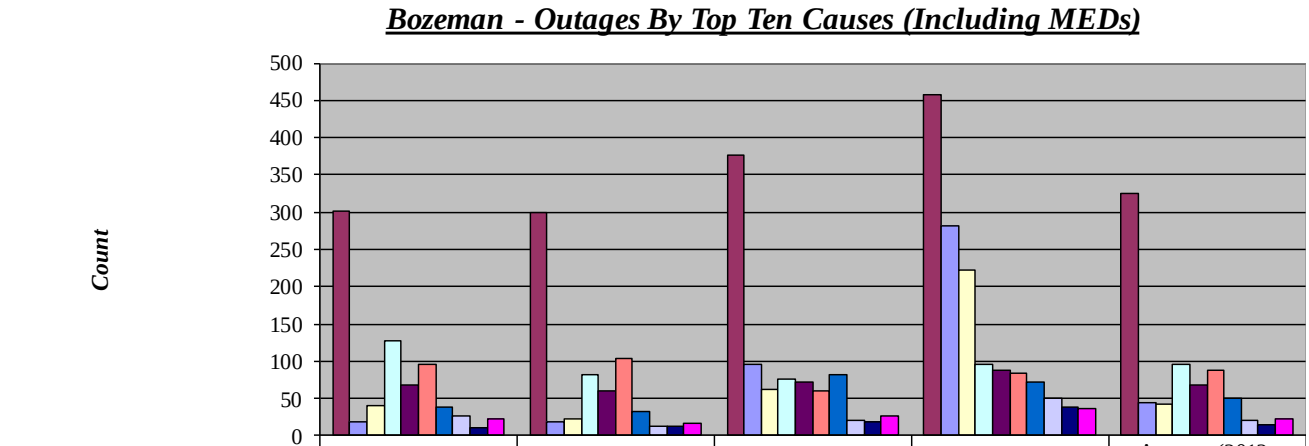


Figure 4.2 Bozeman system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	296	297	377	440	323
System - Scheduled Maintenance	19	19	96	280	45
Animal - Other Bird	40	22	63	219	42
Nature - Lightning	69	60	73	86	67
Nature - Wind	120	77	76	81	91
Nature - Snow/Ice	34	32	81	72	49
Nature - Tree In Line	95	99	61	71	85
Animal - Squirrel	27	13	21	49	20
System - Human Error/Accident	10	13	19	38	14
Public - Vehicle Hit	22	16	27	37	22
DIVISION TOTAL	1,150	1,046	1,353	1,609	1,183

Figure 4.3 Bozeman system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

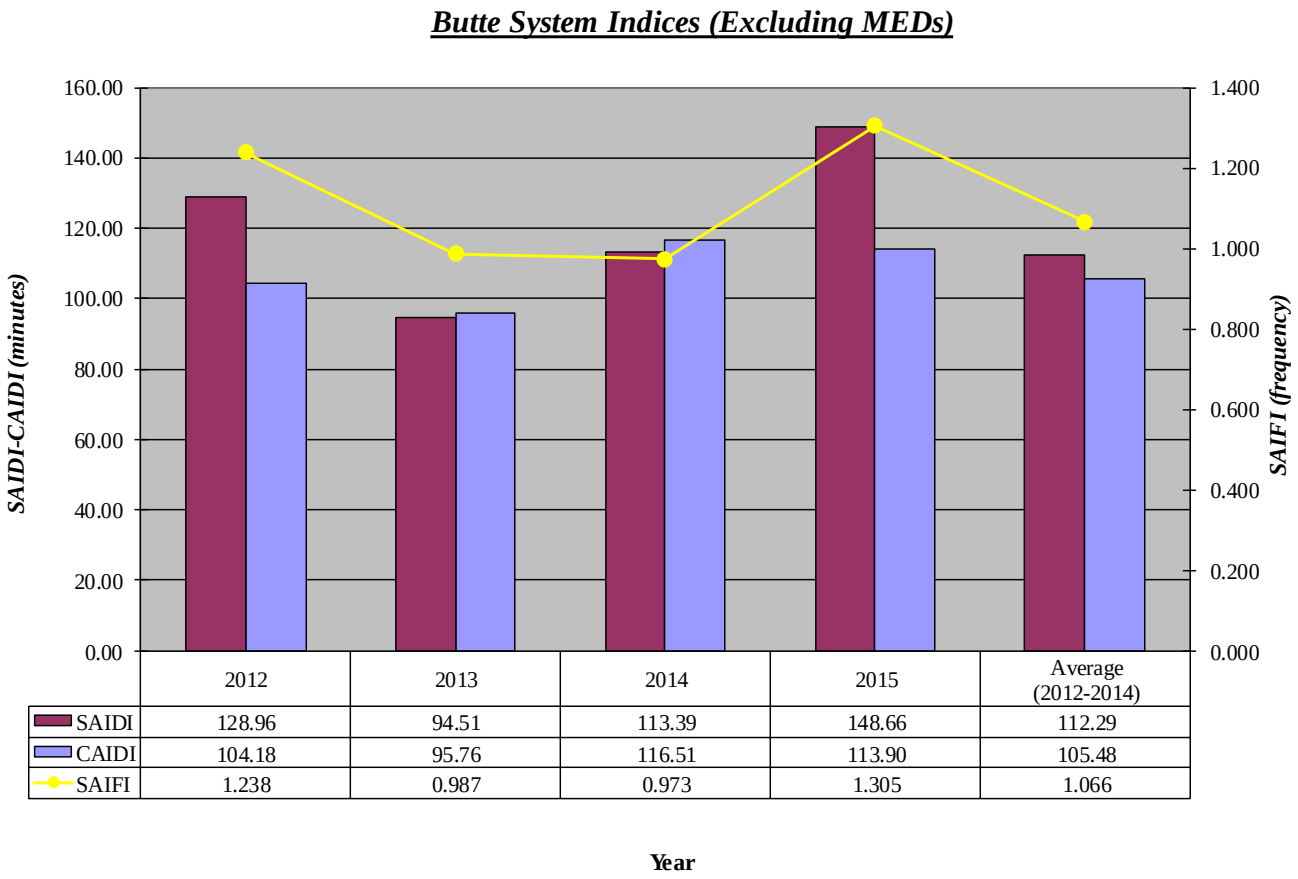


	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	301	300	377	457	326
System - Scheduled Maintenance	19	19	96	281	45
Animal - Other Bird	40	23	63	223	42
Nature - Wind	127	82	76	96	95
Nature - Lightning	69	61	73	88	68
Nature - Tree In Line	96	104	61	83	87
Nature - Snow/Ice	38	32	81	72	50
Animal - Squirrel	27	13	21	51	20
System - Human Error/Accident	10	13	19	39	14
Public - Vehicle Hit	22	16	27	37	22
DIVISION TOTAL	1,168	1,064	1,353	1,668	1,195

Figure 4.4 Bozeman system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

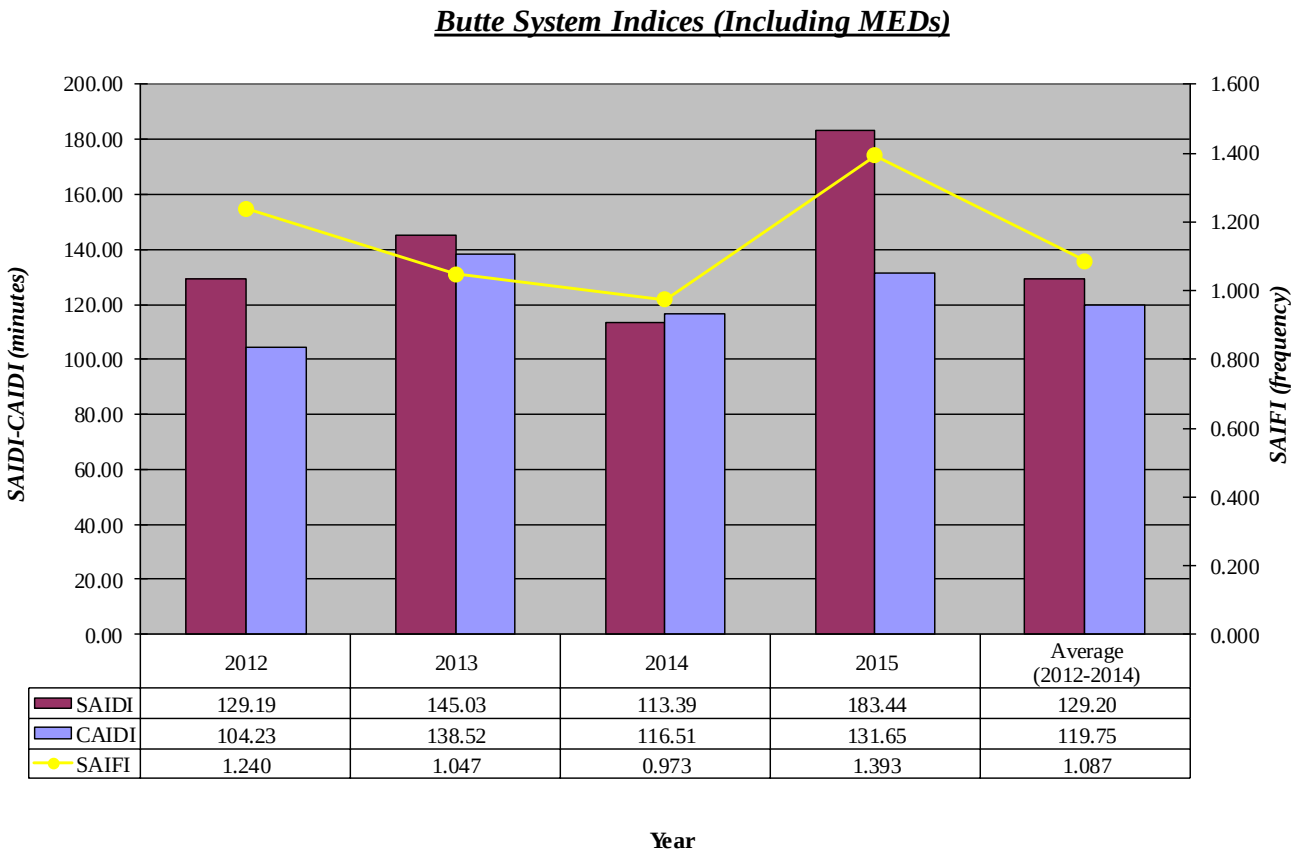
5. BUTTE SYSTEM RELIABILITY

For 2015, SAIDI and SAIFI increased and CAIDI held about the same for the Butte Division. The Butte division numbers were also increased due to the OMS. Lightning struck a tree causing it to fall into two feeders out of the Continental Drive Substation and current transformer failures in the Laurin Substation were the two largest single events for the division. Equipment outages were essentially unchanged for Butte. There was a large increase in animal related outages and bird related outages in particular. Tree outages also increased, likely from more severe wind for the year.



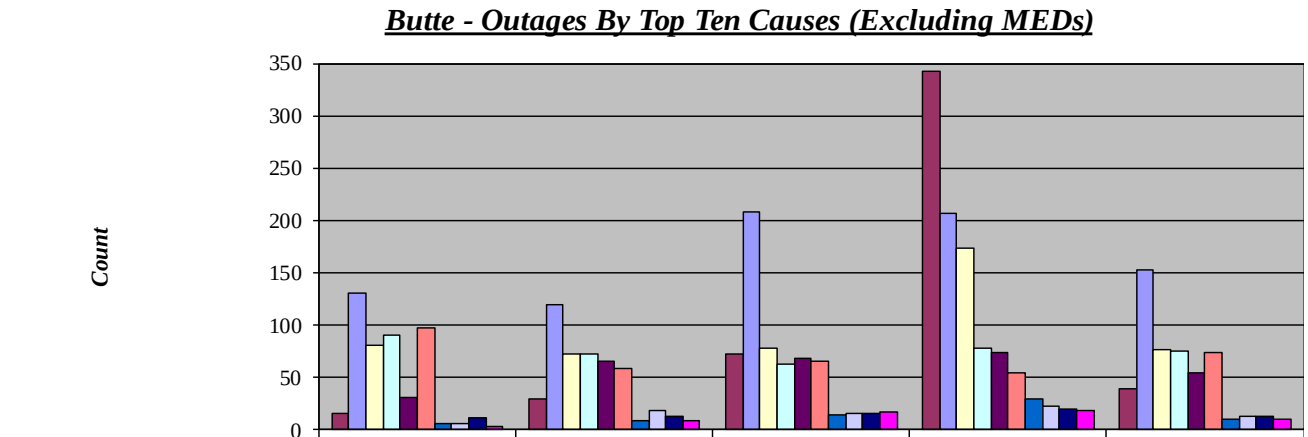
	2012	2013	2014	2015	Average (2012-2014)
SAIDI	128.96	94.51	113.39	148.66	112.29
CAIDI	104.18	95.76	116.51	113.90	105.48
SAIFI	1.238	0.987	0.973	1.305	1.066

Figure 5.1 Butte system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.



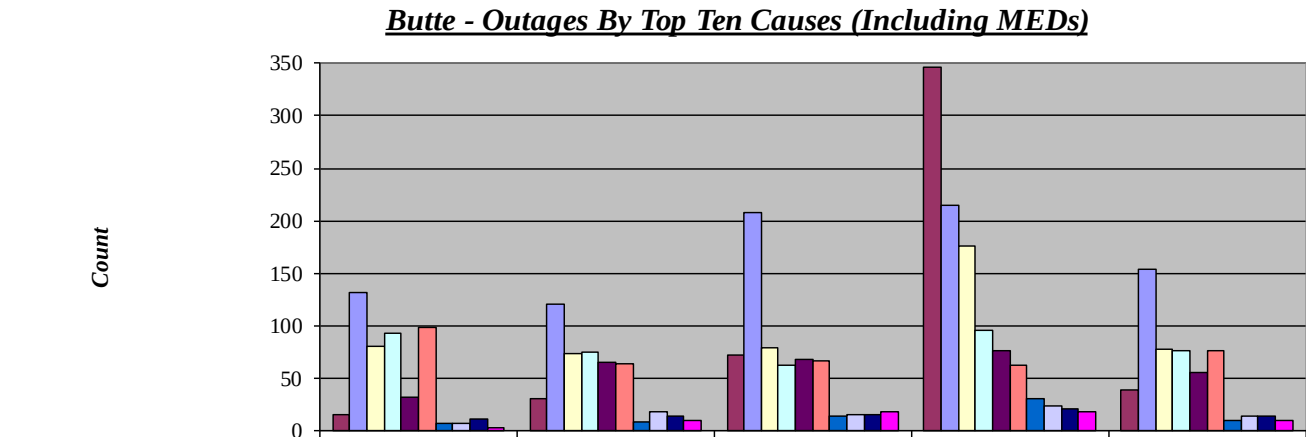
	2012	2013	2014	2015	Average (2012-2014)
SAIDI	129.19	145.03	113.39	183.44	129.20
CAIDI	104.23	138.52	116.51	131.65	119.75
SAIFI	1.240	1.047	0.973	1.393	1.087

Figure 5.2 Butte system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	15	30	72	343	39
System - Equipment Failure	131	119	208	206	153
Animal - Other Bird	80	73	78	174	77
Nature - Tree In Line	90	72	62	78	75
Nature - Lightning	31	65	68	74	55
Nature - Wind	97	59	66	55	74
Animal - Waterfowl	6	8	14	30	9
Nature - Limb In Line	6	18	15	22	13
Animal - Squirrel	11	13	15	20	13
System - Scheduled Construction	3	9	17	18	10
DIVISION TOTAL	692	691	837	1,153	739

Figure 5.3 Butte system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

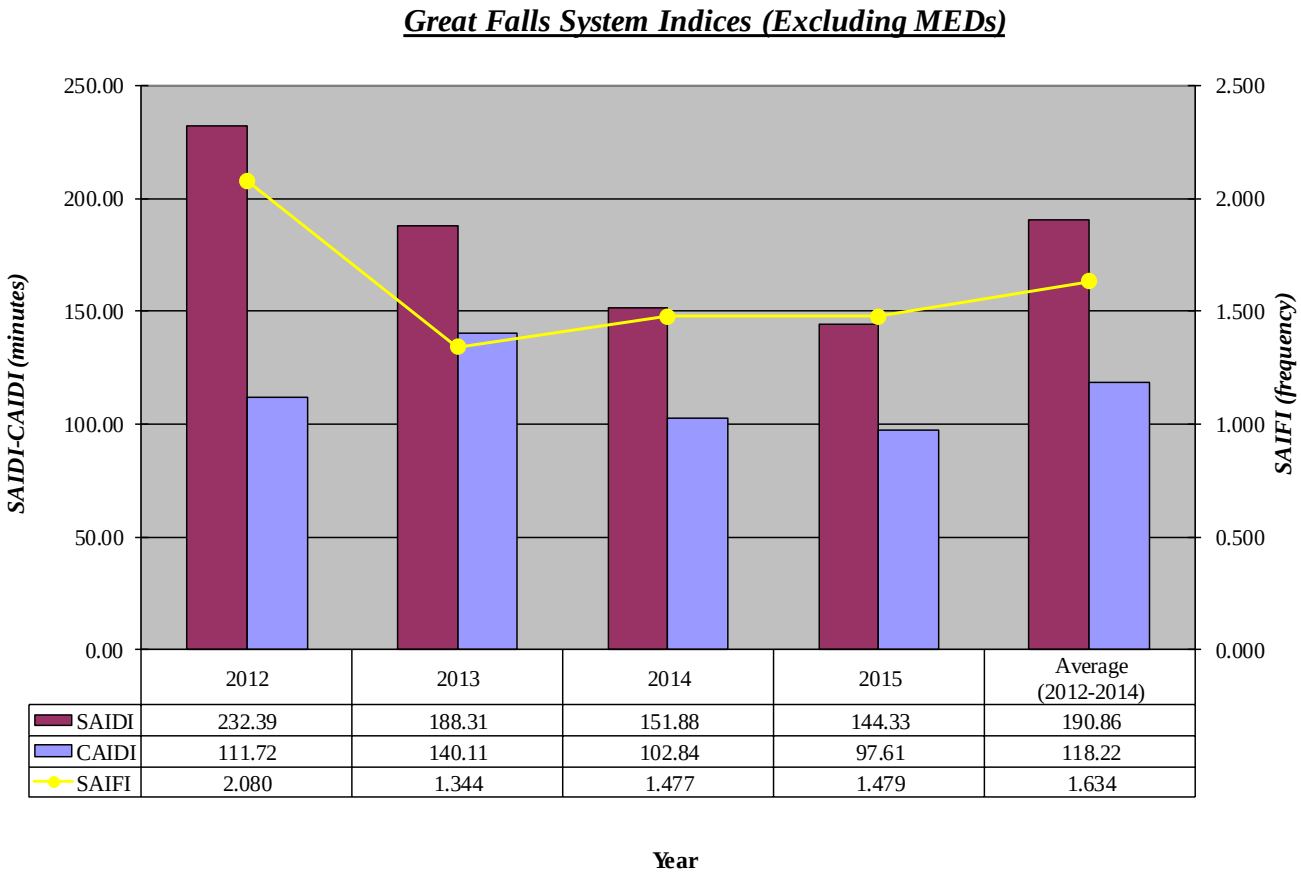


	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	15	30	72	347	39
System - Equipment Failure	132	120	208	214	153
Animal - Other Bird	80	73	78	176	77
Nature - Tree In Line	92	75	62	96	76
Nature - Lightning	31	65	68	76	55
Nature - Wind	98	63	66	62	76
Animal - Waterfowl	6	8	14	30	9
Nature - Limb In Line	6	18	15	23	13
Animal - Squirrel	11	13	15	20	13
System - Scheduled Construction	3	9	17	18	10
DIVISION TOTAL	698	703	837	1,200	746

Figure 5.4 Butte system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

6. GREAT FALLS SYSTEM RELIABILTY

Great Falls Division saw a decrease in SAIDI and CAIDI and a slight decrease in SAIFI for 2015. Animal related and lightning caused outages greatly increased. The number of equipment failures also increased. Strong winds contributed to many of the failures. This reflects the large impact of weather in 2015. Great Falls was greatly affected by three MEDs in 2015.Surprisingly, the number of Vehicle Hit outages also had a large increase. The larger outages for the division were a vehicle hit a transmission structure that fell into a distribution line, a tree got into Great Falls City CKT #34, and relaying problem in the Great Falls Riverview Substation.



	2012	2013	2014	2015	Average (2012-2014)
SAIDI	232.39	188.31	151.88	144.33	190.86
CAIDI	111.72	140.11	102.84	97.61	118.22
SAIFI	2.080	1.344	1.477	1.479	1.634

Figure 6.1 Great Falls system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

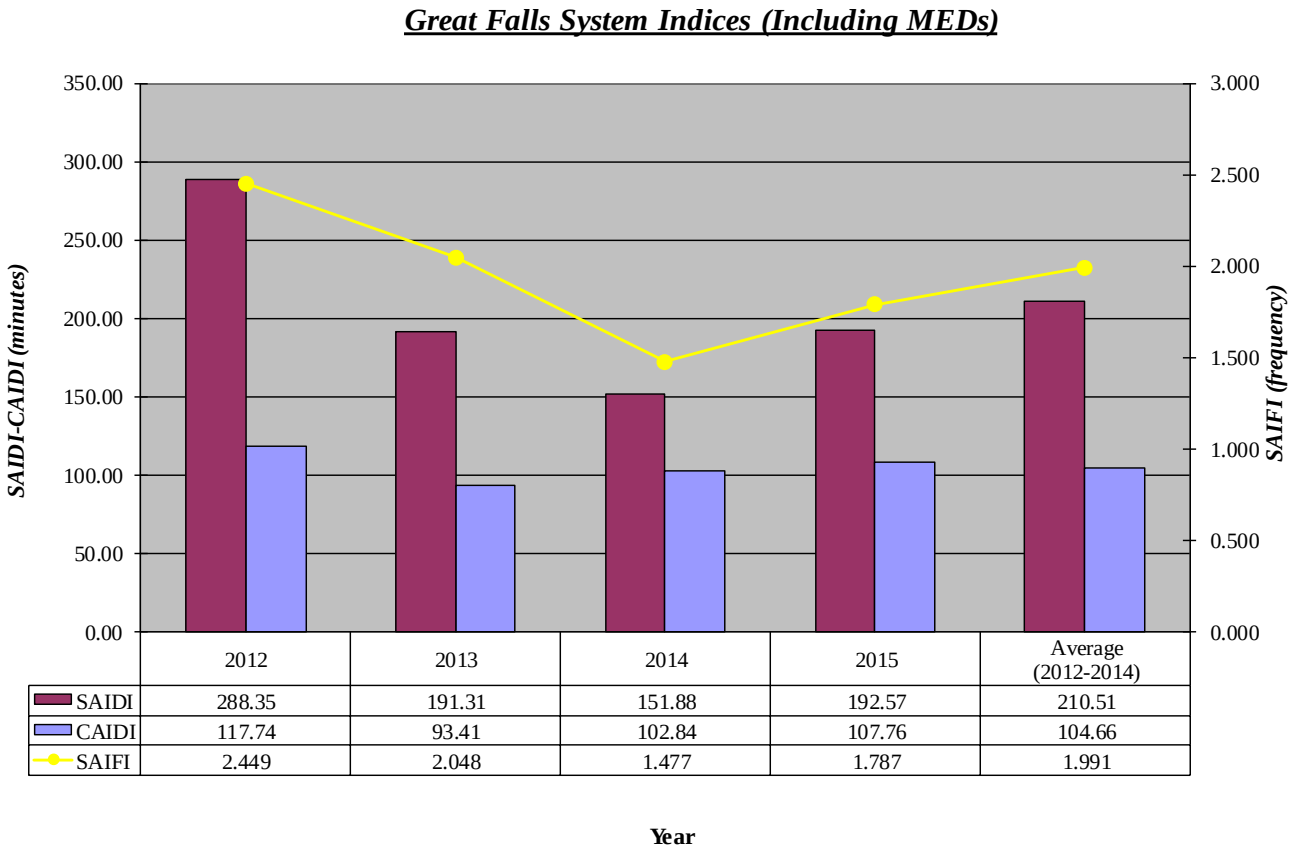
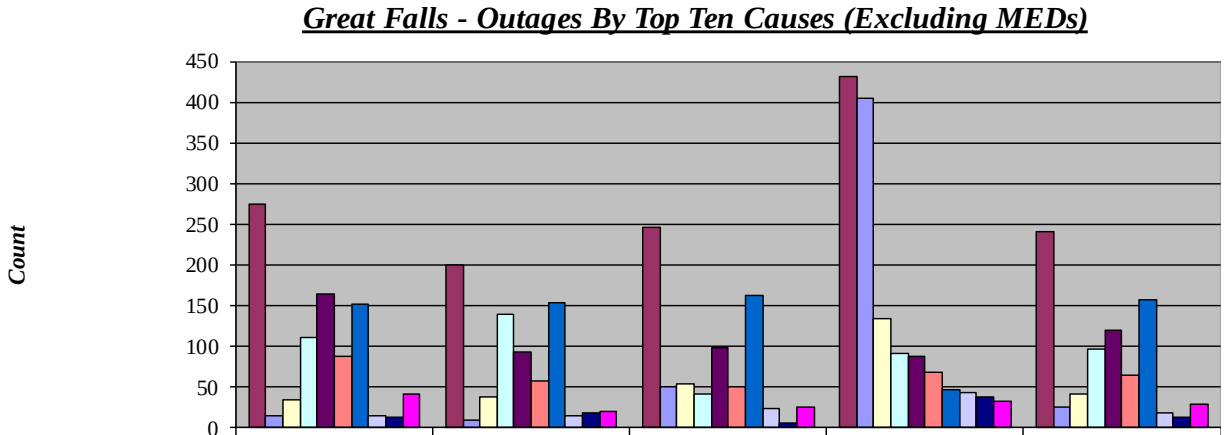
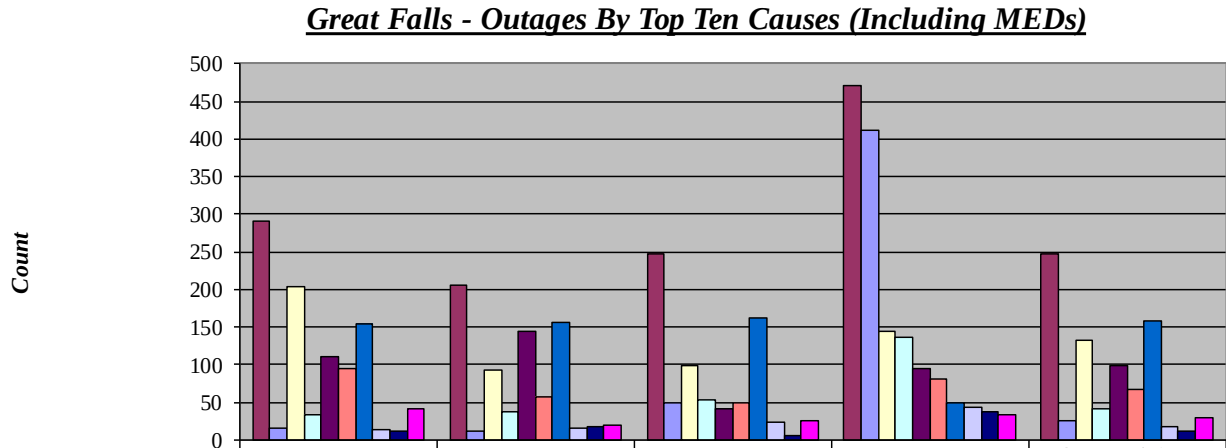


Figure 6.2 Great Falls system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	275	200	247	431	241
System - Scheduled Maintenance	15	10	50	404	25
Animal - Other Bird	34	37	54	134	42
Nature - Lightning	110	139	42	91	97
Nature - Wind	165	93	99	88	119
Nature - Tree In Line	87	57	50	68	65
Unknown	152	154	163	47	156
Animal - Waterfowl	14	15	24	43	18
Public - Vehicle Hit	12	18	6	38	12
Animal - Squirrel	42	20	26	32	29
DIVISION TOTAL	1,085	853	921	1,519	953

Figure 6.3 Great Falls system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

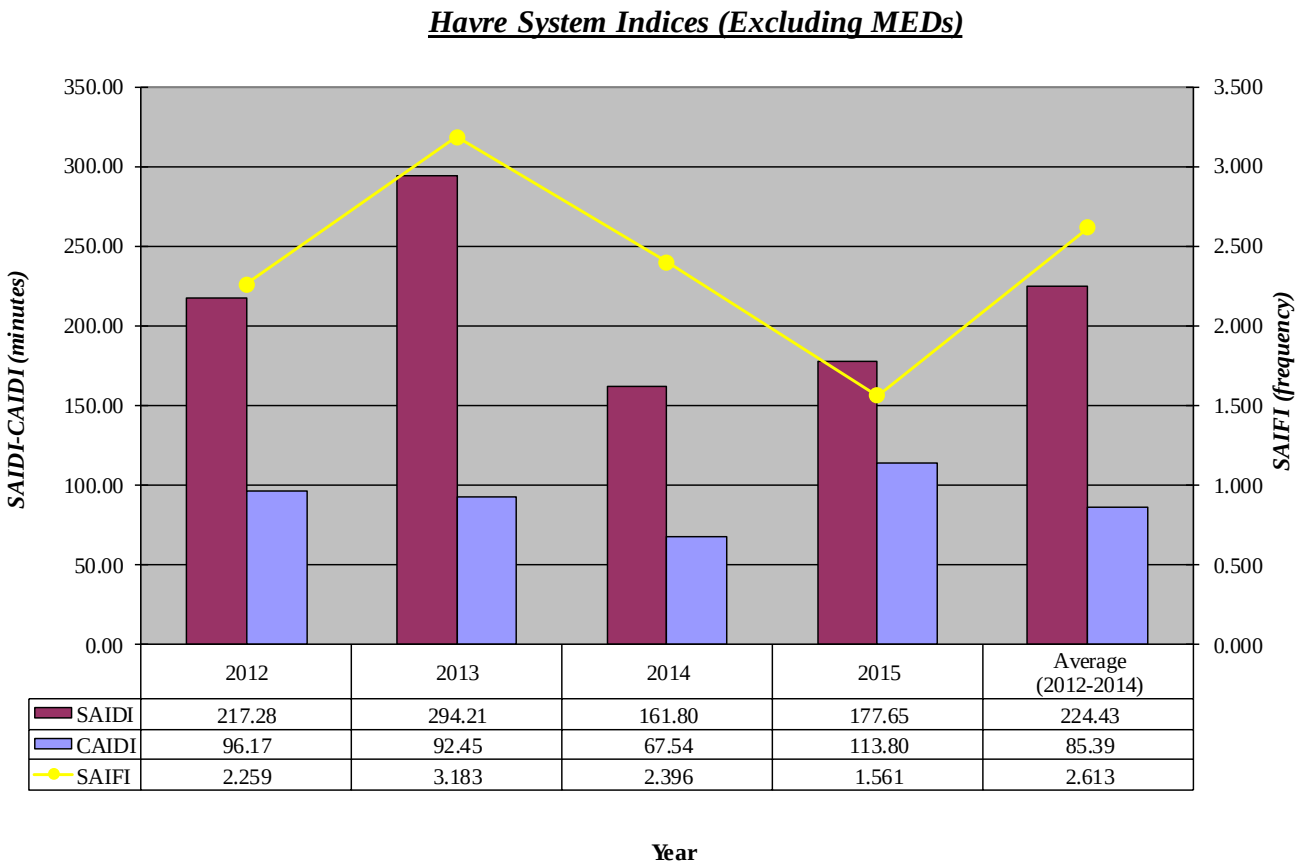


	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	291	205	247	472	248
System - Scheduled Maintenance	15	11	50	411	25
Nature - Wind	204	93	99	145	132
Animal - Other Bird	34	37	54	137	42
Nature - Lightning	110	145	42	95	99
Nature - Tree In Line	94	57	50	81	67
Unknown	154	157	163	49	158
Animal - Waterfowl	14	15	24	44	18
Public - Vehicle Hit	12	18	6	38	12
Animal - Squirrel	42	20	26	33	29
DIVISION TOTAL	1,156	870	921	1,653	982

Figure 6.4 Great Falls system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

7. HAVRE SYSTEM RELIABILITY

Havre saw a slight increase in SAIDI and a larger increase in CAIDI. SAIFI was reduced almost a full minute. SAIDI and SAIFI were lower than the three year averages. Larger outages were a transmission problem that took out the Havre Highland Park Substation and a transmission pole failure that took out Havre Eastside Substation. Non-MED storm related outages were notably down, animal and equipment failures were notably higher. Storm caused MEDs had a large impact on the Havre area.



	2012	2013	2014	2015	Average (2012-2014)
SAIDI	217.28	294.21	161.80	177.65	224.43
CAIDI	96.17	92.45	67.54	113.80	85.39
SAIFI	2.259	3.183	2.396	1.561	2.613

Figure 7.1 Havre system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

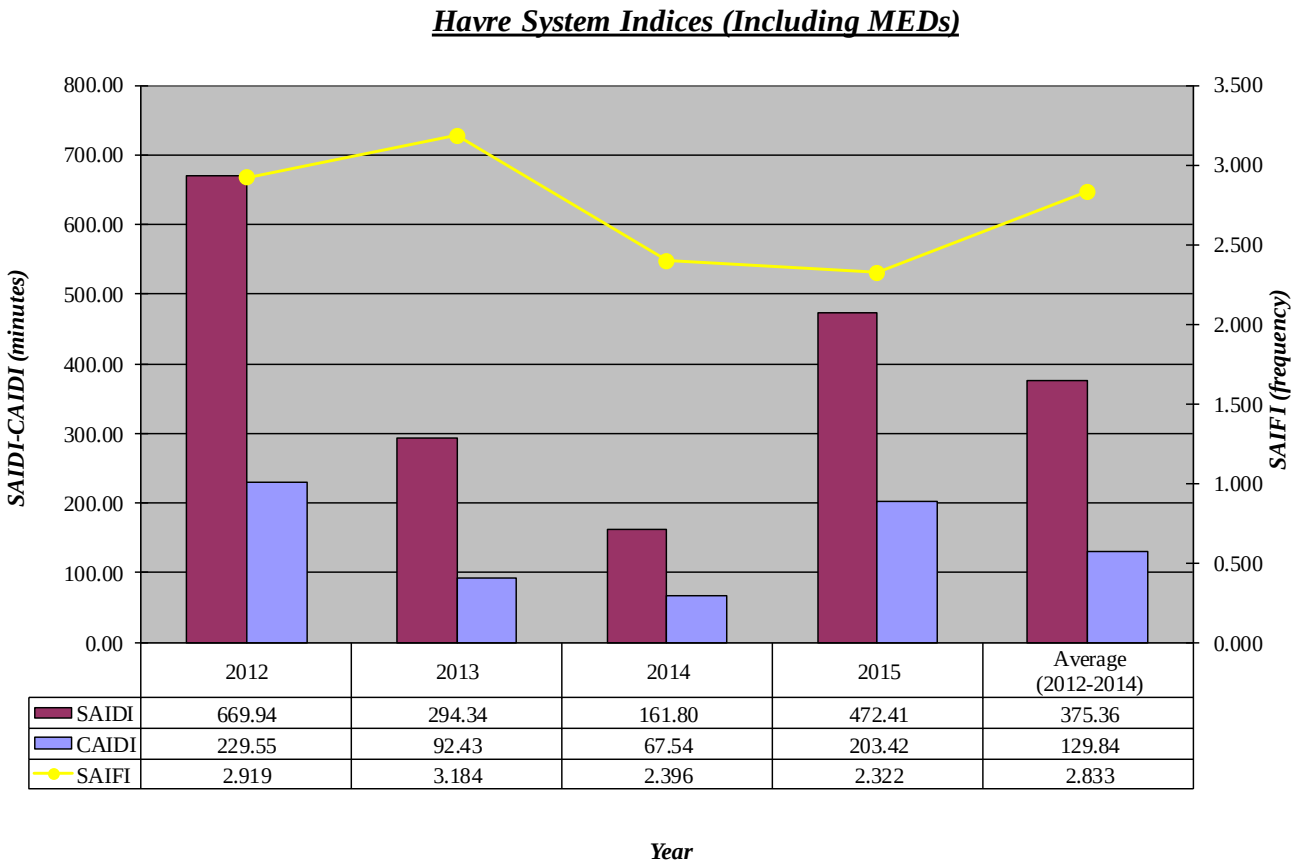
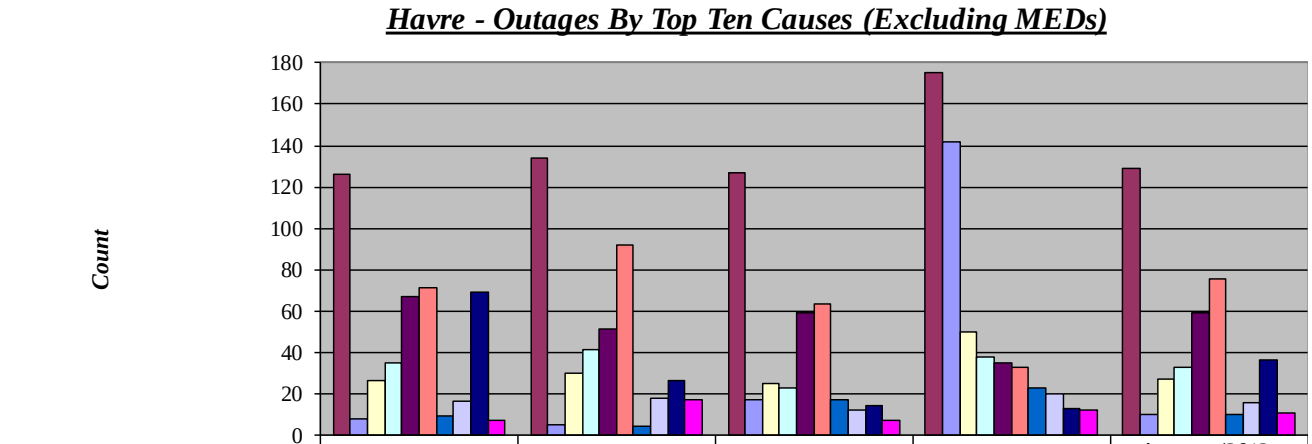


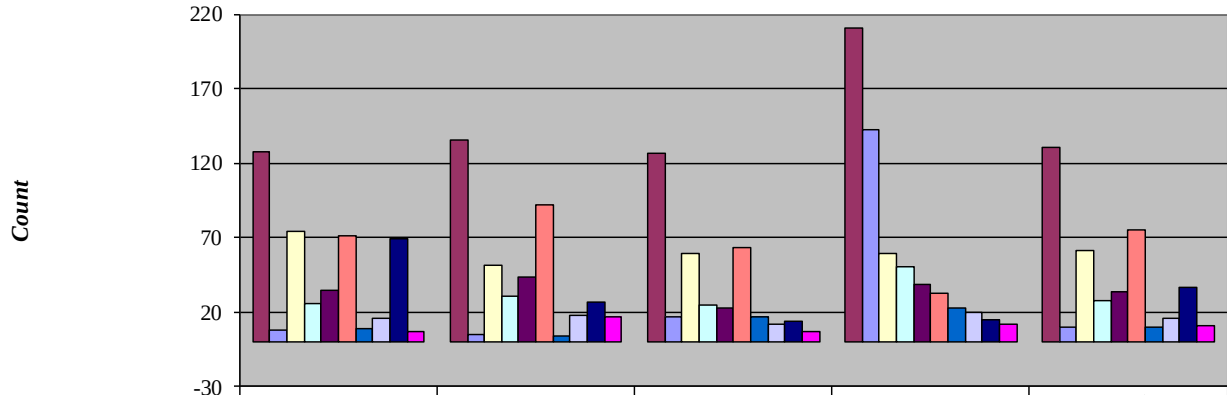
Figure 7.2 Havre system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	126	134	127	175	129
System - Scheduled Maintenance	8	5	17	142	10
Animal - Other Bird	26	30	25	50	27
Unknown	35	41	23	38	33
Nature - Wind	67	51	59	35	59
Nature - Lightning	71	92	63	33	75
Public - Vehicle Hit	9	4	17	23	10
Animal - Raccoon	16	18	12	20	15
Nature - Tree In Line	69	26	14	13	36
Animal - Waterfowl	7	17	7	12	10
DIVISION TOTAL	545	486	427	590	486

Figure 7.3 Havre system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

Havre - Outages By Cause (Including MEDs)

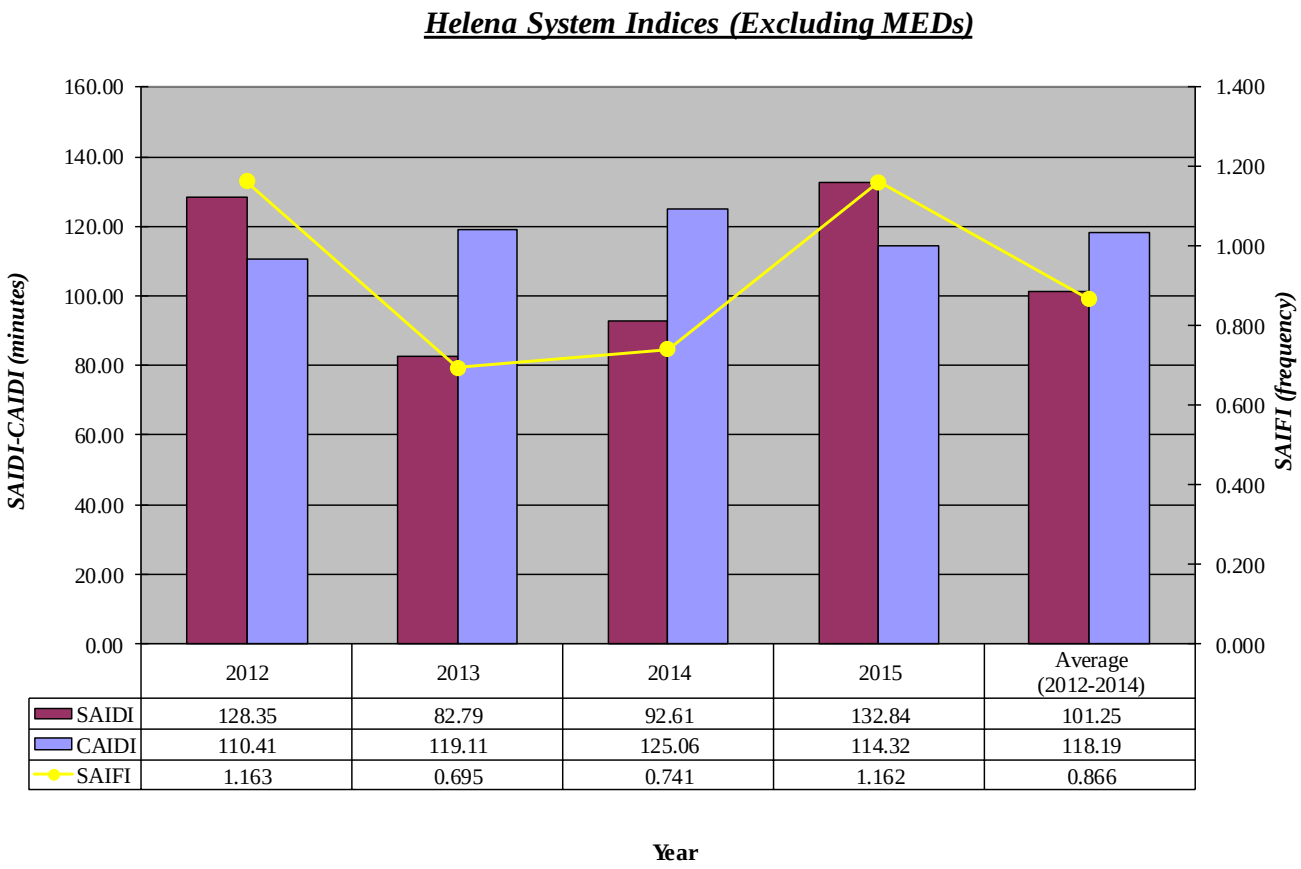


	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	128	135	127	211	130
System - Scheduled Maintenance	8	5	17	142	10
Nature - Wind	74	51	59	59	61
Animal - Other Bird	26	31	25	50	27
Unknown	35	43	23	38	34
Nature - Lightning	71	92	63	33	75
Public - Vehicle Hit	9	4	17	23	10
Animal - Raccoon	16	18	12	20	15
Nature - Tree In Line	69	27	14	15	37
Animal - Waterfowl	7	17	7	12	10
DIVISION TOTAL	577	491	427	655	498

Figure 7.4 Havre system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

8. HELENA SYSTEM RELIABILITY

Helena Division saw an increase of all three indices for 2015 over 2014 values. Like other divisions, the OMS implementation had a significant impact. The Mont. Ave. South Fdr. 2 had a major outage caused by a tree falling into the line and breaking a crossarm. Human error caused an outage on the East Valley Fdr. 63. And a transmission problem resulted in the loss of service to Clancy Substation. Equipment failure and animal outages were higher.



	2012	2013	2014	2015	Average (2012-2014)
SAIDI	128.35	82.79	92.61	132.84	101.25
CAIDI	110.41	119.11	125.06	114.32	118.19
SAIFI	1.163	0.695	0.741	1.162	0.866

Figure 8.1 Helena system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

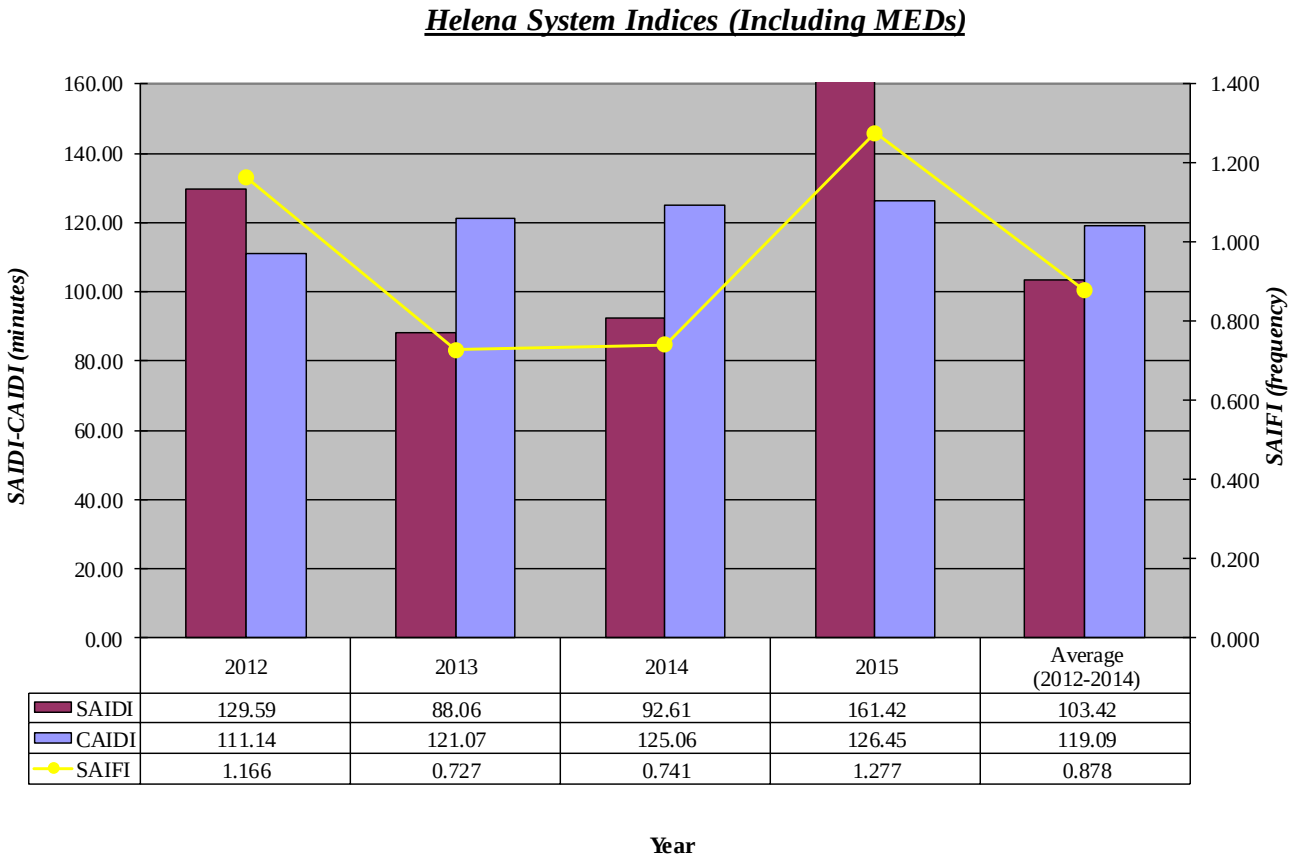
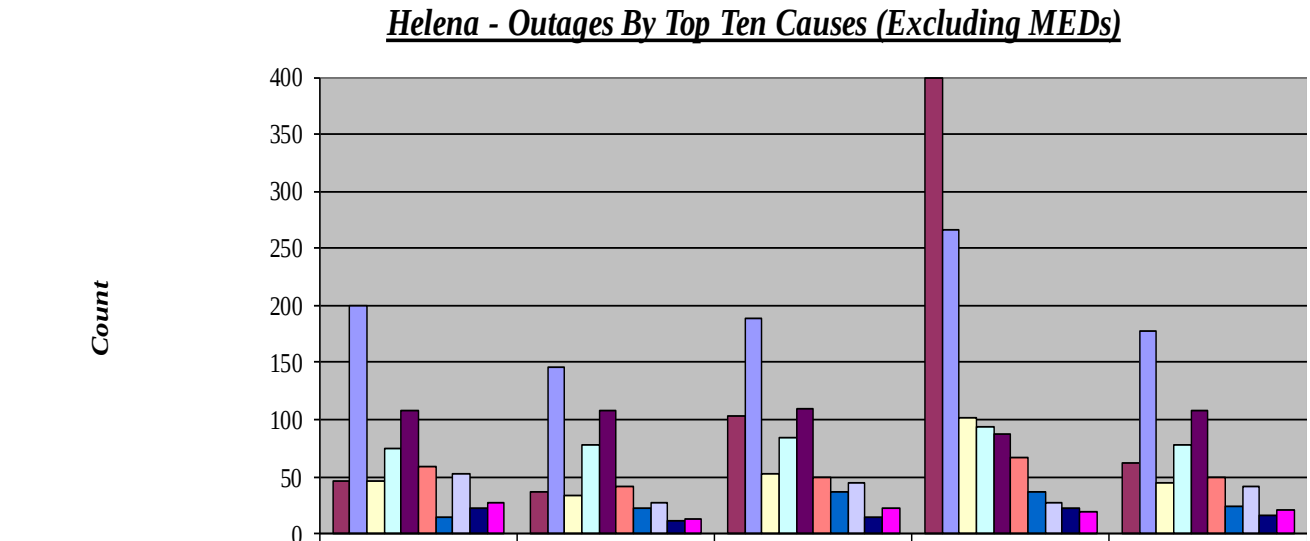
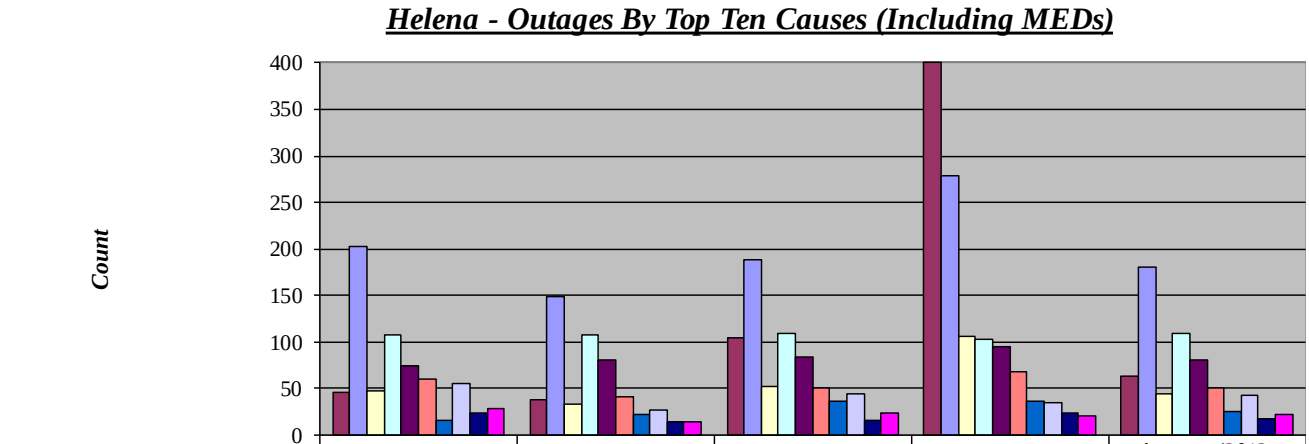


Figure 8.2 Helena system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	46	37	104	399	62
System - Equipment Failure	200	146	189	266	178
Animal - Other Bird	47	33	52	101	44
Nature - Lightning	74	78	84	94	79
Nature - Tree In Line	108	108	109	88	108
Animal - Squirrel	59	41	50	67	50
Nature - Snow/Ice	14	22	36	36	24
Nature - Wind	52	27	44	28	41
Nature - Limb In Line	23	12	15	22	17
System - Scheduled Construction	28	13	23	20	21
DIVISION TOTAL	811	636	847	1,217	765

Figure 8.3 Helena system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	46	38	104	401	63
System - Equipment Failure	203	148	189	278	180
Animal - Other Bird	47	33	52	105	44
Nature - Tree In Line	108	108	109	102	108
Nature - Lightning	74	81	84	95	80
Animal - Squirrel	59	41	50	67	50
Nature - Snow/Ice	16	22	36	36	25
Nature - Wind	55	27	44	34	42
Nature - Limb In Line	23	13	15	24	17
System - Scheduled Construction	28	13	23	20	21
DIVISION TOTAL	820	638	847	1,259	768

Figure 8.4 Helena system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

9. LEWISTOWN SYSTEM RELIABILITY

Lewistown District saw an increase in all three indices in 2015. Even with these increases, a SAIDI of 86 minutes and SAIFI of 0.76, it was still a very reliable year! Larger outages were an cutout and insulator failure at the Moccasin Substation caused by a raccoon and an transmission problem with an unknown cause.. Wind related outages were significantly down, but animals are making a comeback. Equipment failure outages doubled.

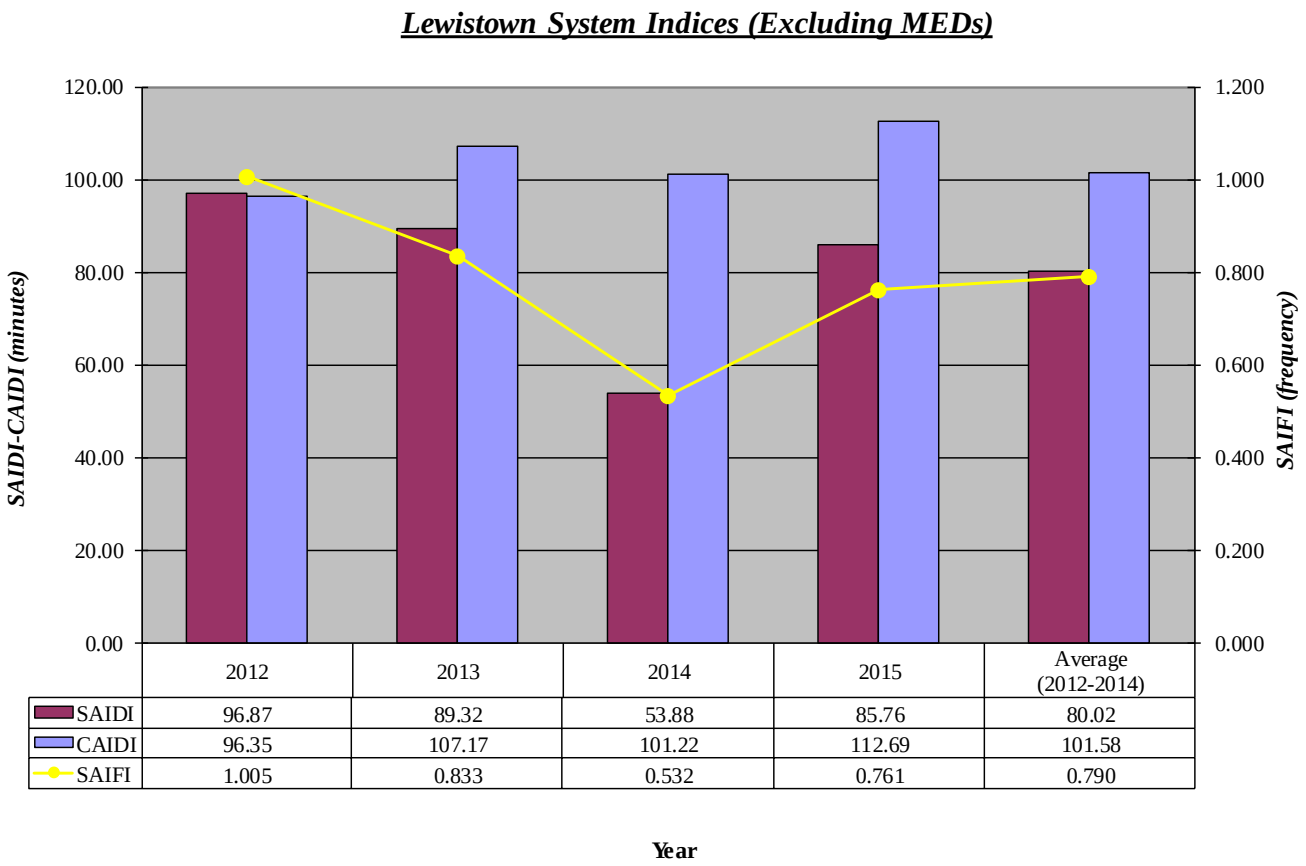
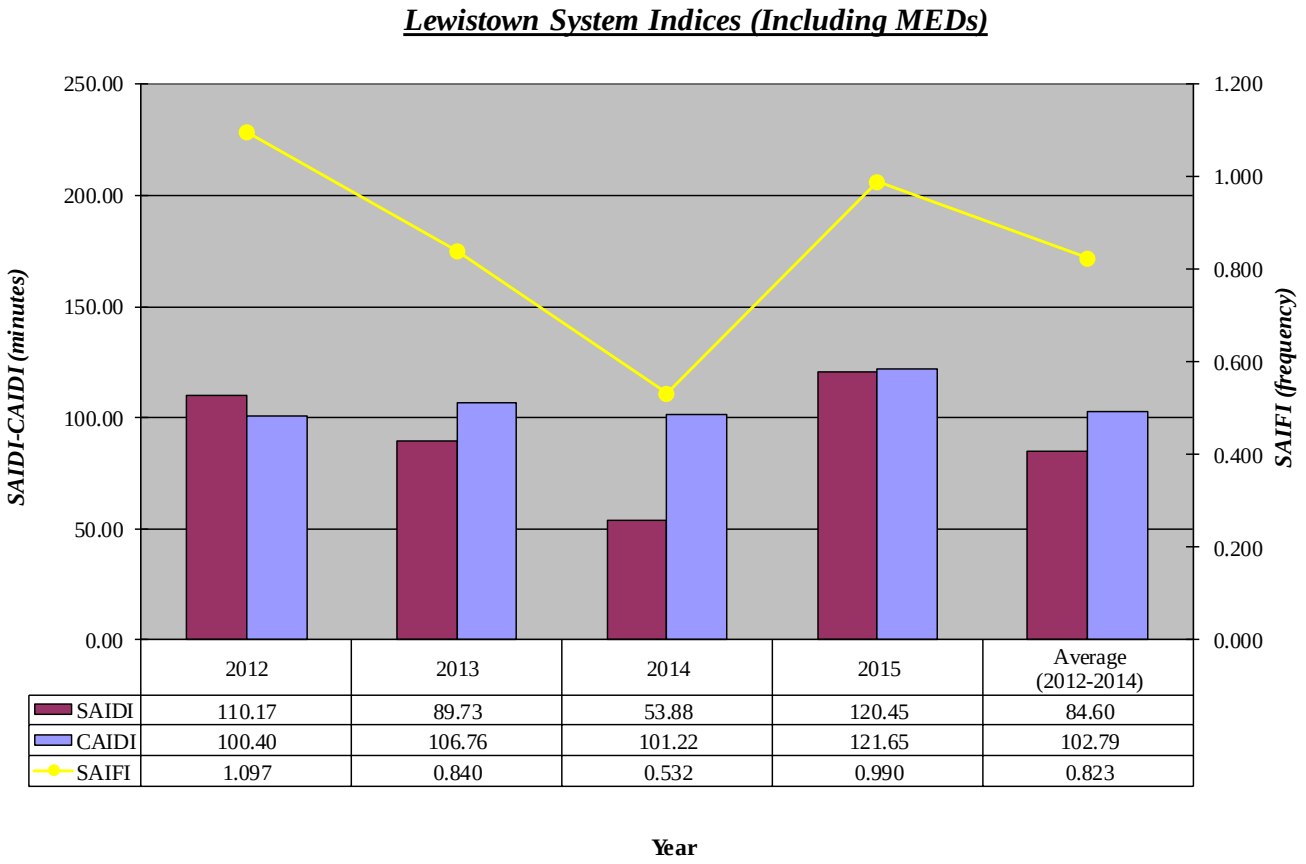
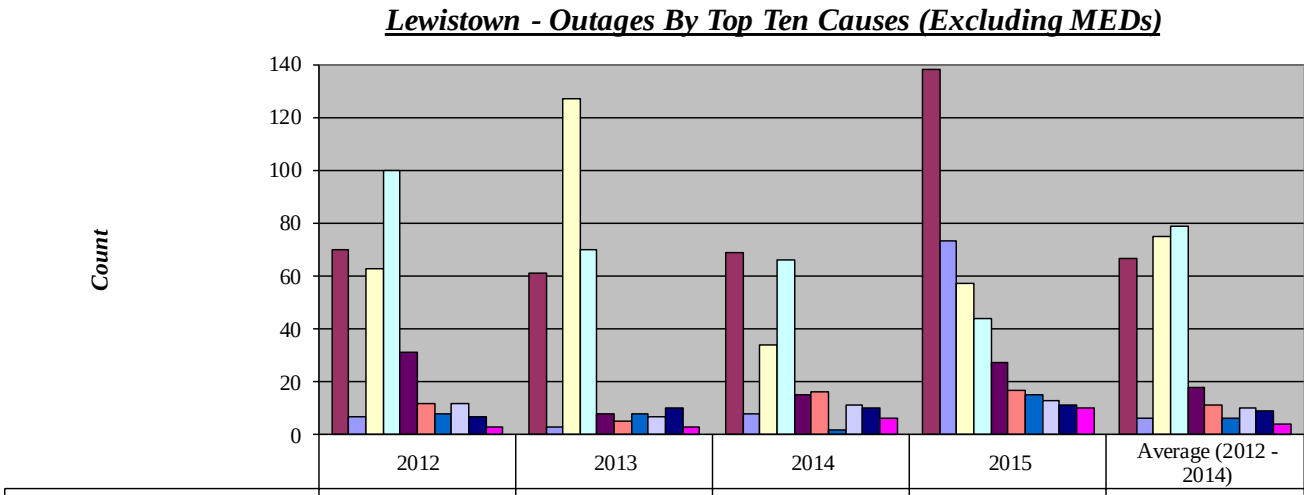


Figure 9.1 Lewistown system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.



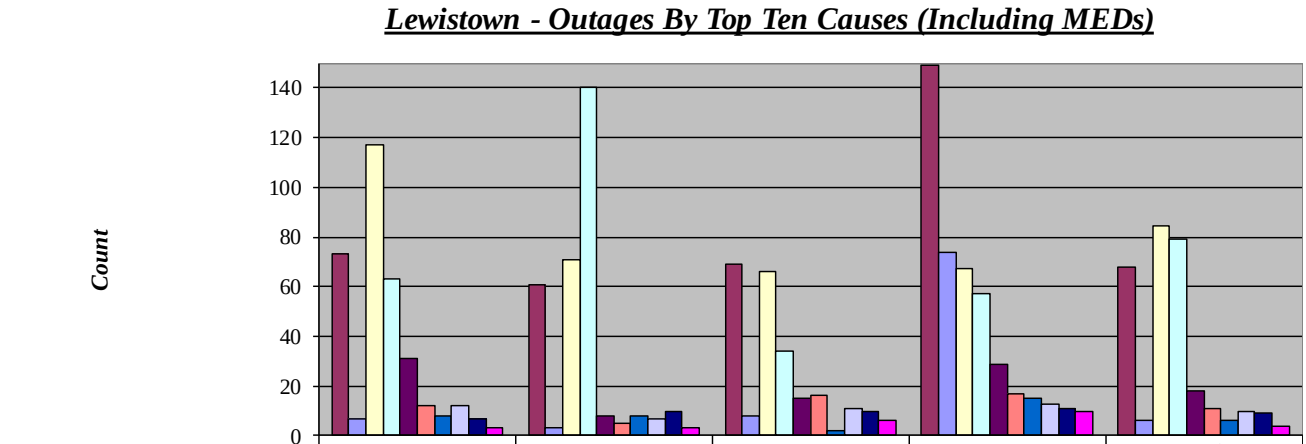
	2012	2013	2014	2015	Average (2012-2014)
SAIDI	110.17	89.73	53.88	120.45	84.60
CAIDI	100.40	106.76	101.22	121.65	102.79
SAIFI	1.097	0.840	0.532	0.990	0.823

Figure 9.2 Lewistown system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	70	61	69	138	67
System - Scheduled Maintenance	7	3	8	73	6
Nature - Lightning	63	127	34	57	75
Nature - Wind	100	70	66	44	79
Animal - Other Bird	31	8	15	27	18
Animal - Raccoon	12	5	16	17	11
Nature - Tree In Line	8	8	2	15	6
Animal - Other	12	7	11	13	10
Animal - Waterfowl	7	10	10	11	9
Animal - Squirrel	3	3	6	10	4
DIVISION TOTAL	400	361	286	445	349

Figure 9.3 Lewistown system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

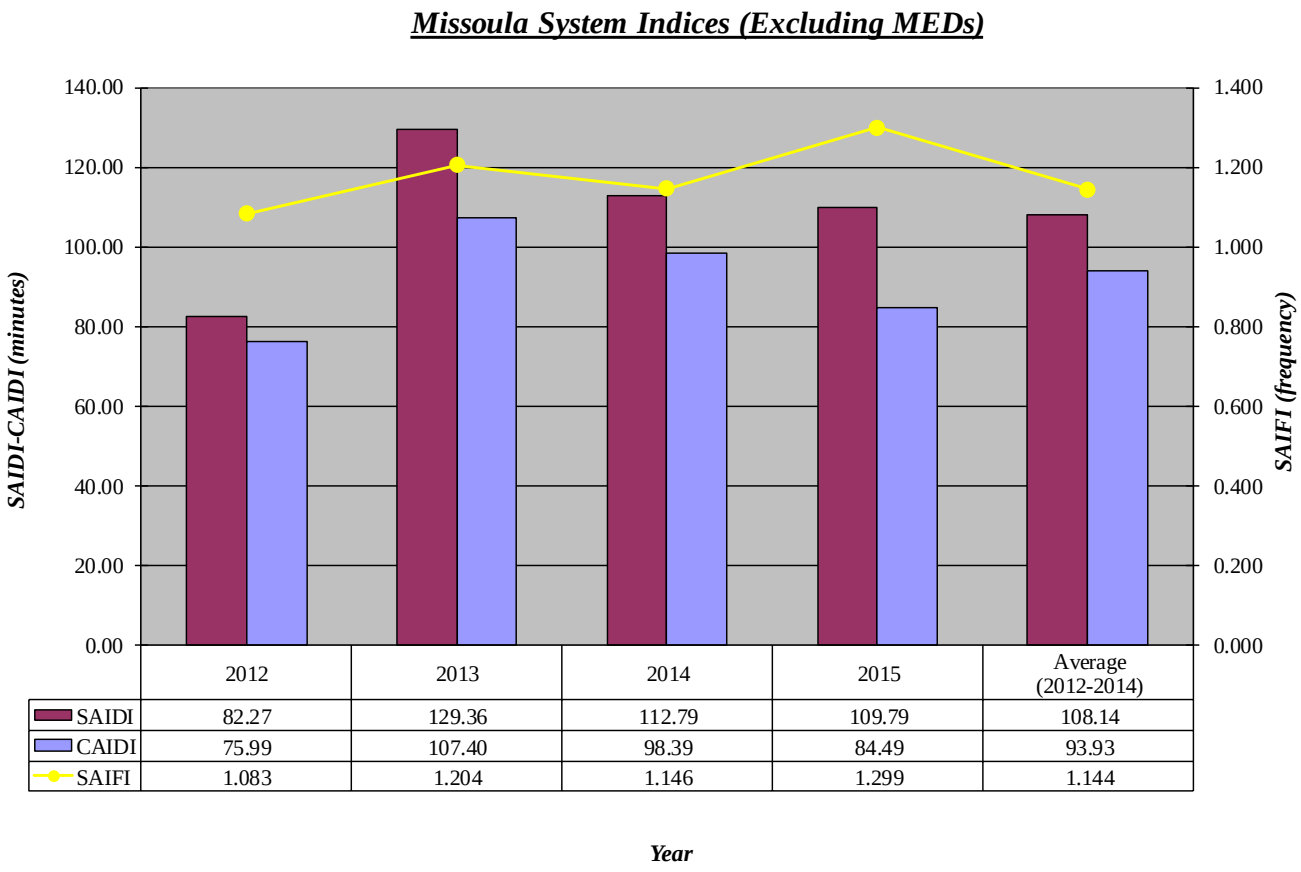


	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	73	61	69	149	68
System - Scheduled Maintenance	7	3	8	74	6
Nature - Wind	117	71	66	67	85
Nature - Lightning	63	140	34	57	79
Animal - Other Bird	31	8	15	29	18
Animal - Raccoon	12	5	16	17	11
Nature - Tree In Line	8	8	2	15	6
Animal - Other	12	7	11	13	10
Animal - Waterfowl	7	10	10	11	9
Animal - Squirrel	3	3	6	10	4
DIVISION TOTAL	428	375	286	482	363

Figure 9.4 Lewistown system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

10. MISSOULA SYSTEM RELIABILITY

Excluding MEDs, the Missoula Division improved the SAIDI and CAIDI indices in 2015. There was a significant increase in SAIFI. The OMS implementation has a significant impact. Missoula experienced the largest impact from MEDs. Two, on August 10th and August 11th, were primarily concentrated in Missoula. The August 11th MED was the largest ever in the Montana Region, contributing 81 SAIDI minutes! Total contribution of both MEDS was 89 minutes. The largest non-MED event was a broken cutout Plains Fdr #1 on August 22nd that caused almost one MT SAIDI minute. Earlier in August, a relay failure in the Missoula Industrial sub also caused a large outage. Also in August, a lightning storm too out Target Range Fdr 71. August was not a good month for Missoula! Tree related outages were down, while equipment, animal, and wind outages were up.



	2012	2013	2014	2015	Average (2012-2014)
SAIDI	82.27	129.36	112.79	109.79	108.14
CAIDI	75.99	107.40	98.39	84.49	93.93
SAIFI	1.083	1.204	1.146	1.299	1.144

Figure 10.1 Missoula system indices excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.

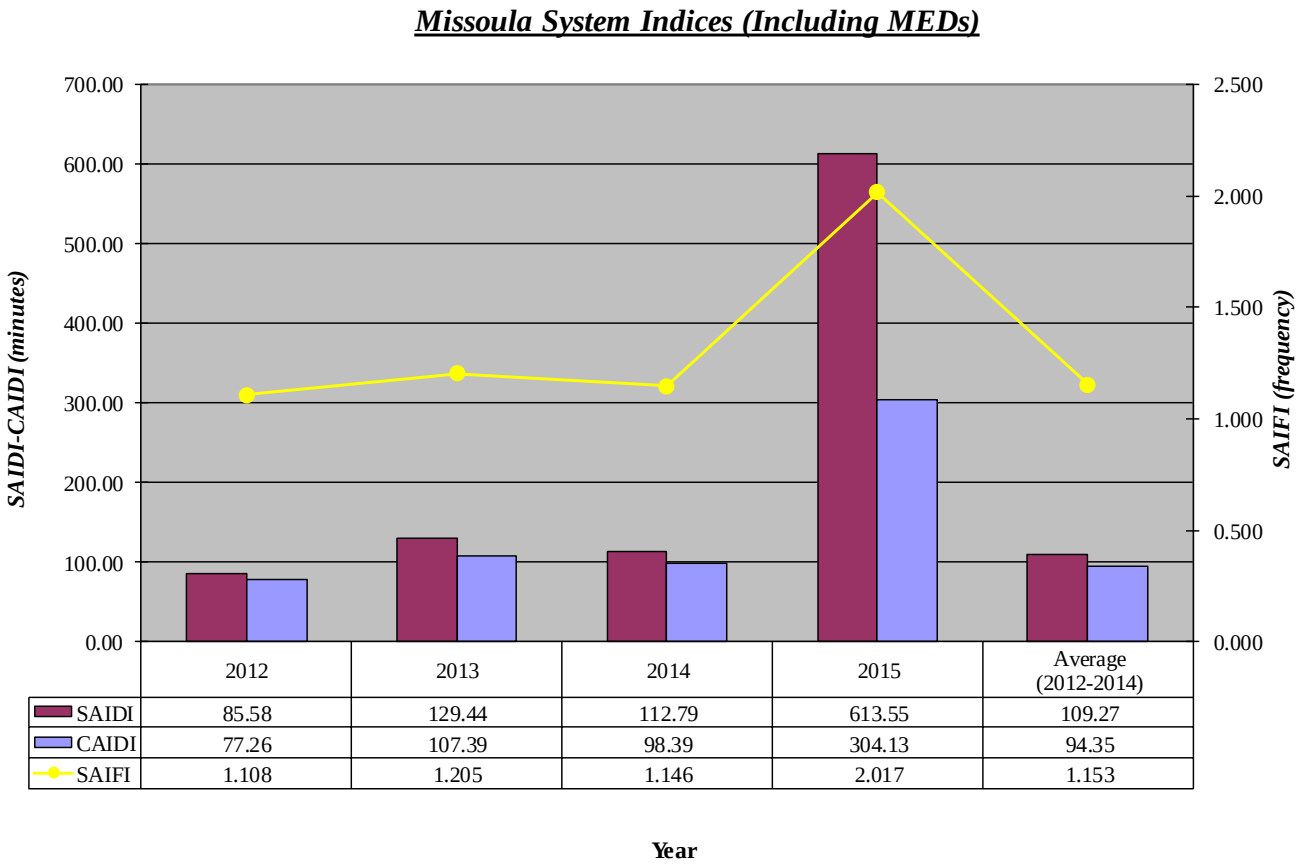
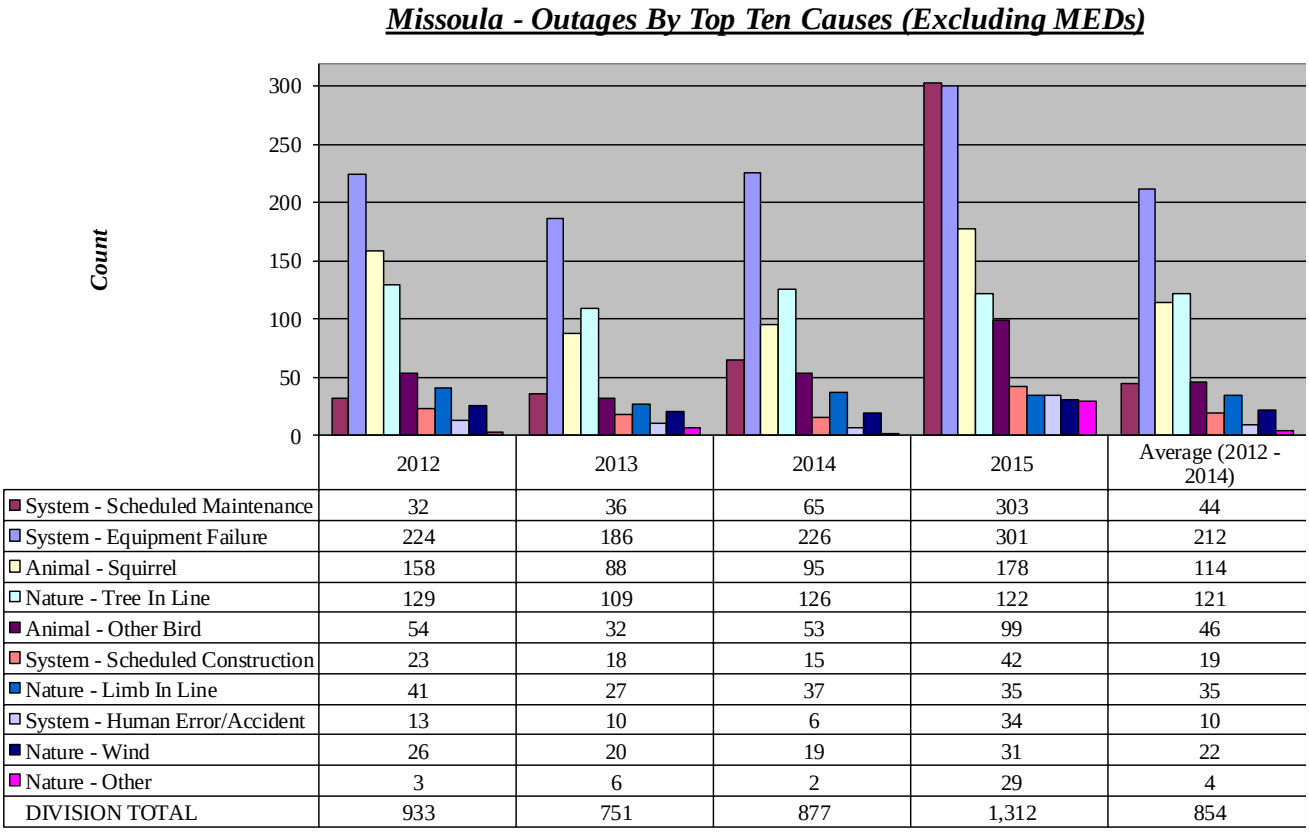
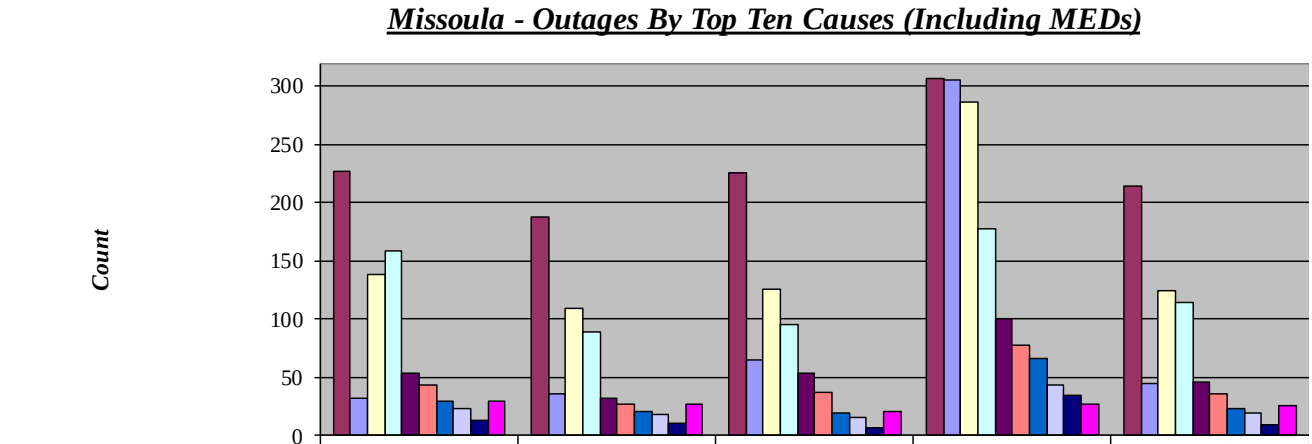


Figure 10.2 Missoula system indices including major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Scheduled Maintenance	32	36	65	303	44
System - Equipment Failure	224	186	226	301	212
Animal - Squirrel	158	88	95	178	114
Nature - Tree In Line	129	109	126	122	121
Animal - Other Bird	54	32	53	99	46
System - Scheduled Construction	23	18	15	42	19
Nature - Limb In Line	41	27	37	35	35
System - Human Error/Accident	13	10	6	34	10
Nature - Wind	26	20	19	31	22
Nature - Other	3	6	2	29	4
DIVISION TOTAL	933	751	877	1,312	854

Figure 10.3 Missoula system outages by top ten causes excluding major event days (MEDs) as defined in IEEE Standard 1366-2012.



	2012	2013	2014	2015	Average (2012 - 2014)
System - Equipment Failure	227	188	226	307	214
System - Scheduled Maintenance	32	36	65	305	44
Nature - Tree In Line	138	109	126	287	124
Animal - Squirrel	159	89	95	178	114
Animal - Other Bird	54	32	53	100	46
Nature - Limb In Line	43	27	37	77	36
Nature - Wind	30	20	19	66	23
System - Scheduled Construction	23	18	15	43	19
System - Human Error/Accident	13	10	6	34	10
Nature - Lightning	30	27	20	27	26
DIVISION TOTAL	955	757	899	1,556	870

Figure 10.4 Missoula system outages by top ten causes including major event days (MEDs) as defined in IEEE Standard 1366-2012.

11. CONCLUSION

Last year started off well with SAIDI being below the three year average until the MED on July 4th. This was caused by a strong wind and rain storm in the Great Falls and Havre areas. This drove that month's SAIDI over 19 minutes, compared to an earlier three-year July average of 14 minutes. With fairly average interruptions from July 4th to August 10th, SAIDI remained higher than average. But then the Missoula MEDs occurred, that added 89 minutes to Montana SAIDI. The remaining months were generally better than their corresponding three year average. The result was a year-end SAIDI, without MEDs, of 129 compared to the three year average of 124. The year-end SAIDI, with MEDs, was 260. This is the largest Montana SAIDI in company history.

The InService mobile work force and outage management system was implemented by NWE during the fall of 2014. This provided more accurate and timely outage reporting for 2015. Outage customer counts and times are derived from the GIS, call logging, and automated systems, eliminating the earlier manual outage reporting system and its inherent approximations. This was well illustrated in 2015 with the large increase in Scheduled Construction and Maintenance outages. In the past, many of these outages were not reported. Both IEEE and the Department of Energy reports indicate that SAIDI numbers normally increase with this improved accuracy, but with the whims of nature, this may be difficult to determine for some time. The conversion to The IEEE reliability standard (1366-2012) does not define the 24 hour day and many of the utilities involved in the IEEE benchmark survey have gone to something other than midnight-to-midnight. Some will even "roll" the 24 hours to more accurately capture the full impact of a storm day (and possible MED). This option was implemented by NWE in 2015.

Increased efforts in line patrol and repairs as well as vegetation work may have improved reliability in 2015, as well as reduced the impacts from larger storms. Additionally, with the implementation of reliability projects under the Distribution System Infrastructure Project (DSIP), stability and hopefully improvement in electric system reliability should be realized. Of course the impacts of storms are a major contributor to reduced reliability and complicate any analysis. Substation and other asset improvements increased scheduled outages, but careful planning kept these outages to a minimum and this work helps avoid equipment failures and provides facilities to serve future loads. With continued upgrades and planning, diligent work, and sincere effort, NorthWestern Energy strives to provide safe, reliable electric service to our customers and a safe working environment for our employees, now and into the future.

ANNEX A: TRANSMISSION DATA AND GRAPHS

Attached below are graphs showing the electric transmission cumulative outage duration, cumulative outage frequency, ASAI and SAIFI. A graph for 2015 is given for each metric. Also a graph showing data from 2002 to 2015 is given for ASAI and SAIFI. Graphs showing the 2012-2014 average and 2015 year end are provided. Also included are graphs showing the outage cause duration and frequency by year from 2011 through 2015.

The 2015 outage duration is approximately **287 hours (17.3%) less** than the 2012-2014 average. The 2014 outage frequency (count) is approximately **48 outages (6.7%) more** than the 2012-2014 average. These numbers reflect a very reliable year at the transmission level. Terminal Equipment, Hardware, and Unknown outage numbers were all down from 2015, with Weather and Tree outages notably up in 2015.

Outage Duration - Hours													
Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	Monthly	20.89	185.73	107.21	105.61	47.40	126.22	218.31	81.36	48.27	44.85	304.05	81.35
2012-2014	Monthly	103.32	92.18	98.97	139.71	155.37	134.41	247.32	176.24	133.91	167.75	87.17	121.48
2015	Cumulative	20.89	206.63	313.84	419.45	466.85	593.07	811.37	892.74	941.00	985.86	1289.90	1371.25
2012-2014	Cumulative	103.32	195.50	294.48	434.19	589.55	723.96	971.27	1147.51	1281.42	1449.17	1536.34	1657.82

Outage Frequency - Count													
Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	Monthly	32.0	64.0	51.0	65.0	66.0	79.0	94.0	115.0	43.0	57.0	44.0	55.0
2012-2014	Monthly	41.7	35.7	45.7	70.7	66.3	91.7	105.0	76.7	59.0	48.3	34.0	42.0
2015	Cumulative	32.0	96.0	147.0	212.0	278.0	357.0	451.0	566.0	609.0	666.0	710.0	765.0
2012-2014	Cumulative	41.7	77.3	123.0	193.7	260.0	351.7	456.7	533.3	592.3	640.7	674.7	716.7

ASAI (Average Service Availability Index) - % Larger is Better													
Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	Monthly	99.990	99.904	99.950	99.949	99.978	99.939	99.898	99.962	99.977	99.979	99.854	99.962
2012-2014	Monthly	99.950	99.952	99.952	99.931	99.925	99.933	99.881	99.915	99.934	99.920	99.957	99.942
2015	Cumulative	99.990	99.949	99.950	99.949	99.955	99.953	99.945	99.947	99.950	99.953	99.944	99.946
2012-2014	Cumulative	99.950	99.951	99.951	99.946	99.942	99.941	99.932	99.930	99.930	99.929	99.932	99.932

SAIFI (System Average Interruption Frequency) – Smaller is Better													
Year		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	Monthly	1.308	2.897	2.085	2.746	2.698	3.327	3.830	4.685	1.810	2.322	1.852	2.241
2012-2014	Monthly	1.754	1.642	1.922	3.077	2.793	3.987	4.419	3.227	2.566	2.031	1.475	1.764
2015	Cumulative	1.308	2.062	2.070	2.239	2.333	2.498	2.694	2.948	2.823	2.772	2.689	2.651
2012-2014	Cumulative	1.754	1.701	1.777	2.101	2.243	2.531	2.807	2.860	2.828	2.747	2.632	2.559

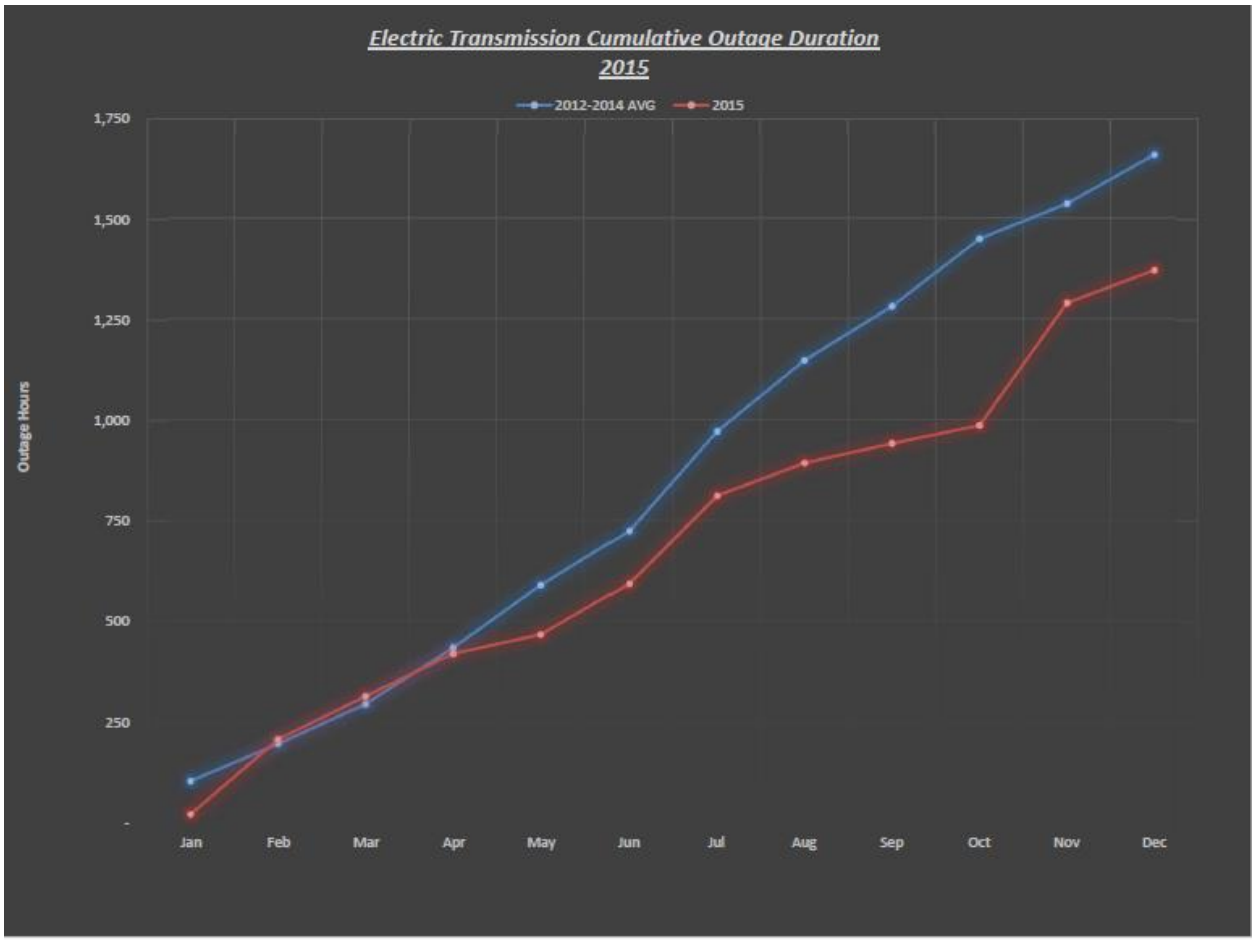


Figure A.1 Electric transmission cumulative outage duration - 2015

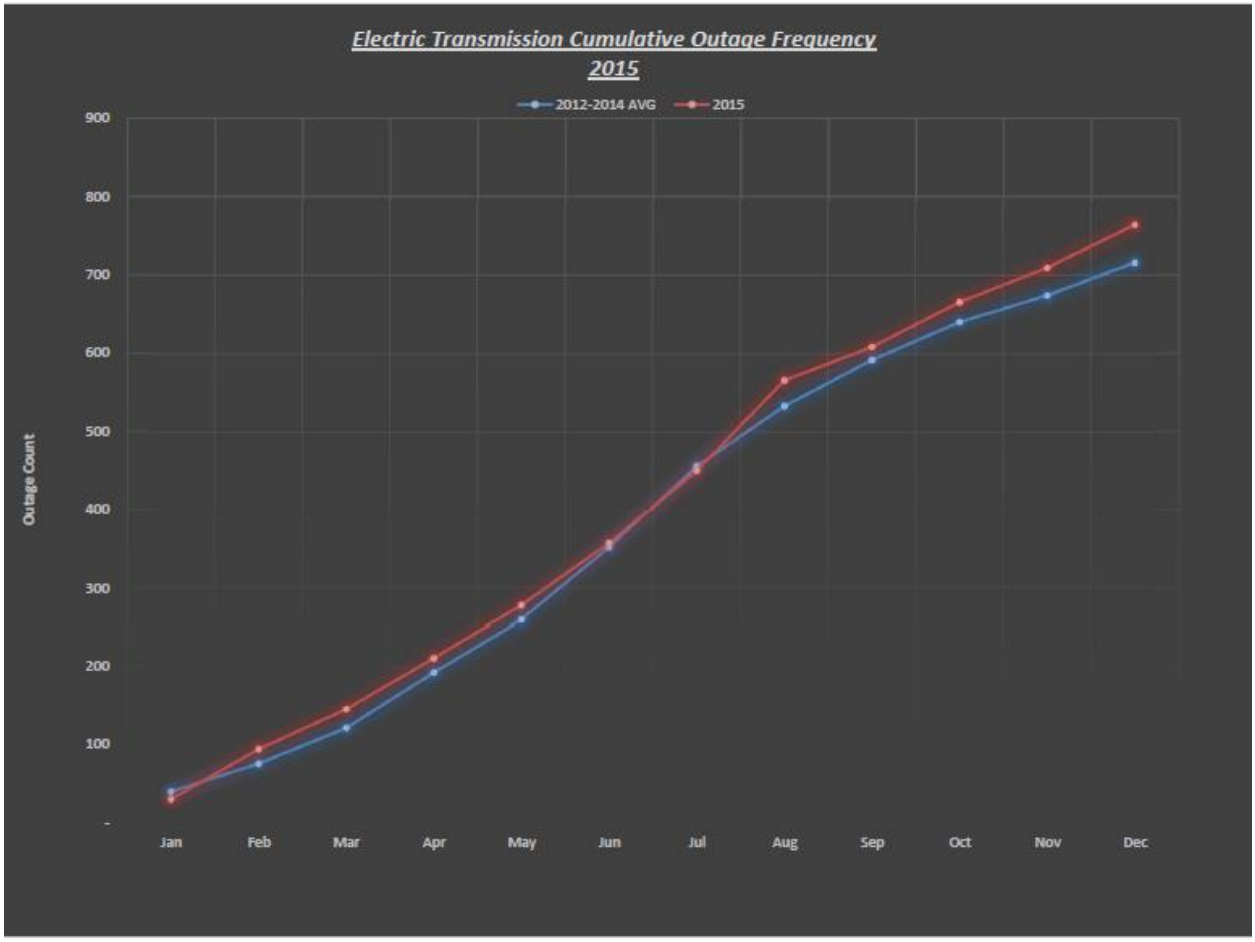


Figure A.2 Electric transmission cumulative outage frequency - 2015

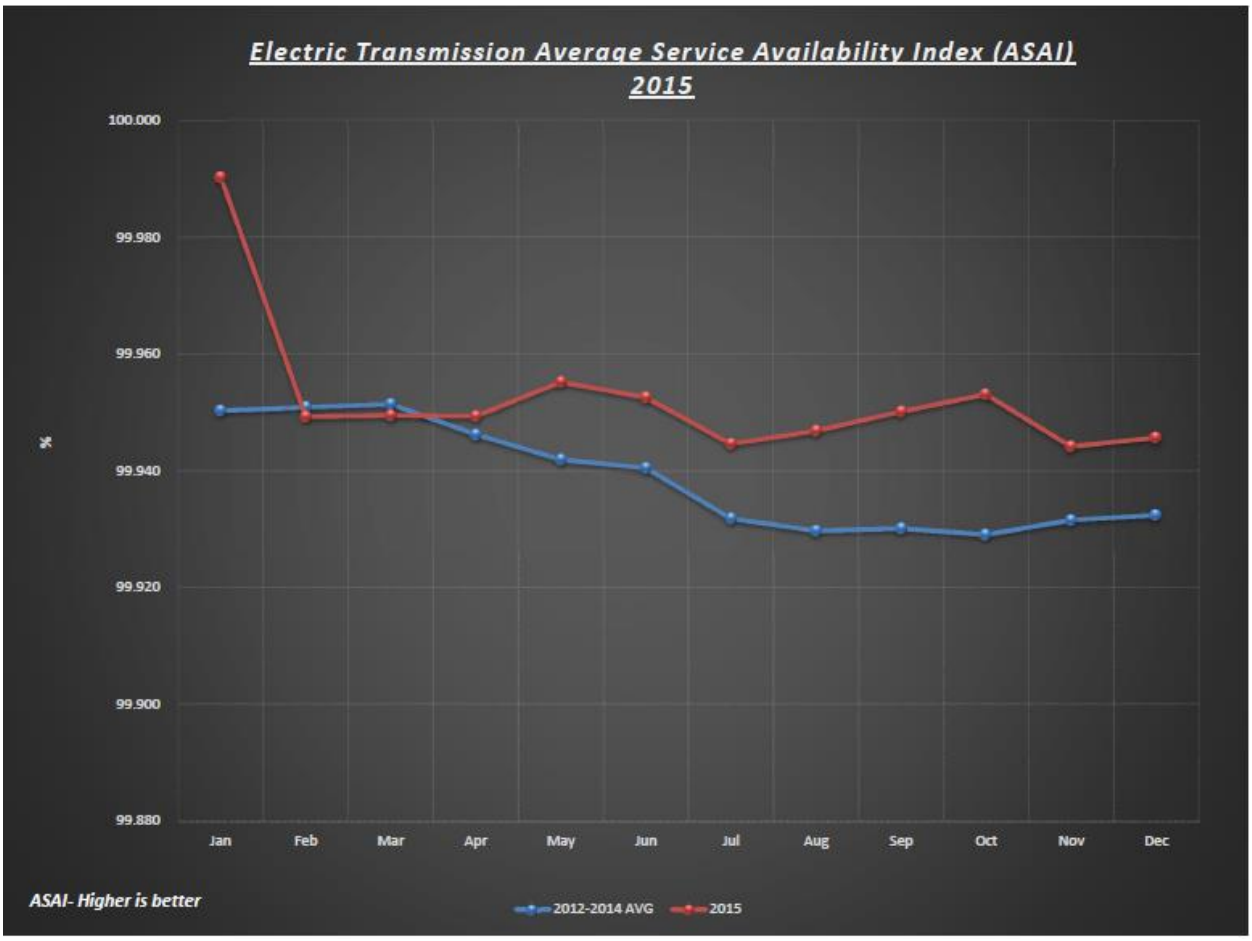


Figure A.3 Electric transmission Average Service Availability Index (ASAI) - 2015

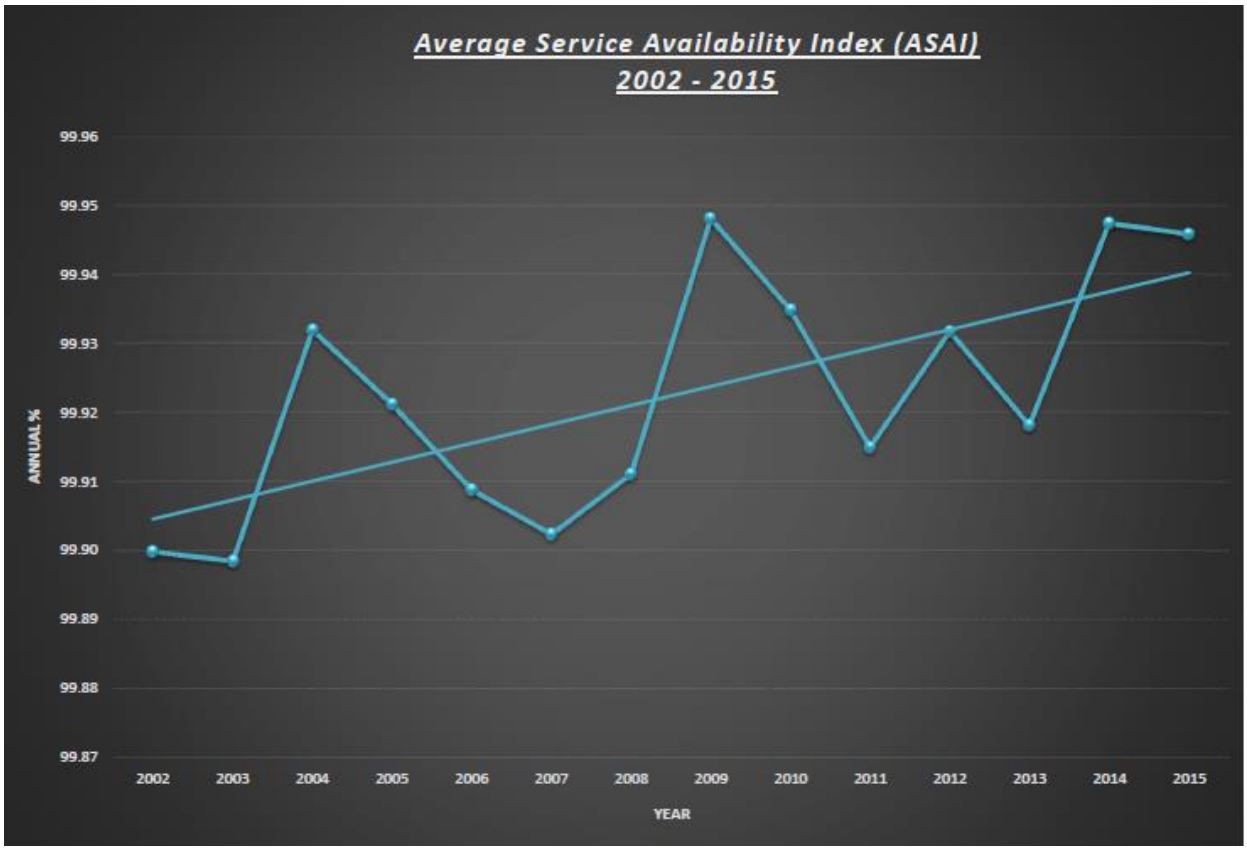


Figure A.4 Electric transmission Average Service Availability Index (ASAI) 2002-2015

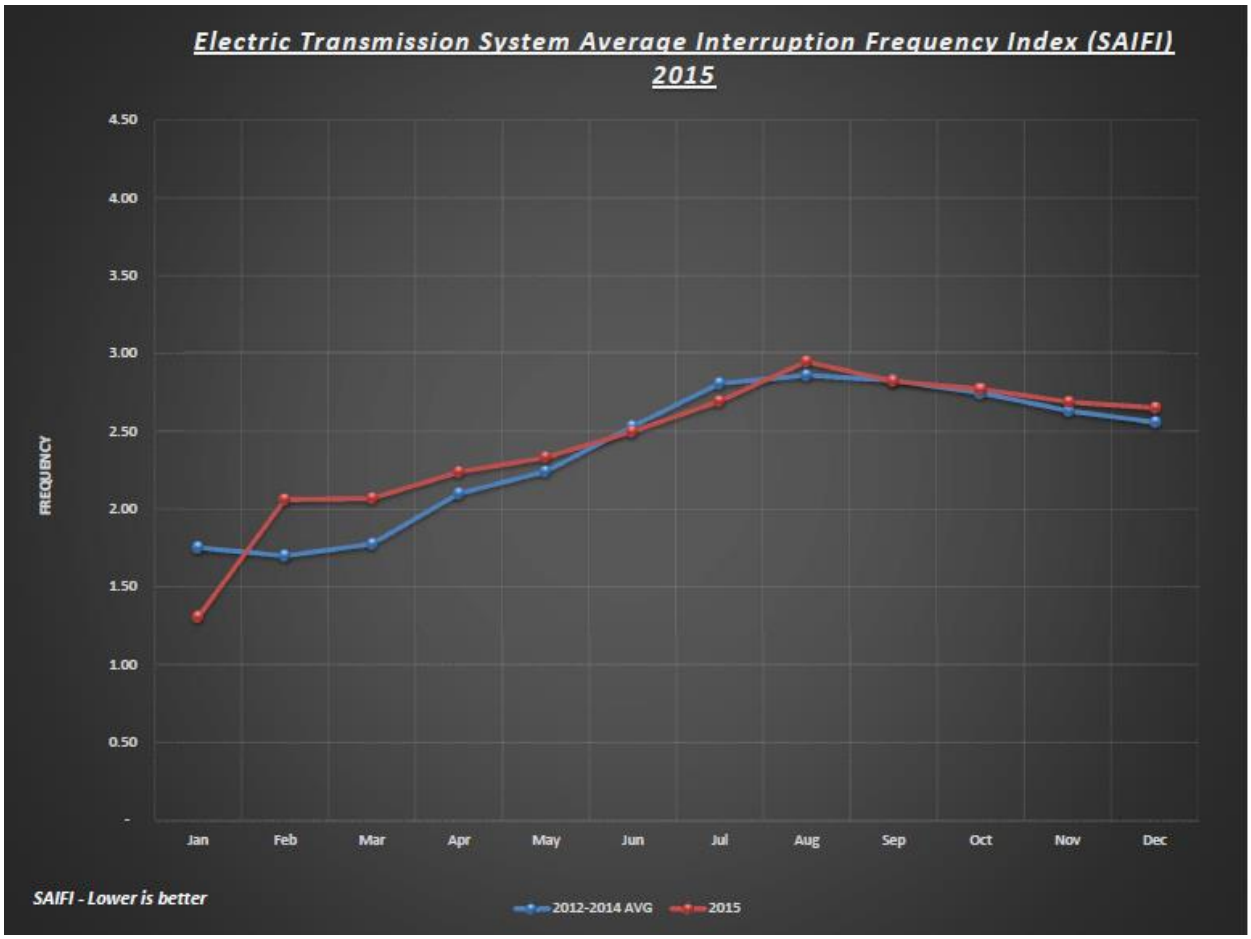


Figure A.5 Elect. Transmission System Average Interruption Frequency Index (SAIFI) - 2015

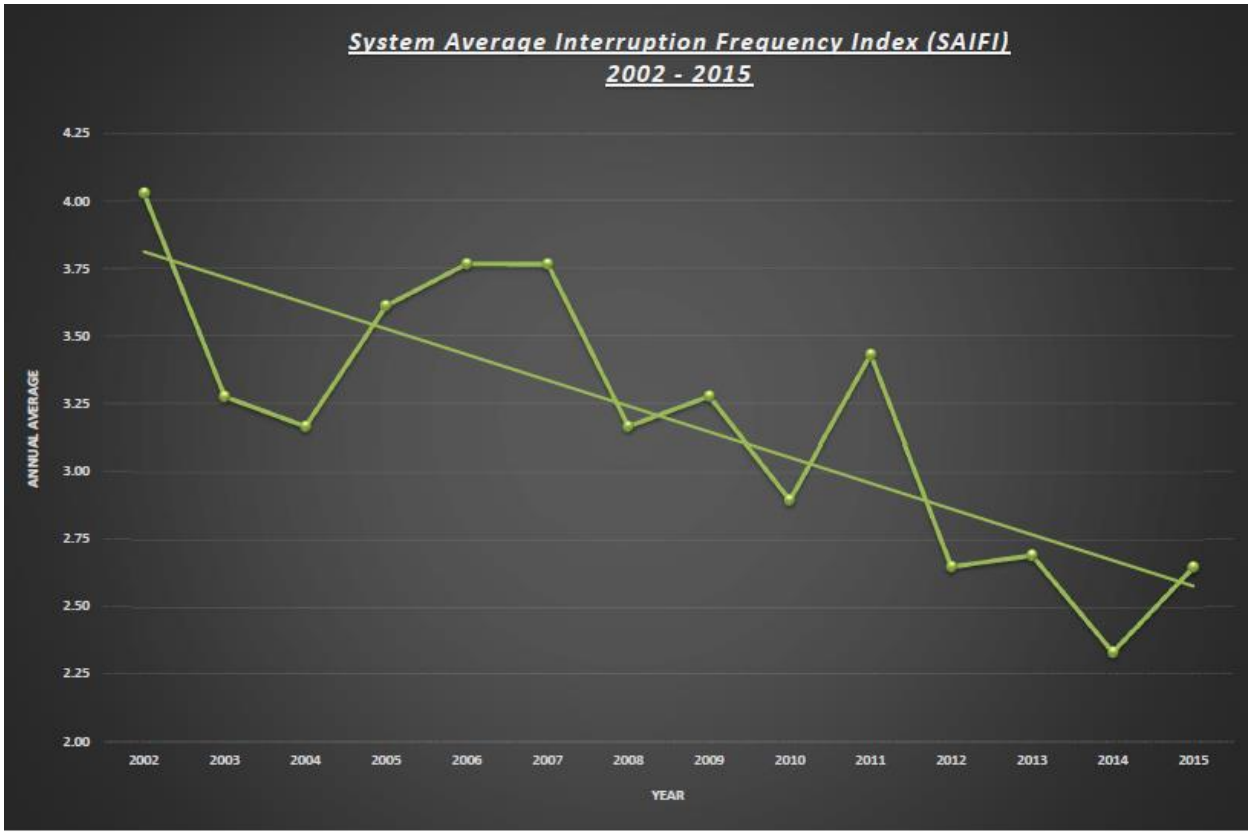


Figure A.6 Elect. Trans. System Average Interruption Frequency Index (SAIFI) 2002 - 2015

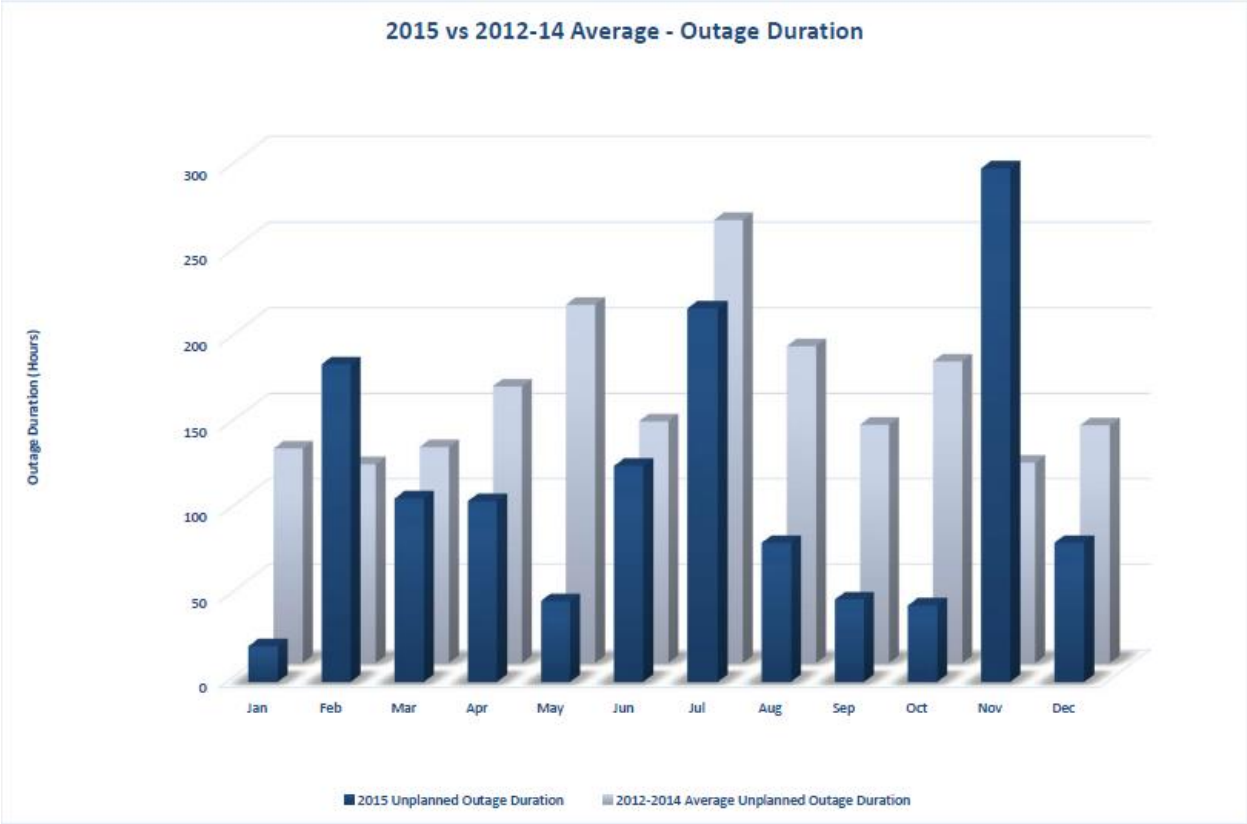


Figure A.7 Comparison of 2015 outage duration to previous three-year average

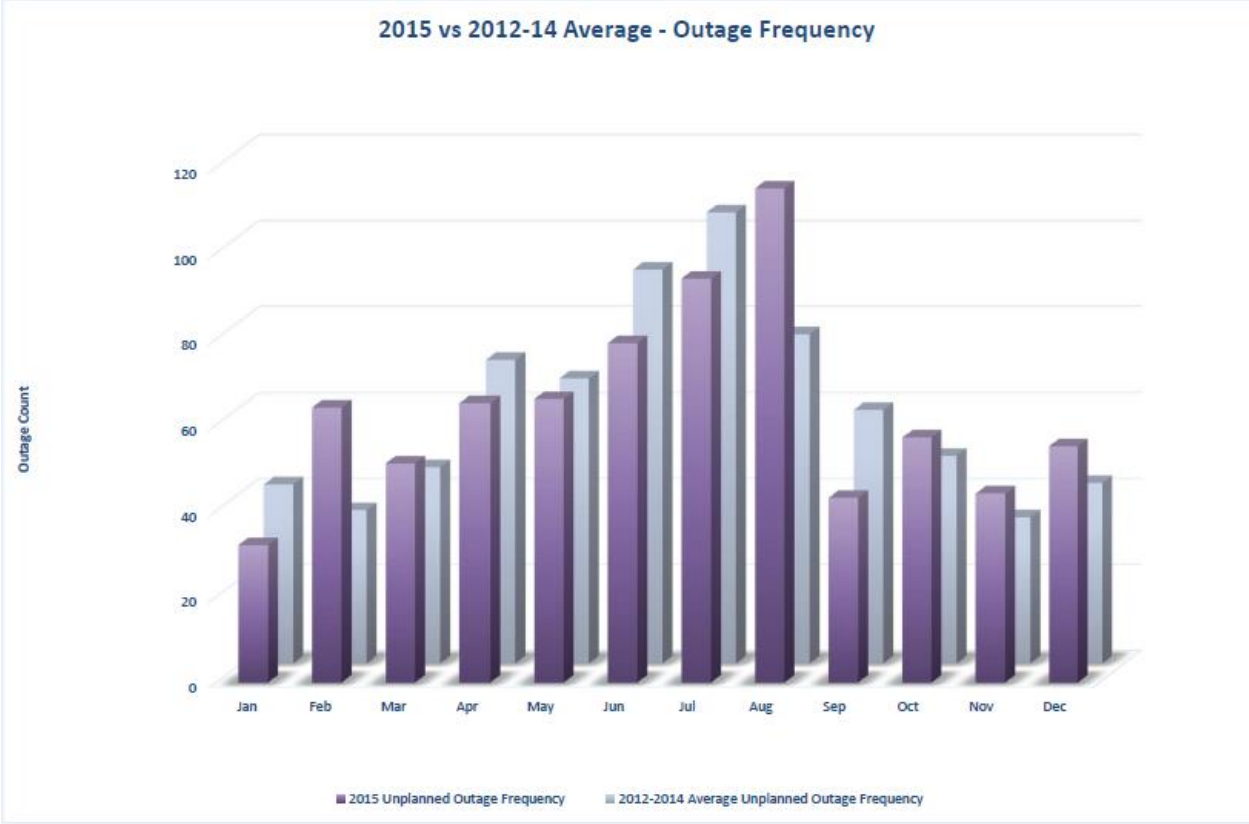


Figure A.8 Comparison of 2015 outage frequency to previous three-year average

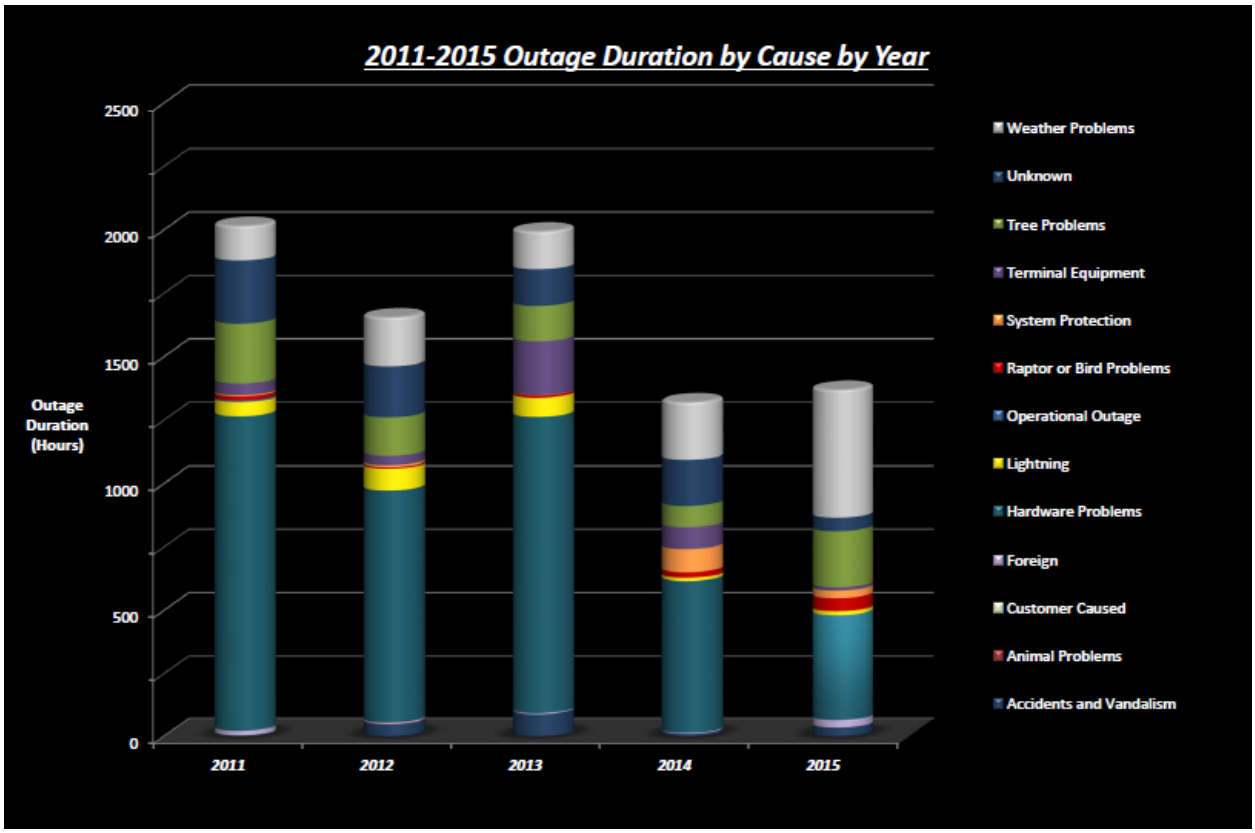


Figure A.9 Outage duration by cause by year for 2011-2015

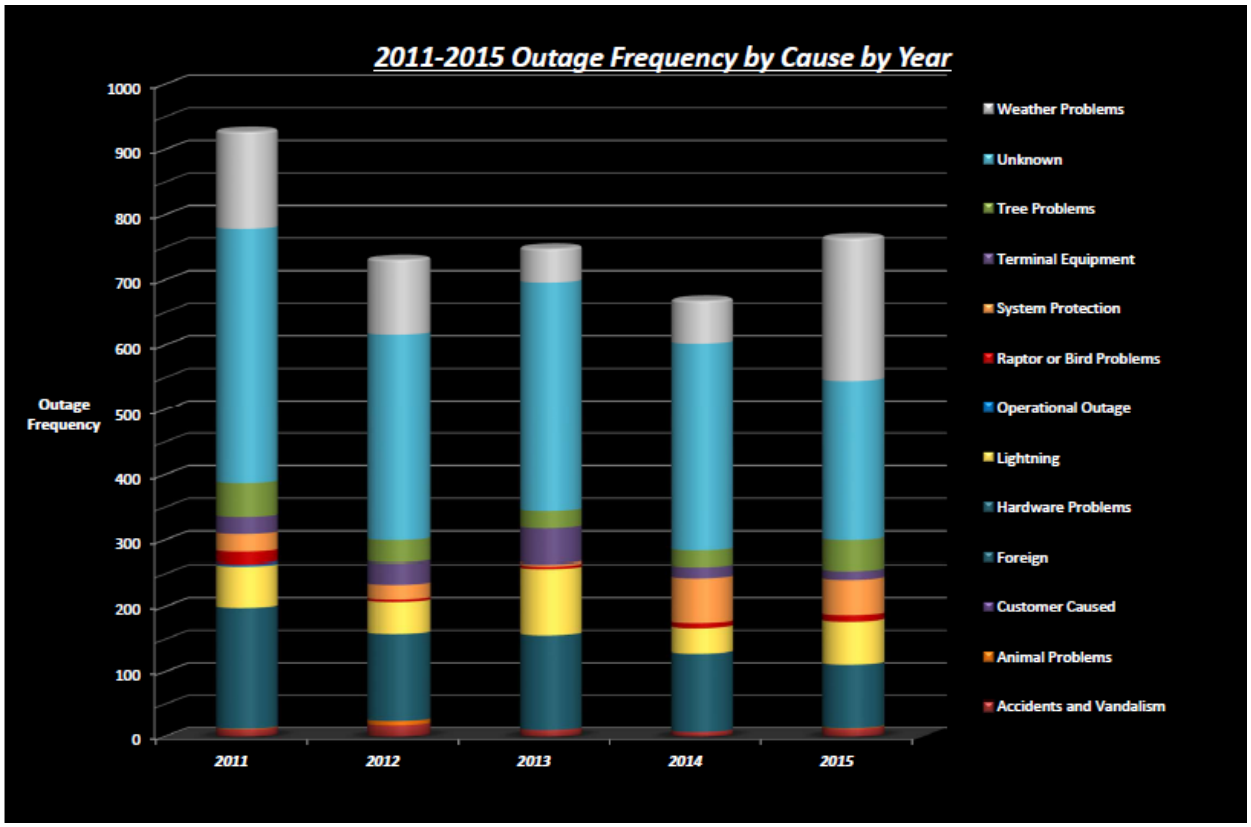


Figure A.10 Outage frequency by cause by year for 2011-2015

CERTIFICATE OF SERVICE

I hereby certify that NorthWestern Energy's 2015 Annual Electric Reliability Report has been hand delivered to the Montana Public Service Commission this date. It has also been e-filed on the MPSC website.

Date: March 1, 2016

Pam LeProwse
Administrative Assistant
Regulatory Affairs