



**2013**

## **Electric Service Reliability Report**

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## **Introduction**

Pursuant to WAC 480-100-398, Avista Corporation dba Avista Utilities (“Avista” or “the Company”) submits its annual Electric Service Reliability Report. The report describes the Company’s reliability monitoring and reliability metrics for 2013. All numbers included in this report are based on system-data. The Company’s system includes 11 geographical divisions with two of those divisions overlapping the Washington and Idaho border leading to a commingling of jurisdictional customers. A map of Avista’s operating area is included on page 58 of this report.

WAC 480-100-393 (3)(b) requires the establishment of baseline reliability statistics. The Company’s baseline statistics are included in this report and compare the current year data to the baseline year of 2005 and years in between. The Company also provides a statistical target that represents an analysis based on an average over a time period and adding two standard deviations. Year to year variations should be below this target, but may provide information that shows continuing trends.

Avista has reported in its previous annual reports that the completion of the transition to the Outage Management Tool (OMT) system had caused an increase in the variability of the data collected from 2001 to 2007. The 2009 Annual Report (UE-100659) indicated that a gradual increase in the SAIFI and SAIDI numbers that cannot be attributed to the transition to the OMT system was occurring. Through 2012, the trend lines for SAIFI and SAIDI were both showing an upward trend. The trend line for SAIFI now shows a slightly downward trend with the inclusion of the 2013 data. The trend line for SAIDI is now showing a very slight upward trend with the inclusion of the 2013 data but has flattened from prior years. The charts on pages 8 and 11 show a trend line for SAIFI and SAIDI historical data.

Continued scrutiny will be important over the next year or two to determine if the rate of increase for SAIFI/SAIDI continues to slow due to the reliability improvement programs implemented from 2010 to 2013.

The 2013 SAIFI and SAIDI reliability indices are slightly higher than the 2005 baseline, which may be due to the under reporting that may have occurred during the transition to OMT in 2005. The 2013 CAIDI index is higher than the 2005 baseline and may be attributable to the nature of the outages seen over the year, namely the higher than average amount of planned interruptions. On another note, the 2013 MAIFI reliability index is below the 2005 baseline.

Avista added a new section beginning in the 2007 annual report (UE-080787) which analyzes the areas where customers are experiencing multiple sustained outages. This section provides analysis of a reliability index called CEMI<sub>n</sub>, which implies Customers Experiencing Multiple sustained Interruptions more than n times.

Avista continues to review its annual baseline reliability statistics in light of operational experience under current regulatory protocol. Avista may modify its baseline statistics as appropriate and will update the Commission accordingly.

## **Definitions**

*“Reliability Statistic”* – Standard Statistics measures and calculation methods are per the IEEE Standard 1366-2003 (or latest version) Titled “IEEE Guide for Electric Power Distribution Reliability Indices”. Same as Reliability Indices.

*“Major event”* – Modified this definition to the IEEE Standard 1366-2012 (or latest version) of Major Event Day (MED), which uses a process “Beta Method” to identify a Major Event Day. The previous definition was “An event that impacts more than 5% of the Company’s customers and causes outages of more than 24 hours in duration in any given division within its territory”.

*“Sustained Interruption”* - An interruption lasting longer than 5 minutes.

*“Momentary Event Interruption”* – An interruption(s) of duration 5 minutes or less. Each event consists of one trip and one reclose operation that occur within 5 minutes. For example, if an interrupting device operates three times and then holds, this would be counted as three events with the number of customers affected as three times the Ni.

*“Baseline reliability statistic”* – Avista will compare its reliability statistics to the year 2005.

*“Reliability Target”* - A statistical method was developed in 2004 for baseline statistics. The method is defined as the average over a specific timeframe and 2 times the standard deviation. For 95% of the time, the Reliability Statistic should be below the target.

*“Customer Complaint”* - When a customer is not satisfied with the Company as it relates to Electric Reliability and makes a complaint directly to a Company representative.

*“Commission Complaint”* – When a customer is not satisfied with the Company as it relates to Electric Reliability and files a complaint directly with the Commission.

## **Data Collection and Calculation Changes**

WAC 480-100-398 (2) requires the Company to report changes made in data collection or calculation of reliability information after initial baselines are set. This section addresses changes that the Company has made to data collection.

### **Data Collection**

Since Avista's Electric Service Reliability Monitoring and Reporting Plan was filed in 2001 (UE-011428), there have been several improvements in the methods used to collect outage data. In late 2001, centralizing the distribution trouble dispatch and data collection function for Avista's entire service territory began. The distribution dispatch office is located in the Spokane main complex. At the end of September 2005, 100% of the Company's feeders, accounting for 100% of the customers, are served from offices that employ central dispatching.

The data collected for 2013 represents the seventh full year of outage data collected through the Outage Management Tool (OMT). For 2013, all data was collected using the "Outage Management Tool" (OMT) based on the Company's Geographic Information System (GIS). The OMT system automates the logging of restoration times and customer counts.

Avista discovered a software coding error that has been within the OMT system since 2002 that caused a small increase in the SAIDI and CAIDI for 2008. Previous years were also evaluated to determine the overall impact to the Avista baseline statistics and at this time Avista is not proposing a change to the baseline numbers. The software error only occurred during very specific outage conditions when a group of customers with an initial outage starting time were "rolled" up into another group of customers that were determined to be part of the first group outage. The second group may have had a later outage starting time. When the first group of customer outage information was rolled up, the original outage starting time was lost and the second group outage starting time was used for both groups of customers instead of using the first outage starting time. The number of customers was counted correctly.

Even as good as the OMT system is at quantifying the number of customers and duration of the outage duration, there still are areas where the data collection is not precise. Determining the exact starting time of an outage is dependent on when a customer calls in, how well the Avista Distribution Dispatcher determines where the outage is and defines the device that has opened to remove the faulted section.

As AMR/AMI metering is implemented in the future and the customer meter provides outage information to the OMT system through an interface, the SAIDI and CAIDI numbers are expected to increase. This is similar to the above discussion.

Use of the OMT system and GIS data has improved the tracking of the numbers of customers without power, allowed for better prioritization of the restoration of service, and the improved dispatching of crews.

### **Interruption Cause Codes**

Cause code information is provided in this report to give readers a better understanding of outage sources. Further, the Company uses cause information to analyze past outages and, if possible, reduce the frequency and duration of future outages.

Since 2011, Avista has stopped using the subcategory “protected” under the “Animal” category. Almost all birds are considered protected, so there is little differentiation between the “Bird” and “Protected” subcategories. Avista will include additional information in the Remarks section as reported from the field personnel.

## Customers Experiencing Multiple Interruptions

The IEEE Standard 1366P-2003 provides for two methods to analyze data associated with customers experiencing multiple momentary interruptions and/or sustained interruptions. Avista’s Outage Management Tool (OMT) and Geographical Information System (GIS) provide the ability to geospatially associate an outage to individual customer service points. This association allows for graphically showing Customers Experiencing Multiple sustained Interruptions ( $CEMI_n$ ) with Major Event Day data included onto GIS produced areas. Data can be exported to MS Excel to also create graphs representing different values of n. 2013 information is provided in the Customer Experiencing Multiple Interruptions (page 22) to summarize the analysis Avista performed on the 2013 outage data. The calculation for  $CEMI_n$  and Customers Experiencing Multiple Sustained and Momentary Interruptions  $CEMSMI_n$  is provided in the Index Calculations section (page 60).

## Major Events

Major Events and Major Event Days as used in this report are defined per the IEEE Guide for Electric Power Distribution Reliability Indices, IEEE P1366-2012. The following definitions are taken from this IEEE Guide.

**Major Event** – Designates an event that exceeds reasonable design and or operation limits of the electric power system. A Major Event includes at least one Major Event Day (MED).

**Major Event Day** – A day in which the daily system SAIDI exceeds a threshold value,  $T_{MED}$ . For the purposes of calculating daily system SAIDI, any interruption that spans multiple calendar days is accrued to the day on which the interruption began. Statistically, days having a daily system SAIDI greater than  $T_{MED}$  are days on which the energy delivery system experienced stresses beyond that normally expected (such as severe weather). Activities that occur on major event days should be separately analyzed and reported.

The Company will use the process defined in IEEE P1366 to calculate the threshold value of  $T_{MED}$  and to determine MED’s. All indices will be reported both including and excluding MED’s. The comparisons of service reliability to the baseline statistics in subsequent years will be made using the indices calculated without MED’s.



**Table 1.1 – 2013 Major Event Days**

<b>Major Event Days</b>	<b>SAIDI (Customer- Minutes)</b>	<b>Cause</b>
2013 Major Event Day Threshold	8.96	
August 25, 2013	24.97	Wind/Lightning
August 26, 2013	11.78	Wind/Lightning
September 15, 2013	14.01	Wind
November 16, 2013	11.09	Wind/Ice

Additional analysis of the 2013 Major Event Days is provided in this Annual Report as was done in previous years in the Major Event Day Causes section on page 53.

### **Customer Complaints**

The Company tracks reliability complaints in two areas, Commission Complaints and Customer Complaints, which are defined in the Definitions section. See the Customer Complaints section on Page 36 for a summary of results for this year.

## System Indices

The charts below show indices for Avista’s Washington and Idaho (“system”) electric service territory by year. Breakdown by division is included later in this report. Each chart shows seven years of data along with the baseline reliability statistic which is highlighted in green. The Company also has calculated a reliability target that is the average over the previous five years plus two standard deviations. This target is shown in yellow on the reliability index charts.

The reliability targets have been adjusted by removing Major Event Days, MED’s, as defined in the previous section.

**Table 2.1 - Reliability Statistic Target by Index**

<b>Index</b>	<b>2007-2013 Average</b> (Excluding Major Events)	<b>2005 Baseline</b>	<b>Reliability Target</b> (Ave + 2 Standard Deviations)
SAIFI	1.25	0.97	1.60
MAIFI	3.44	3.58	5.18
SAIDI	148	108	200
CAIDI	121	112	130

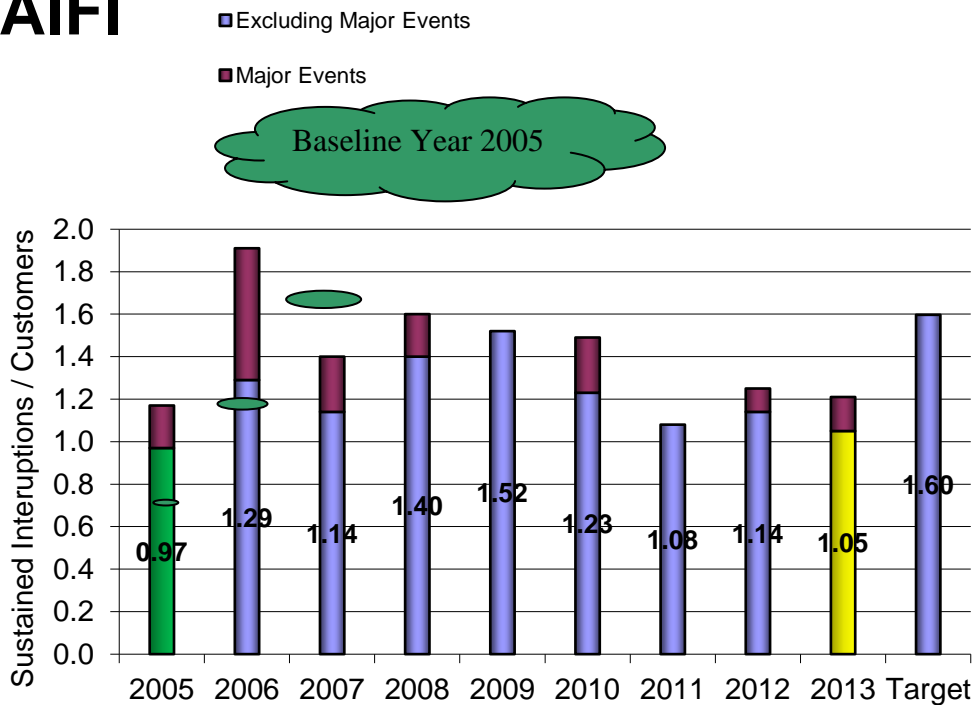
Additional comparisons of the Reliability Indices are provided in the Office Indices section (page 12) and Monthly Indices section (page 34) of this report.

The Company continues to use the definition of major events as described above to be consistent with IEEE Standards. Therefore, the following charts show statistics including the effect of major events per this definition. Both the Baseline Statistic is shown for the year 2005 (green bar), along with the Avista Target Statistic which is shown as the yellow bar.

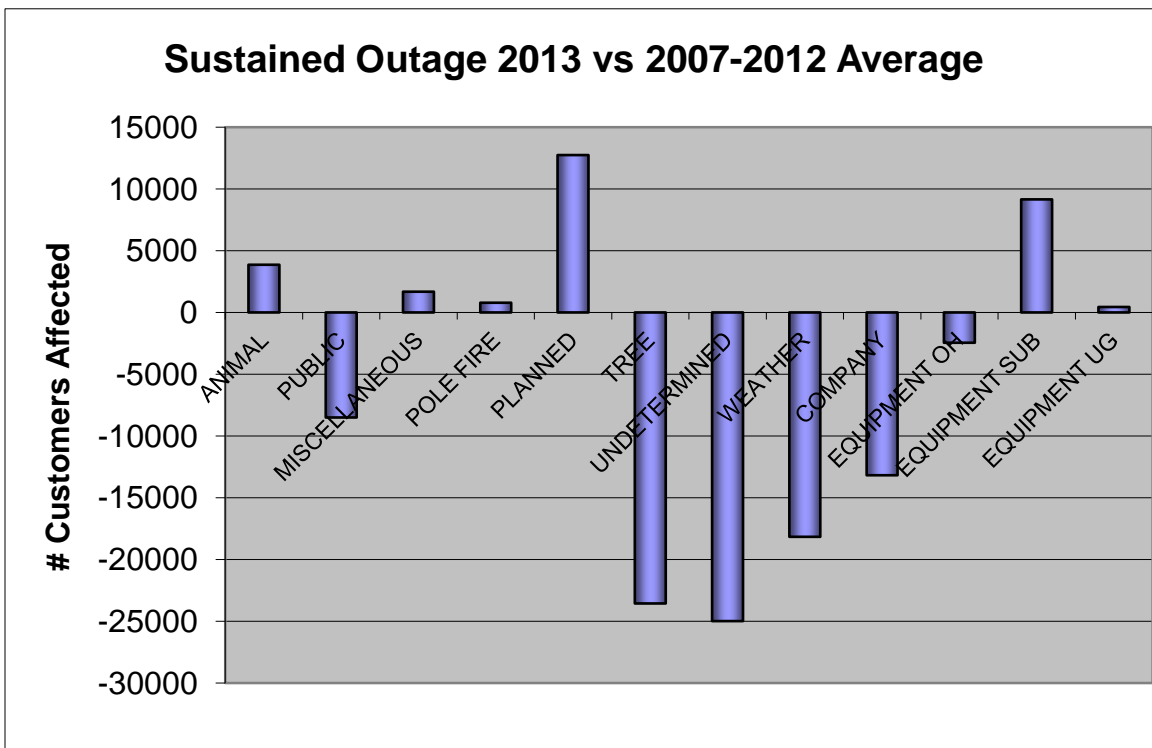
Refer to Attachment 1 – SAIDI and SAIFI Historical Summary for additional historical information.

**Chart 2.1 – SAIFI - Sustained Interruptions / Customer**

# SAIFI



**Chart 2.2 – Sustained Interruptions / Customer Historic Comparison**



SAIFI for 2013 was slightly over the 2005 baseline statistic but represents a decreasing trend. The 2013 SAIFI number is lower than 2012 and similar to 2011 and may represent gains due to Company expenditures specifically targeting reliability. Using a simple linear regression to establish a trend line, it would look like about a -0.007% growth in the number of customers affected. The  $R^2$  coefficient of determination shows a slightly stronger correlation to the data than in 2012. A chart of this analysis has been provided just after this discussion.

There were 77,001 customers affected by sustained outages caused by weather in 2013. This compares to the 2007–2012 average of 95,165 customers and the 2012 level of 103,066 customers.

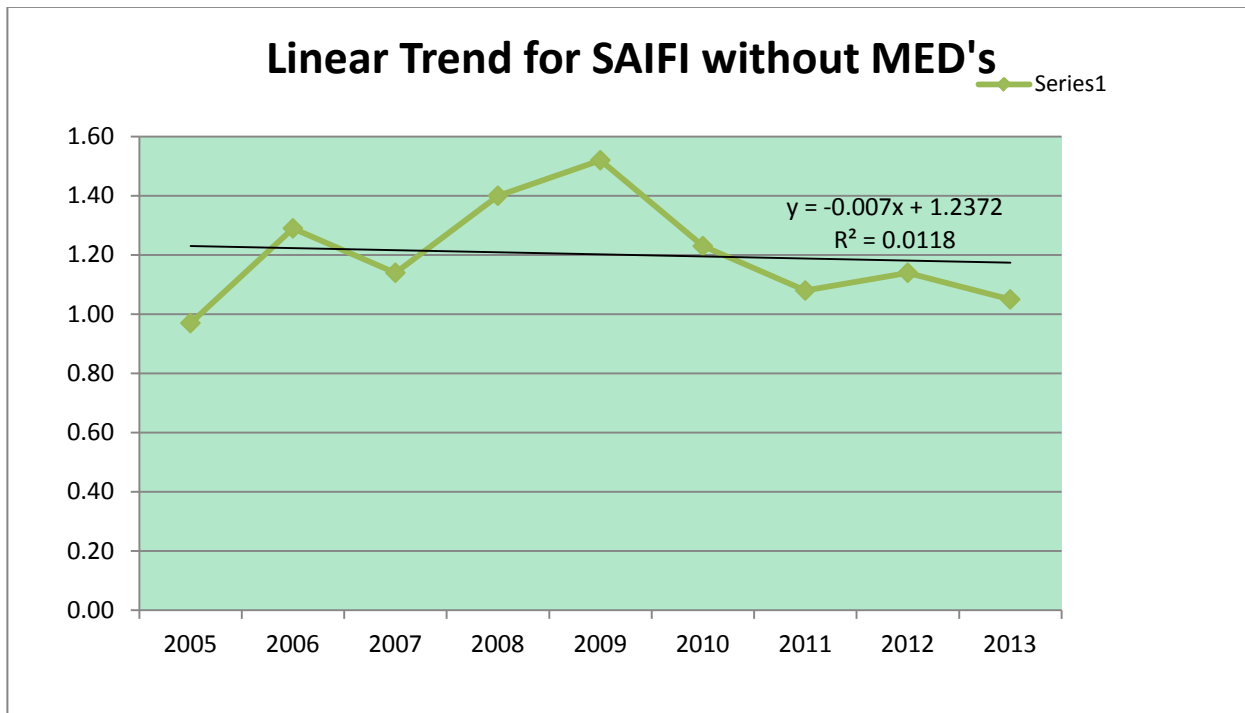
Planned outages numbered 55,035 customers for 2013 as compared to the previous 5-year average of 42,293 customers and also represents as the highest annual total to date.

Public outages affected 50,938 customers as compared to the 2007-2012 average of 39,947 customers.

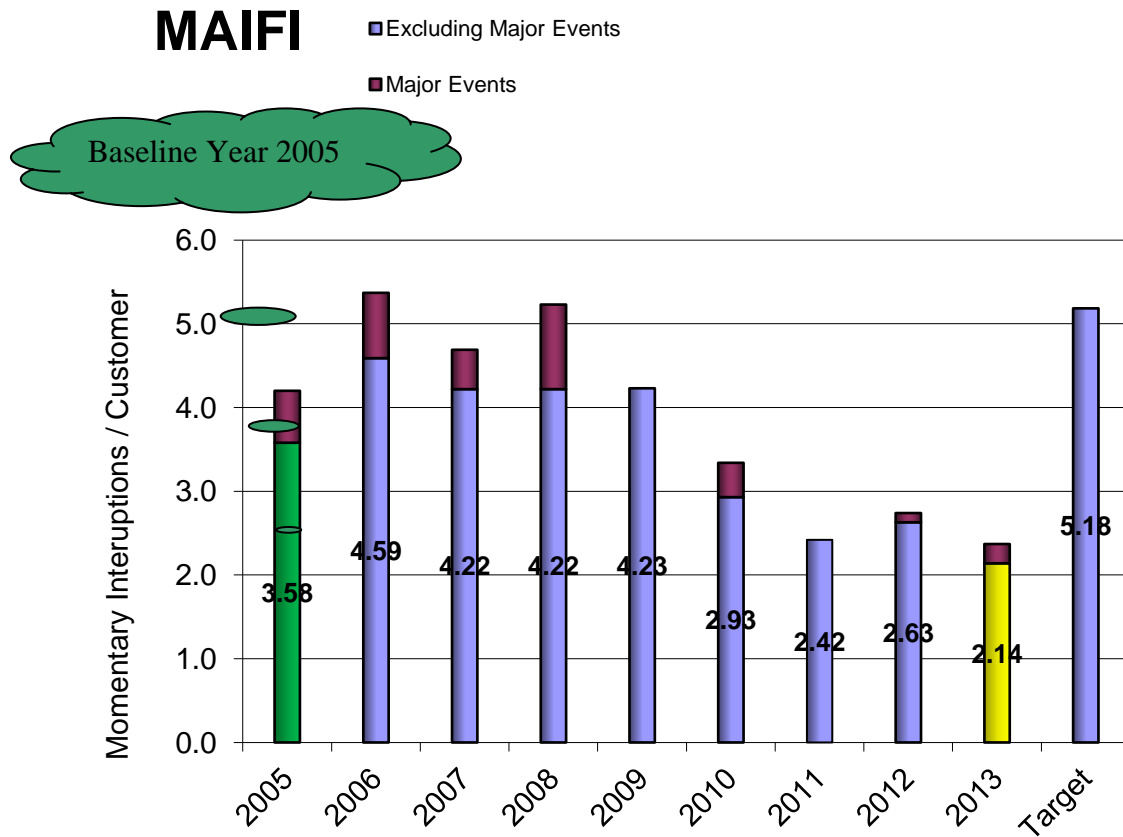
Outages associated with Tree causes affected 30,417 customers as compared to the 2007-2012 average of 53,977.

Undetermined cause outages affected 39,447 customers as compared with the 2007-2012 average of 64,435.

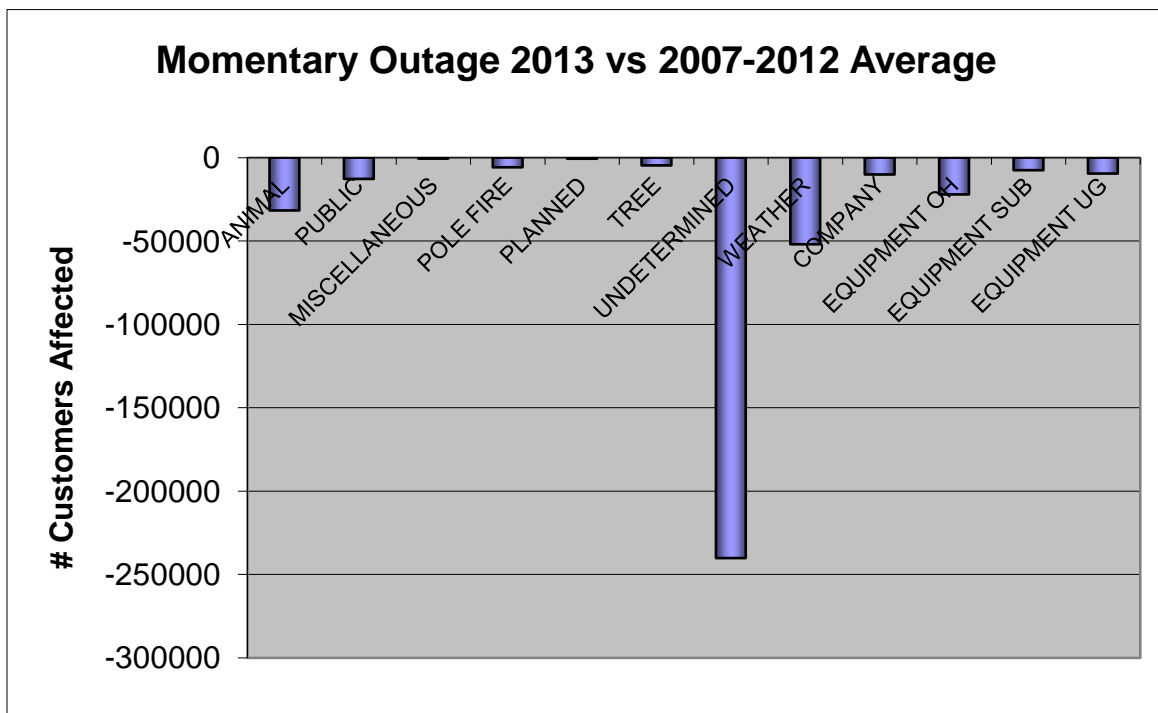
**Chart 2.3 - SAIFI Linear Trend Line Chart**



**Chart 2.4 - MAIFI Momentary Interruption Events / Customer**



**Chart 2.5 – Momentary Interruptions/ Customer Historic Comparison**



The 2013 results for MAIFI show the lowest level we have seen, continuing the downward trend we have seen over the past few years. There was a decrease for 2013 in every category, including a significant reduction in the number of undetermined cause interruptions. This shift may be due to accuracy improvement efforts in Distribution Dispatch. The overall improvements in the MAIFI numbers may be due to tree trimming efforts along with Overhead Equipment replacement and Underground Equipment replacement. Some of the Urban areas have had the instantaneous trip function blocked, which reduces the total feeder customer momentary impacts, but may increase both SAIFI and SAIDI numbers for a few customers located downstream of a fused lateral.

Distribution Dispatch continues to make improvements in correlating the momentary outages with subsequent sustained outages, which reduces the undetermined causes.

**Chart 2.6 - SAIDI – Average Outage Time / Customer**

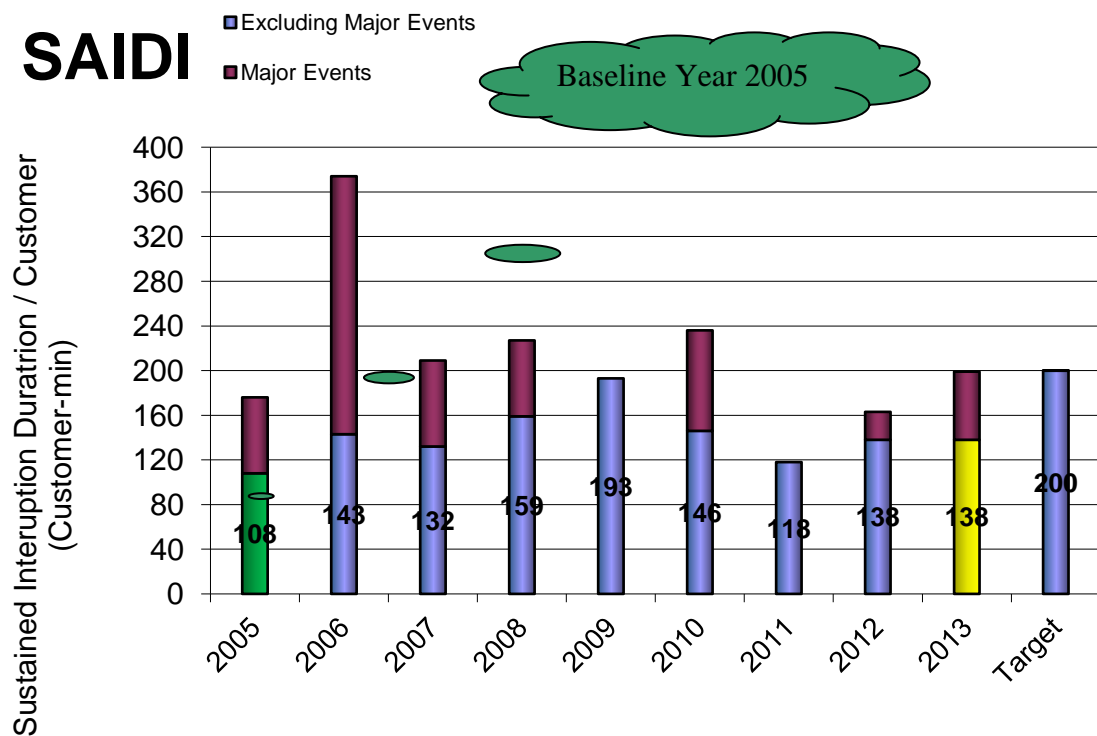


Chart 2.7 - SAIDI Linear Trend Line Chart

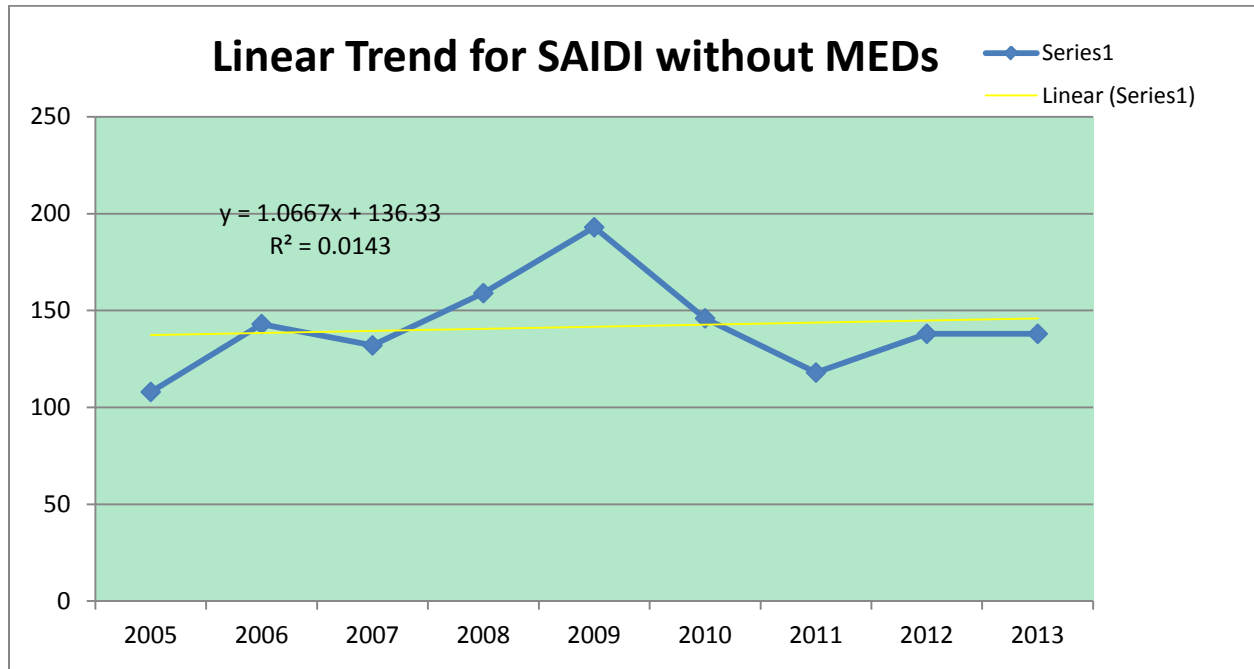
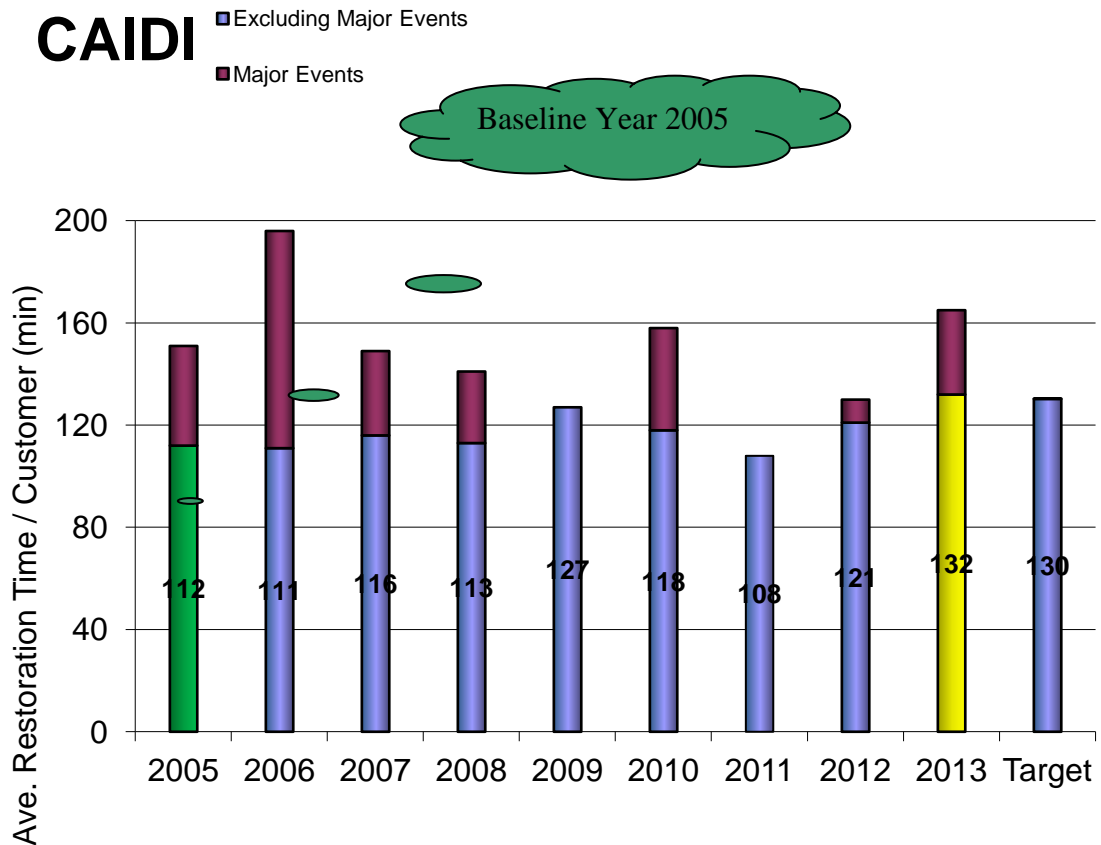
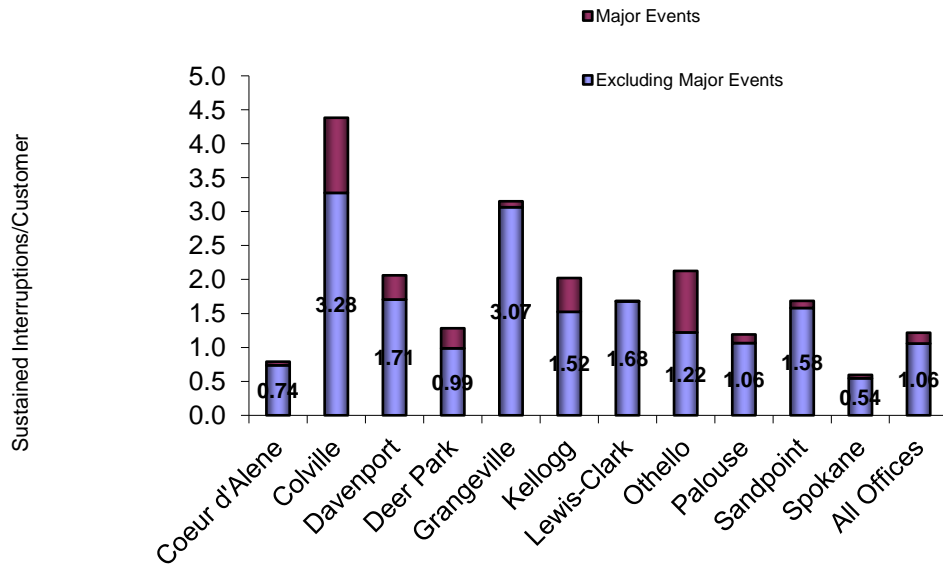


Chart 2.8 - CAIDI – Average Restoration Time

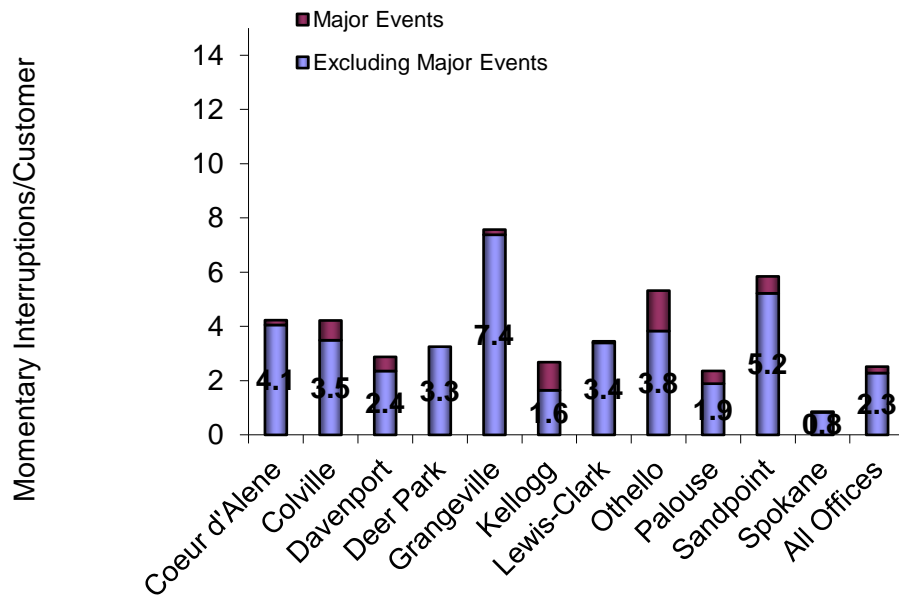


## OFFICE Indices

**Chart 3.1 – SAIFI - Sustained Interruptions / Customer**

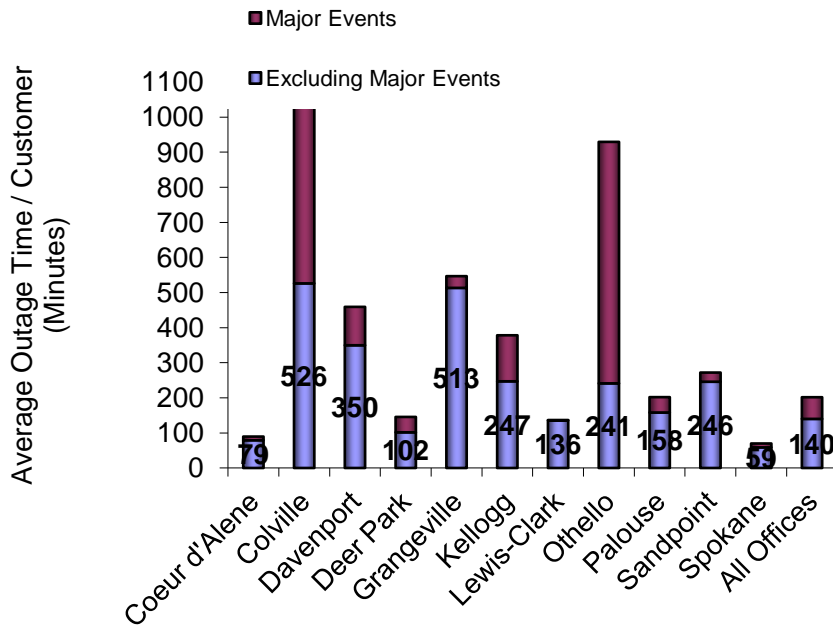


**Chart 3.2 - MAIFI Momentary Interruption Events / Customer**

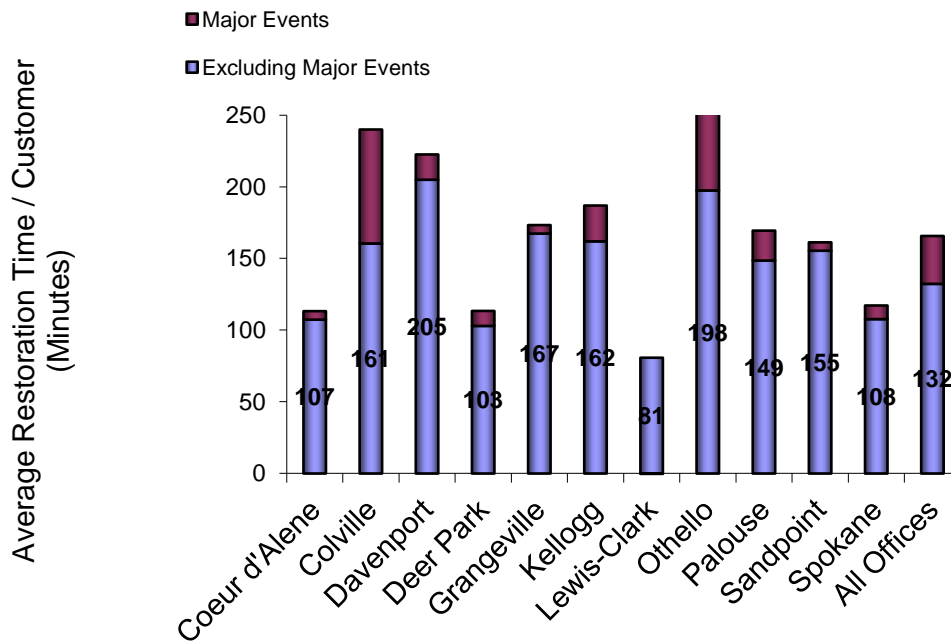




**Chart 3.3 - SAIDI – Average Outage Time / Customer**



**Chart 3.4 - CAIDI – Average Restoration Time**



## **Areas of Concern**

As in previous years, Colville continues to have the lowest reliability of Washington's operating areas. However, the Colville area continues to show improvement over previous years as work plans are implemented. Colville was judged lowest based on its performance in the yearly indices for SAIFI, SAIDI, CAIDI, and MAIFI. Within the Colville area, six feeders were identified as the Areas of Concern for 2013. Additionally one feeder in the Spokane area is included as an area of concern. These feeders are Gifford 34F1, Gifford 34F2, Colville 34F1, Spirit 12F1, Valley 12F1, and Valley 12F3 in the Colville Area, and Opportunity 12F1 in the Spokane area. Valley 12F3 and Opportunity 12F1 are new areas of concern for 2013 while the remaining feeders were also identified in the 2012 report (UE-130649).

## **Cause Information**

Generally, rural areas have a greater number of outages per customer. Colville is predominately rural and most feeders traverse forested areas. There are approximately 2,417 miles of distribution line exposed to weather, underground cable failures and tree problems. Unlike most of the Company's system, lines in this area are built on the narrow, cross-country rights-of-way, typical of PUD construction practices prior to Avista acquiring the system. These conditions make patrolling, tree trimming, rights-of-way clearing and other maintenance difficult. When cost effective, Avista moves sections of these overhead lines to road rights-of-way and/or converts them to underground.

Further, when outages occur in rural areas, the time required to repair damage is longer. More time is required for first responders to arrive and assess the damage and more time is required for the crew to reach the site. Often the damage is off road and additional time is required to transport materials and equipment to the site.

Snow loading on green healthy trees growing beyond the rights-of-way often causes them to bend or break and contact distribution lines. These trees are not cut as part of our vegetation management program because they are outside our rights-of-way and are considered healthy marketable timber.

Listed below is a summary of the specific cause data for each feeder. This is a compilation of data from the Avista OMT and the reporting from our local servicemen to Distribution Dispatch. Data from the reporting system is shown as a percentage of total customer-outages, (SAIFI) for that feeder.

A single, major wind storm was the main factor in Opportunity 12F1 becoming an area of concern in 2013. The storm caused a prolonged outage that affected the entire feeder. This single event represented more than 60 percent of the total customer hours interrupted on the feeder for the year. It is believed that this is an isolated incident and that the reliability indices will normalize in the future.

#### Gifford 34F1

ANIMAL	5.0%
COMPANY	6.0%
MISCELLANEOUS	4.0%
POLE FIRE	0.5%
PUBLIC	0.1%
TREE	5.7%
UNDETERMINED	8.9%
WEATHER	11.4%
EQUIPMENT OH	27.2%
EQUIPMENT UG	0.0%
EQUIPMENT SUB	0.0%
PLANNED	31.1%

#### Gifford 34F2

ANIMAL	0.3%
COMPANY	0.0%
MISCELLANEOUS	0.0%
POLE FIRE	16.2%
PUBLIC	0.0%
TREE	5.9%
UNDETERMINED	7.4%
WEATHER	17.9%
EQUIPMENT OH	0.9%
EQUIPMENT UG	0.0%
EQUIPMENT SUB	0.0%
PLANNED	51.4%

#### Colville 34F1

ANIMAL	0.2%
COMPANY	0.0%
MISCELLANEOUS	0.0%
POLE FIRE	0.5%
PUBLIC	8.1%
TREE	16.4%
UNDETERMINED	2.1%
WEATHER	41.3%
EQUIPMENT OH	23.7%
EQUIPMENT UG	0.7%
EQUIPMENT SUB	0.0%
PLANNED	7.1%

#### Spirit 12F1

ANIMAL	0.0%
COMPANY	0.0%
MISCELLANEOUS	0.0%
POLE FIRE	0.0%
PUBLIC	0.0%
TREE	35.6%
UNDETERMINED	0.3%
WEATHER	9.9%

EQUIPMENT OH	4.8%
EQUIPMENT UG	0.1%
EQUIPMENT SUB	0.0%
PLANNED	49.3%

#### Valley 12F1

ANIMAL	15.7%
COMPANY	0.0%
MISCELLANEOUS	0.0%
POLE FIRE	0.0%
PUBLIC	0.3%
TREE	2.6%
UNDETERMINED	3.6%
WEATHER	1.7%
EQUIPMENT OH	15.2%
EQUIPMENT UG	0.0%
EQUIPMENT SUB	15.2%
PLANNED	45.6%

#### Valley 12F3

ANIMAL	15.8%
COMPANY	0.0%
MISCELLANEOUS	0.0%
POLE FIRE	0.0%
PUBLIC	10.7%
TREE	0.2%
UNDETERMINED	0.0%
WEATHER	1.7%
EQUIPMENT OH	23.0%
EQUIPMENT UG	0.1%
EQUIPMENT SUB	0.0%
PLANNED	48.4%

#### Opportunity 12F1

ANIMAL	0.0%
COMPANY	0.0%
MISCELLANEOUS	0.0%
POLE FIRE	0.0%
PUBLIC	34.6%
TREE	1.1%
UNDETERMINED	0.2%
WEATHER	62.2%
EQUIPMENT OH	1.9%
EQUIPMENT UG	0.0%
EQUIPMENT SUB	0.0%
PLANNED	0.0%

## Colville Area Work Plans

The improvement work that has been accomplished or planned for each feeder is listed below. The Company's reliability working group is continuing to study these feeders to develop additional work plans. Each of the identified feeders also had planned outages that correspond to the maintenance and replacement activities in the area.

### Gifford 34F1

- Storm damage to lines led an effort to reconductor sections to 2/0 ACSR in 2012.
- A recloser is budgeted to be installed in 2014/2015 that will allow for better sectionalizing between the northern and southern sections of the feeder during outage events.
- \$167k is budgeted in 2014 to replace 2 miles of overhead distribution line with underground cable.

### Gifford 34F2

- Due to Cultural review issues on some of the Tribal lands only 3,000 feet of OH conductor was replaced in 2010. Continued work and negotiations for the remaining 5,000 feet occurred in 2011. Final work was completed in 2012.
- Vegetation Management work planned for 2012 was re-prioritized to 2011 after circuit assessment showed a large number of dead or dying trees within radius of contact of our lines. Line clearance crews trimmed 651 trees and removed 867 trees in 2011.
- \$167k is budgeted in 2014 to reconductor 2 miles of overhead distribution line.

### Colville 34F1

- Vegetation Management crews were called to trim 3 trees and remove 59 trees as "unplanned" work on this circuit in 2011. A fall 2011 assessment of this circuit showed a significantly high mortality rate of trees within radius of contact of lines on the feeder. A line clearance crew began Risk Tree mitigation work on this circuit in February, 2012.
- \$100k was budgeted in 2011 to replace outage prone overhead sections with URD cable.
- \$62k was budgeted to install wild life guards in 2011. Approximately 65% of the CLV12F1 feeder was completed in 2011. Remaining work was completed in 2012.
- \$250k was budgeted in 2013 to replace overhead line sections with URD cable to reduce tree exposure. Work was completed in 2013.
- \$50k was budgeted in 2013 to install a recloser to allow for better outage sectionalizing. Work was completed in 2013.

### Spirit 12F1

- Feeder is scheduled to be part of the Grid Modernization program for 2014. Feeder will have reconductor and fusing work performed as well as other upgrades that may improve reliability.

### Valley 12F1

- No work scheduled for 2014.

### Valley 12F3

- No work scheduled for 2014.

**Table 4.1 - Colville Area Major Reliability Projects by Feeder**

<b>Feeder</b>	<b>Decisions/ basis</b>	<b>2014</b>	<b>2015 and Beyond</b>
Gifford 34F1	Reliability improvements	Reconfigure to install recloser	No work planned in the next 5 years.
Gifford 34F2	Reliability improvements	No work planned	No work planned in the next 5 years.
Colville 34F1	Reliability improvements	Underground Cable conversion, install recloser	No work planned in the next 5 years.
SPI12F1	Reliability Improvements	Grid Modernization Program Feeder	Finish Grid Modernization in 2015
Valley 12F1	Reliability Improvements	No work planned.	No work planned in the next 5 years.
Valley 12F3	Reliability Improvements	No work planned.	No work planned in the next 5 years.

**Table 4.2 - Colville Area Historical & Proposed Future Reliability Projects by Feeder**

<b>Feeder Name</b>	<b>Last WPM Insp.</b>	<b>Proposed WPM Inspection</b>	<b>Proposed WPM Follow-up</b>	<b>Transformer Change-outs</b>	<b>Last Veg. Mgmt.</b>	<b>Veg. Mgmt. Proposed Year</b>	<b>Wildlife Guards Proposed Year</b>
GIF34F1	2011-2014	25% per year for 4 yrs	25% in 2012 25% in 2013 25% in 2014 25% in 2015	18 in 2014	2009	2015	Last 2011 N/A on Proposed
GIF34F2	1995	Past 2018 Plan AM will need to project	N/A	69 in 2013/2014	2011	2016	N/A
CLV34F1	2007	2027 20 year cycle	2028	49 in 2015	2007	2013	Last 2011 N/A on Proposed
VAL12F1	2010	2030 20 year cycle	Completed in 2011 (except for WSDOT ROW poles)	188 in 2013/2014	2010	2016	N/A
SPI12F1	2013	2033 20 year cycle	Grid Modernization Project	6 in 2013	2011	2016	N/A
VAL12F3	1998	2019 20 year cycle	2020	22 changed out since 2010 38 more by end of 2016	2010	2015	N/A

## Avista System Wide Work Plans

Material records show that some wildlife guards were installed on new distribution transformer installations starting in the mid 1980's. With the recognition of increases in animal caused outages, new materials and improvements have been made in the construction standards for new distribution transformer installations to reduce these types of outages. Initial indications show that the outage reduction on a feeder after wildlife guards are installed is significant.

2009 was the start of the multiyear wildlife guard installation program to reduce the squirrel and bird related outages on approximately sixty feeders in Washington and Idaho. Most of the wildlife guards were installed with a hot stick on existing transformers that do not have an existing wildlife guard.

Avista installed a total of 1,570 wildlife guards on 15 feeders in 2013. The chart below shows the effectiveness of the wildlife guard program in reducing squirrel related outages.

Chart 4.1 – Squirrel Related Events

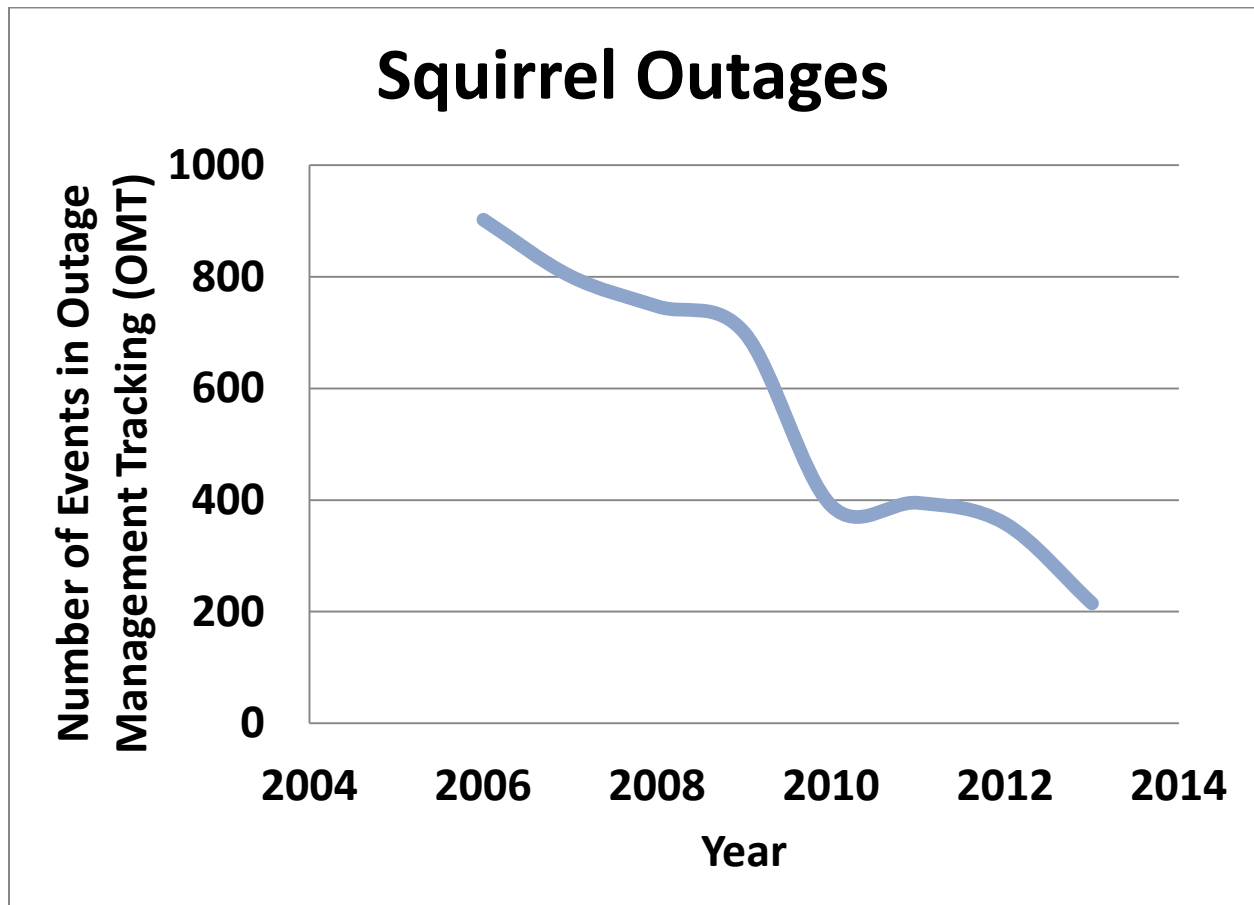
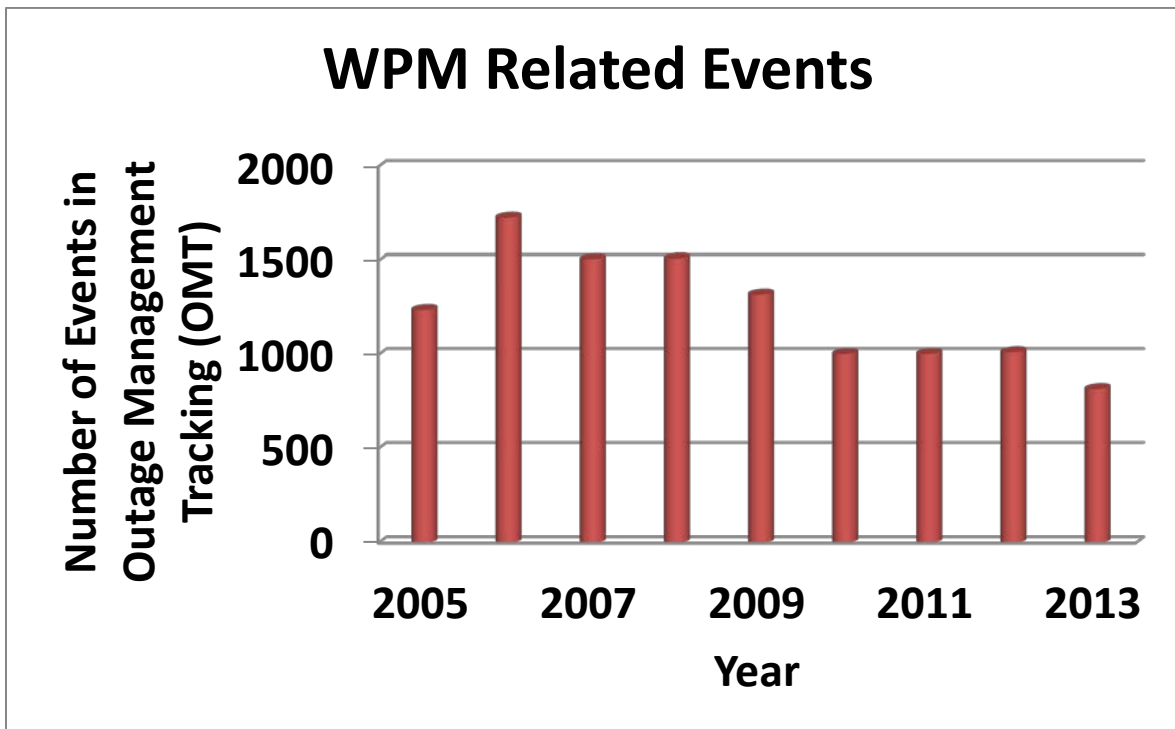
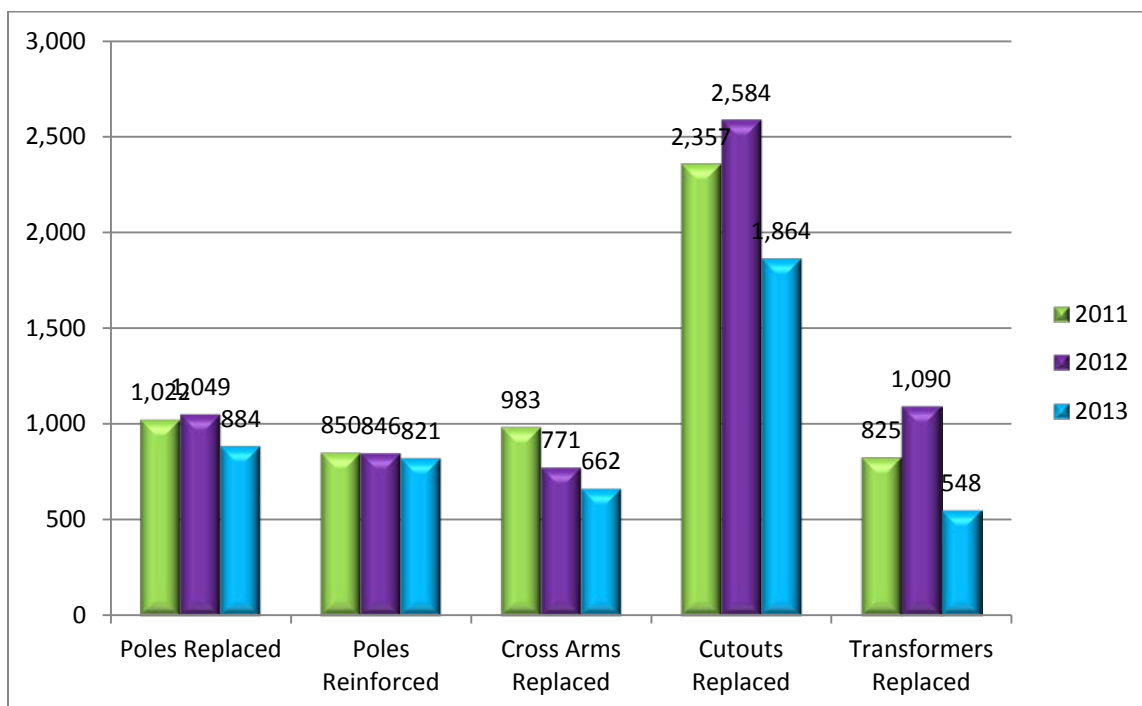


Chart 4.2 – Wood Pole Management Related Events



Asset Management in conjunction with the Wood Pole Management Program over the last three years has stubbed/reinforced or replaced numerous poles, replaced numerous pole top transformers and associated cutouts/arresters. The impacts of the program are shown in the chart above. Below is a chart that summarizes the Wood Pole Management activities.

Chart 4.3 – Wood Pole Management Actions





## **Avista Grid Modernization Program**

### Grid Modernization Program Overview

Avista has initiated a Grid Modernization Program that is designed to reduce energy losses, improve operation, and increase the long-term reliability of its overhead and underground electric distribution system. The program will include replacing the following item: poles, transformers, cross arms, arresters, air switches with steel arms, grounds, cutouts, riser wire, insulators, and conductors to address concerns related to age, capacity, high electrical resistance, strength, and mechanical ability. Changes, including the addition of wildlife guards, smart grid devices, switch capacitor banks, balancing feeders, removing unauthorized attachments, replacing open wire secondary, and reconfigurations are included in the Program.

### Grid Modernization Program Objectives

- Safety – Focus on safe practices for crew work by designing work plans to avoid safety risks.
- Reliability – Replacing aging and failed infrastructure that has a high likelihood of creating an unplanned crew call-out.
- Energy Savings – Replace equipment that has high energy losses with new equipment that is more energy efficient and improve the overall feeder energy performance.
- Operational Ability – Replace conductor and equipment that hinders outage detection and install smart grid devices that enable isolation of outages.

## **Avista System Wide Vegetation Management Plan**

Avista has an annual vegetation management plan and budget to accomplish the plan. The budget is allocated into distribution, transmission, administration, and gas line re-clearing.

### Distribution

Avista's distribution system is managed by Avista's Utility Arborist. Every distribution circuit is scheduled to be line clearance pruned on a regular maintenance cycle of five years. The program also identifies risk trees system wide every two years. Risk tree management includes:

- Improved mid-cycle (two to three years after planned maintenance work is completed) Risk Tree assessment and mitigation on circuits in our more heavily vegetated areas (such as the Colville Division).
- Herbicide program to assess and address needed work on each circuit over a five year cycle (three years after line clearance work performed).

### Transmission

The transmission system is managed by Avista's forester. All 230 kV lines are patrolled annually for hazard trees and other issues, and mitigation is done in that same year. Approximately one third of the 115 kV transmission system is patrolled annually for hazard tree identification and assessment of right-of-way clearing needs. Right-of-way clearing maintenance is scheduled and performed approximately every ten to fifteen years (for each line). Interim spot work is done as identified and needed. Engineering specifications for various voltages, line configurations are followed when clearing the right-of-way. Currently, the work is bid to a variety of contractors.

## Customers Experiencing Multiple Interruptions

Avista has used the data from the OMT system integrated with the GIS system to geospatially display reliability data for specific conditions. The specific conditions imply looking at the number of sustained interruptions for each service point (meter point). This would be similar to the SAIFI index, but would be related to a certain number of sustained interruptions. Avista includes all sustained interruptions including those classified under Major Event Days. This provides a view of what each customer on a specific feeder experiences on an annual basis. Momentary Interruptions are not included in the CEMI<sub>n</sub> index because by IEEE definition only applies to sustained outages. Other Momentary Indices are not included because of the lack of indication at many rural substations and line locations.

The first chart below provides a view of the percentage of customers served from the Avista system that have sustained interruptions. 72.8 % of Avista customers had one or fewer sustained interruptions and 3.1% of Avista customers had six or more sustained interruptions during 2013.

The remaining geographic plots show the sustained interruptions by color designation according to the legend on each plot for each office area. Note the office area is designated as the area in white for each plot and that there is overlap between adjacent office area plots. The adjacent office areas are shown in light yellow.

The plots provide a quick visual indication of varying sustained interruptions, but significant additional analysis is required to determine underlying cause(s) of the interruptions and potential mitigation.

**Chart 5.1 - Avista Service Territory - CEMI<sub>n</sub>**

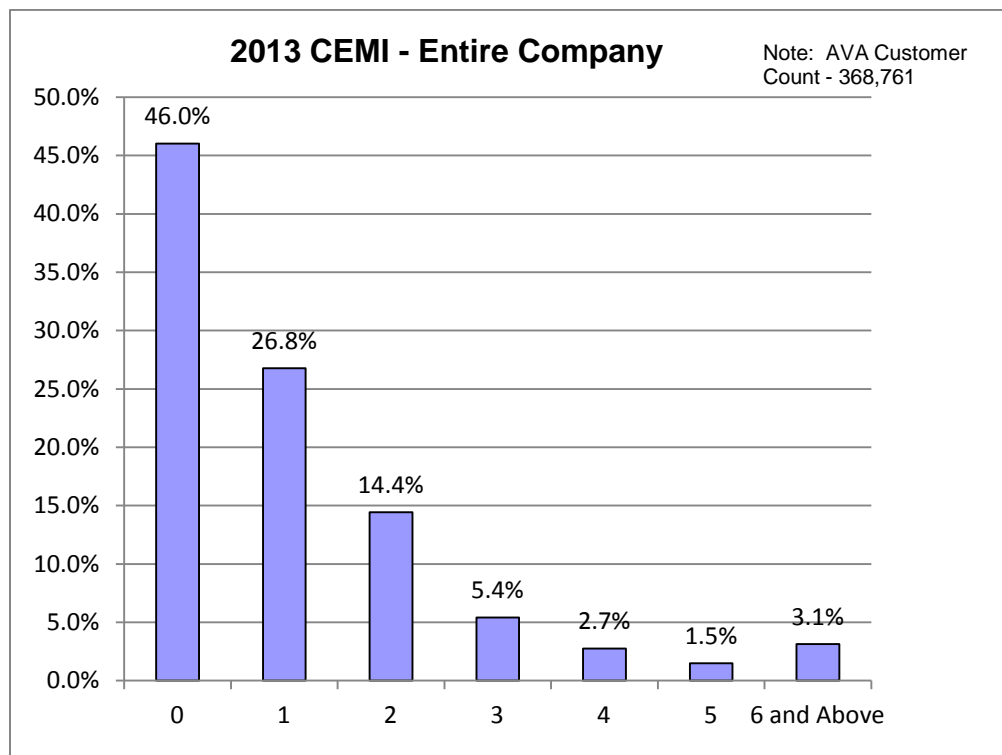


Chart 5.2 - Colville Office - CEMI<sub>n</sub>

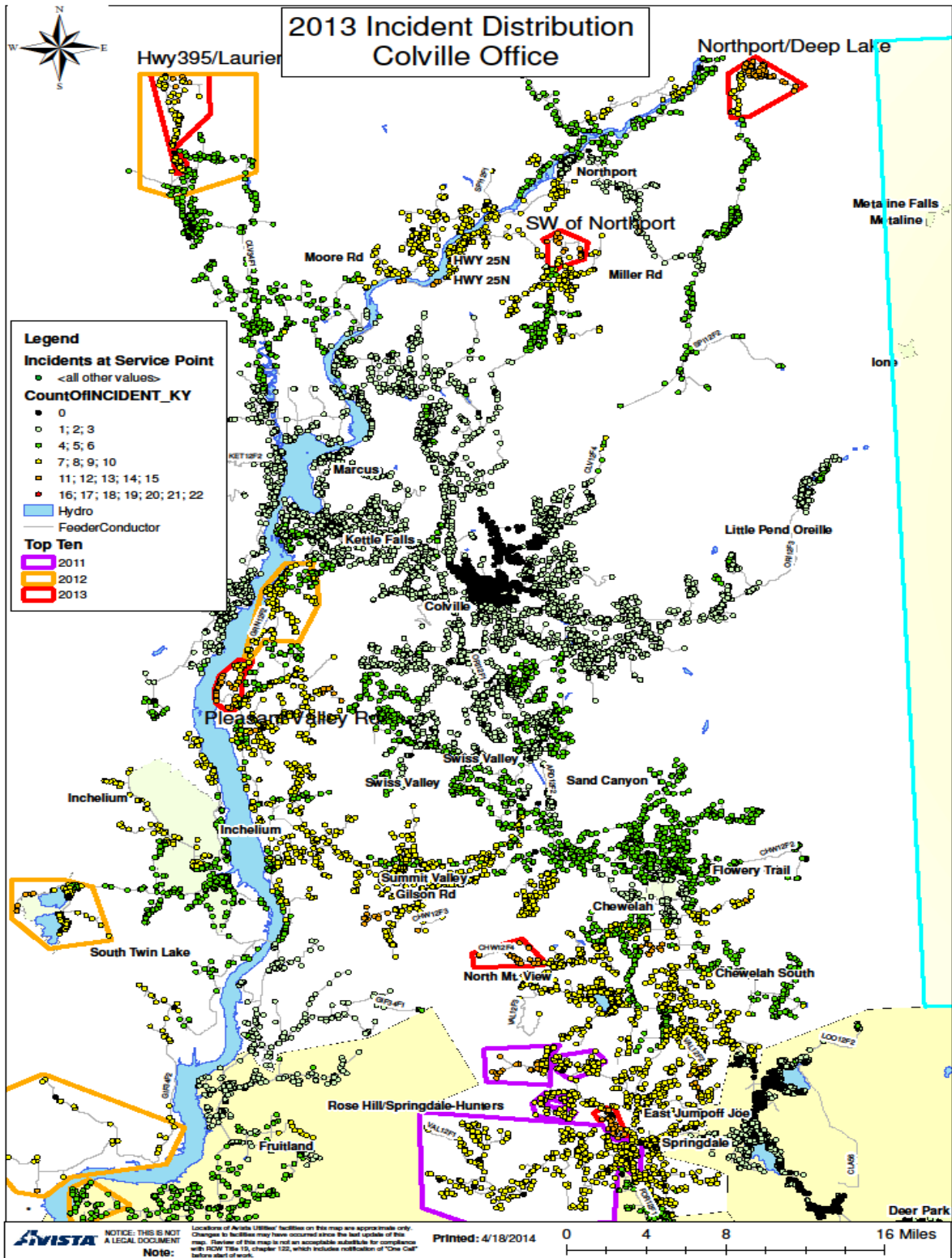


Chart 5.3 - Davenport Office - CEMI<sub>n</sub>

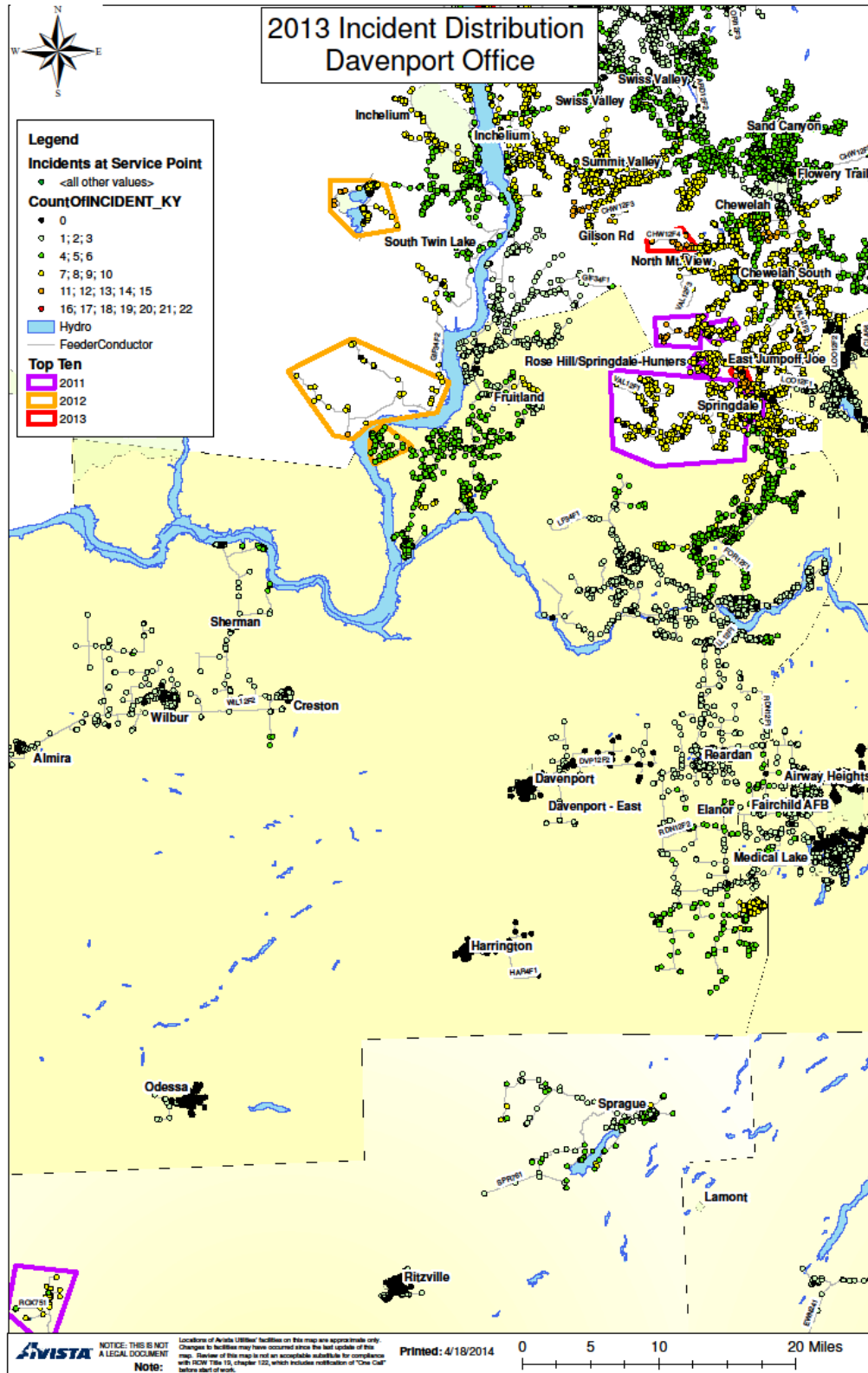


Chart 5.4 - Deer Park Office - CEMI<sub>n</sub>

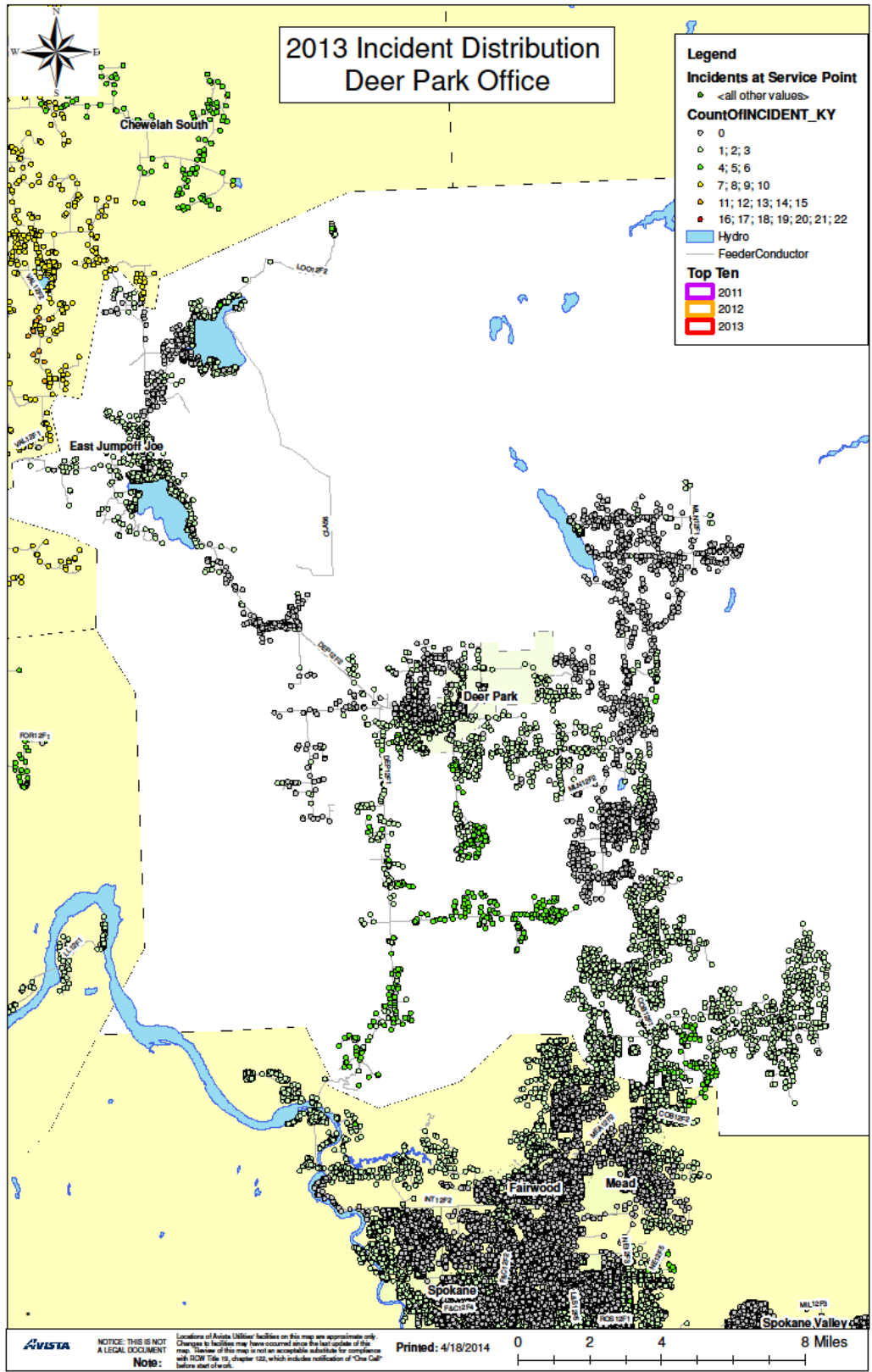


Chart 5.5 - Othello Office - CEMI<sub>n</sub>

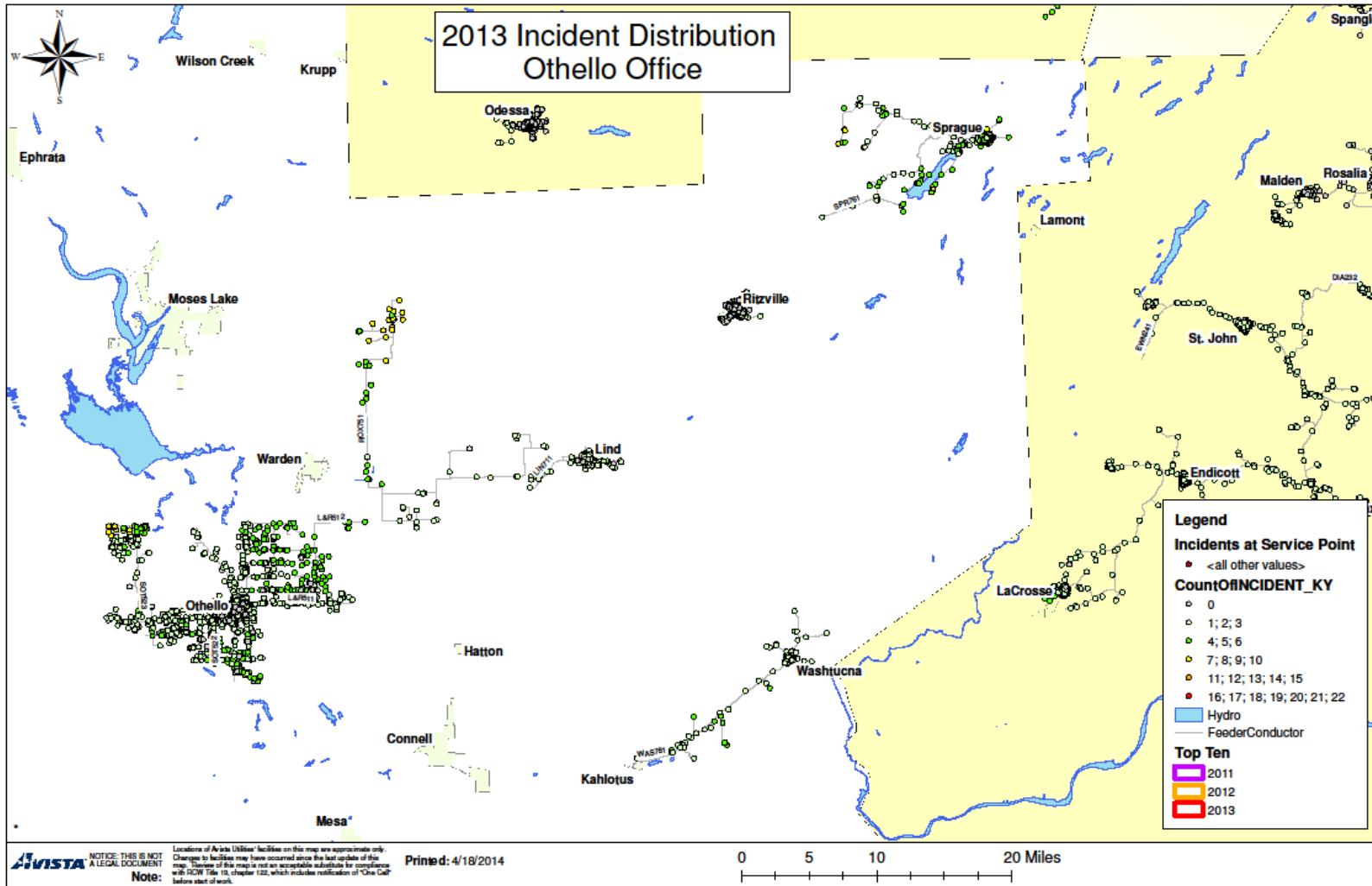




Chart 5.6 - Palouse Office - CEMI<sub>n</sub>

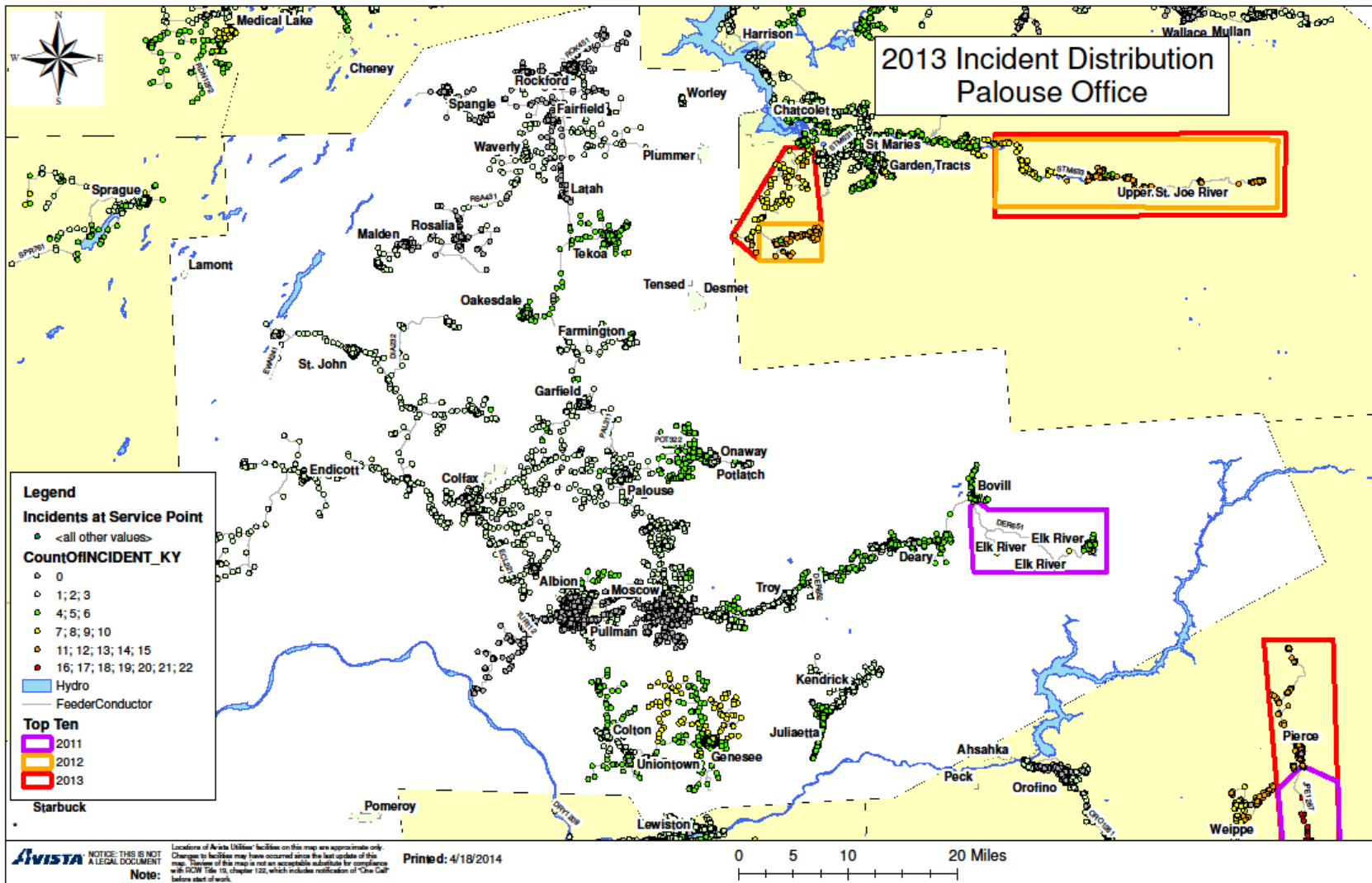


Chart 5.7 - Lewis-Clark Office - CEMI<sub>n</sub>

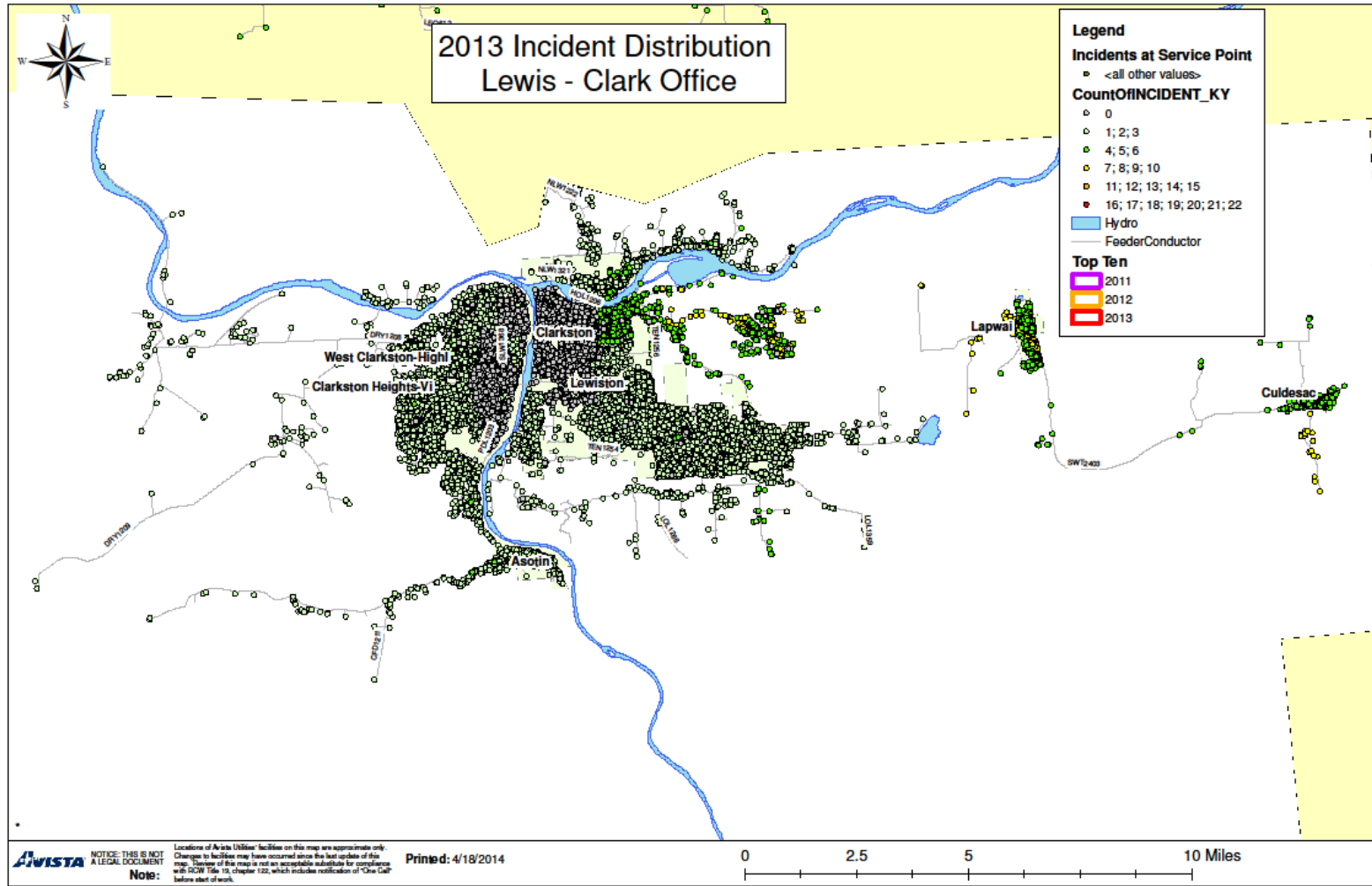




Chart 5.8 - Spokane Office - CEMI<sub>n</sub>

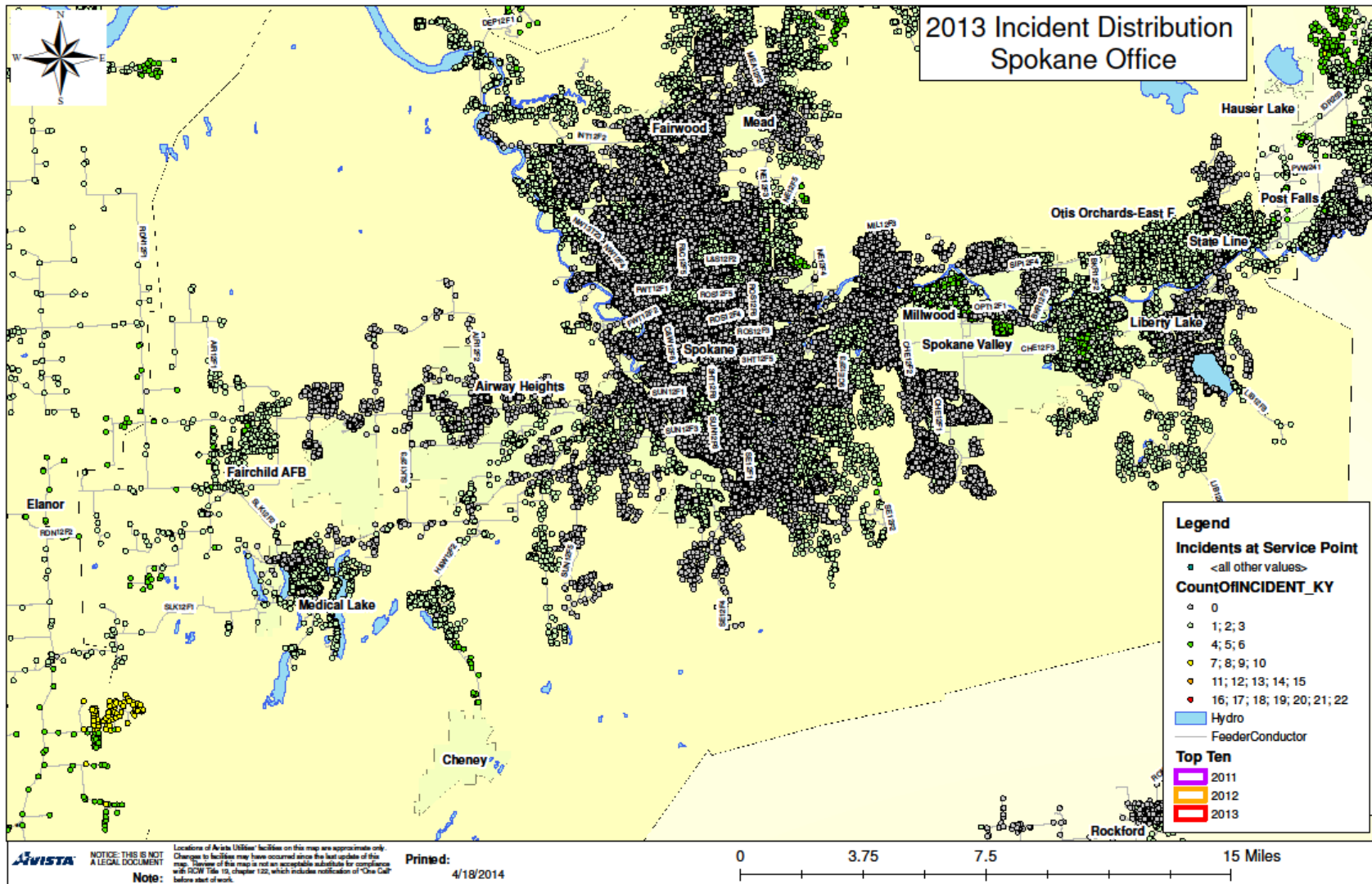


Chart 5.9 - Sandpoint Office - CEMI<sub>n</sub>

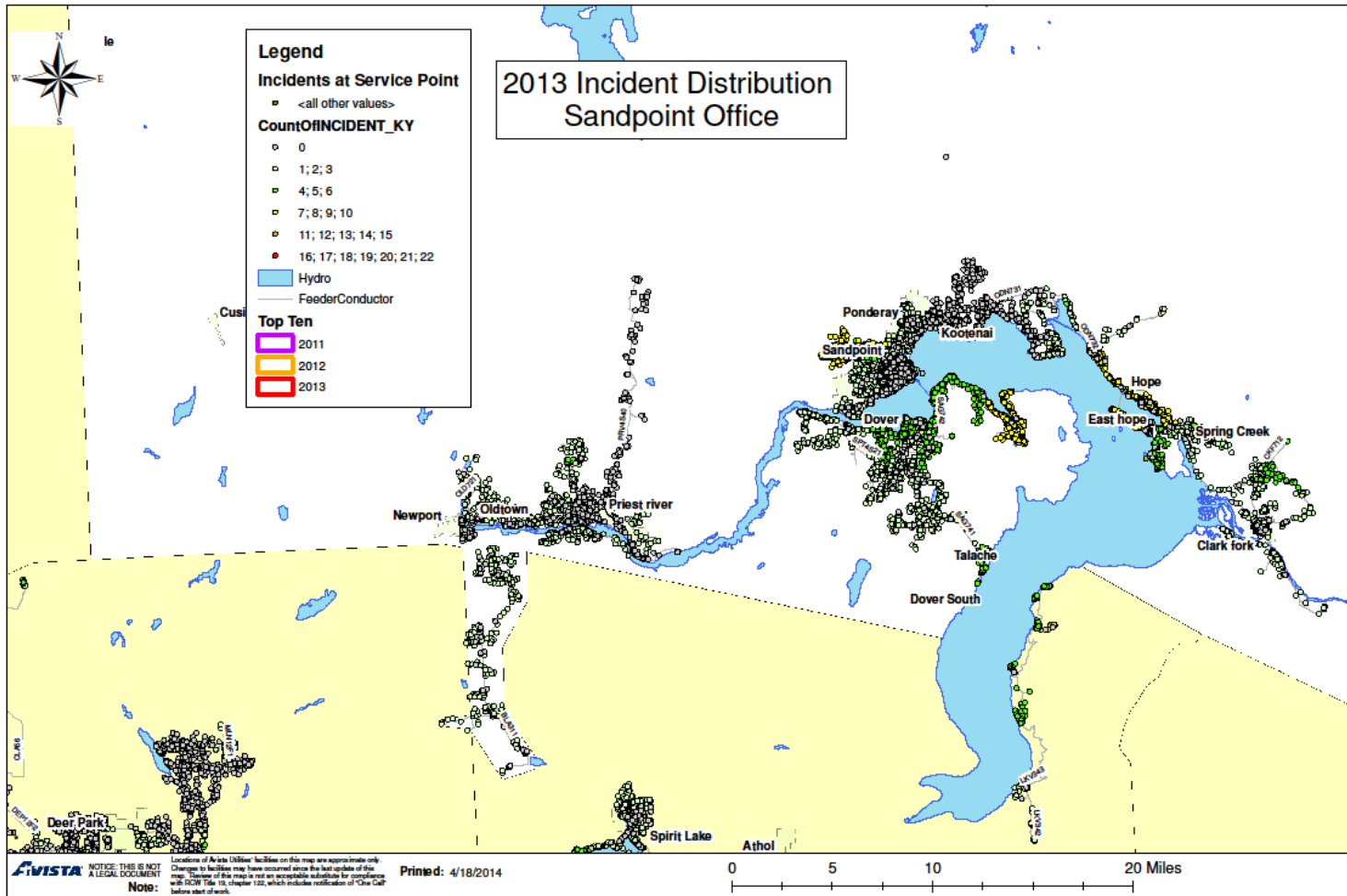


Chart 5.10 - Kellogg Office - CEMI<sub>n</sub>

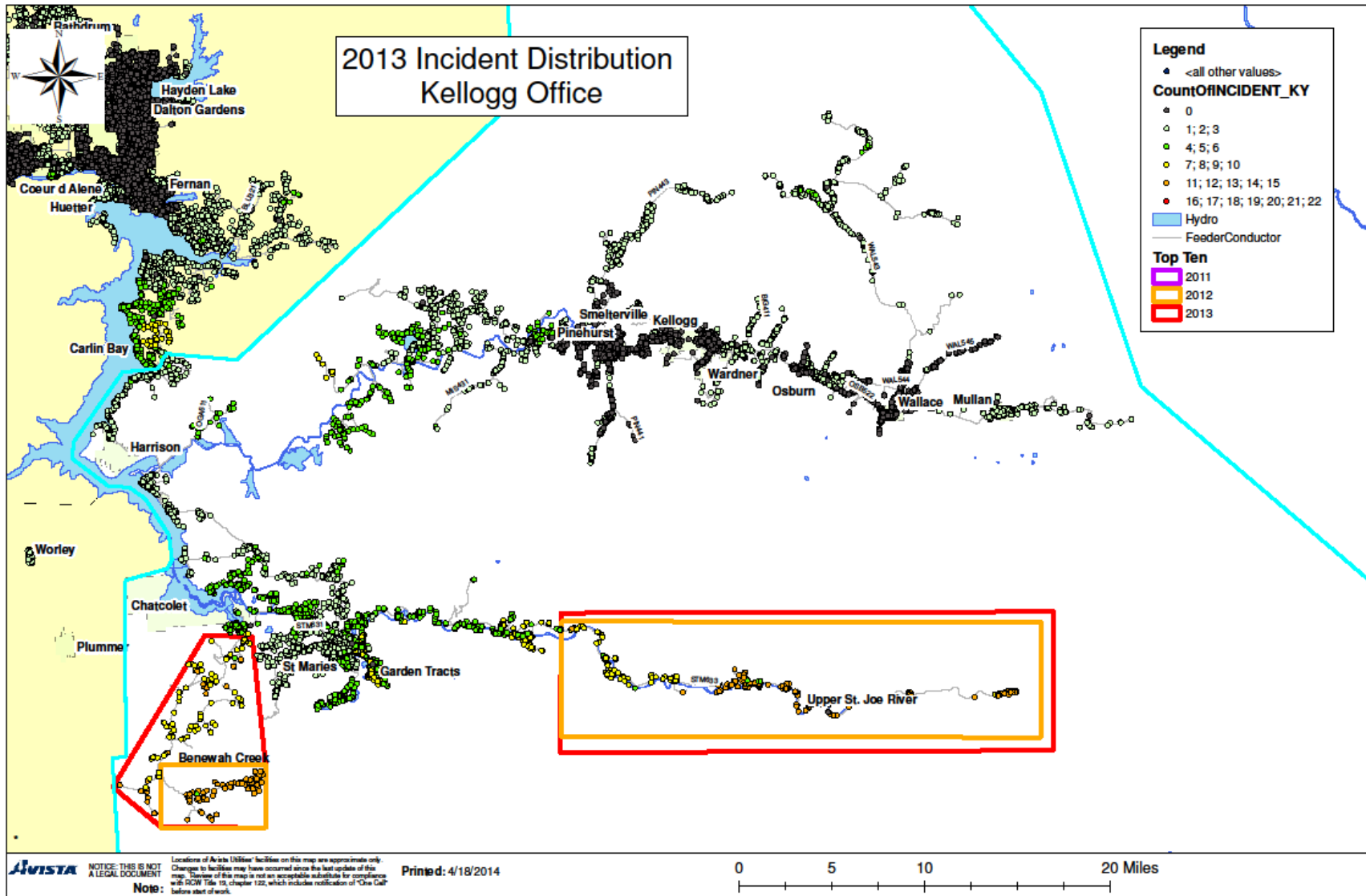


Chart 5.11 - Coeur d'Alene - CEMI<sub>n</sub>

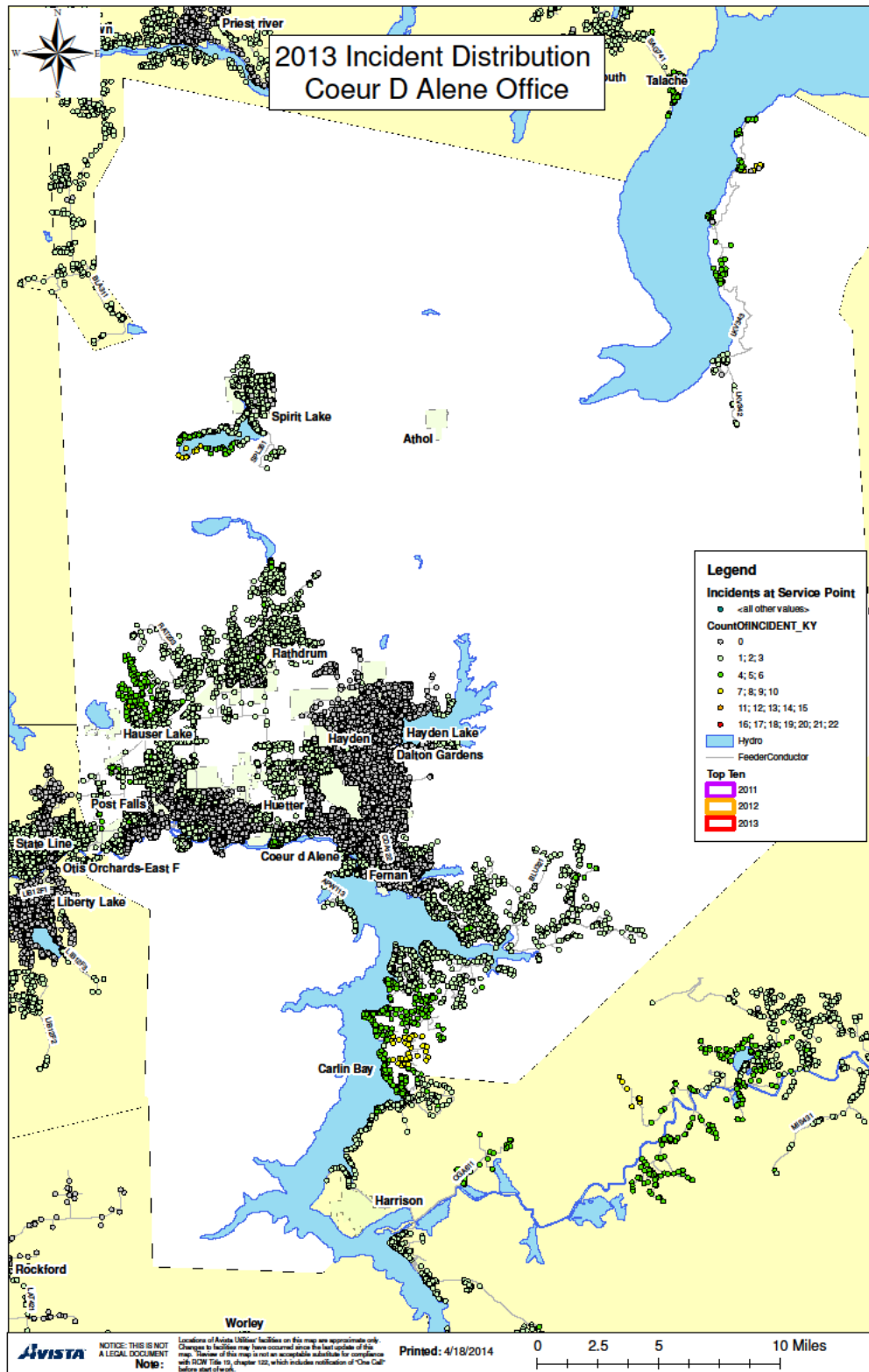
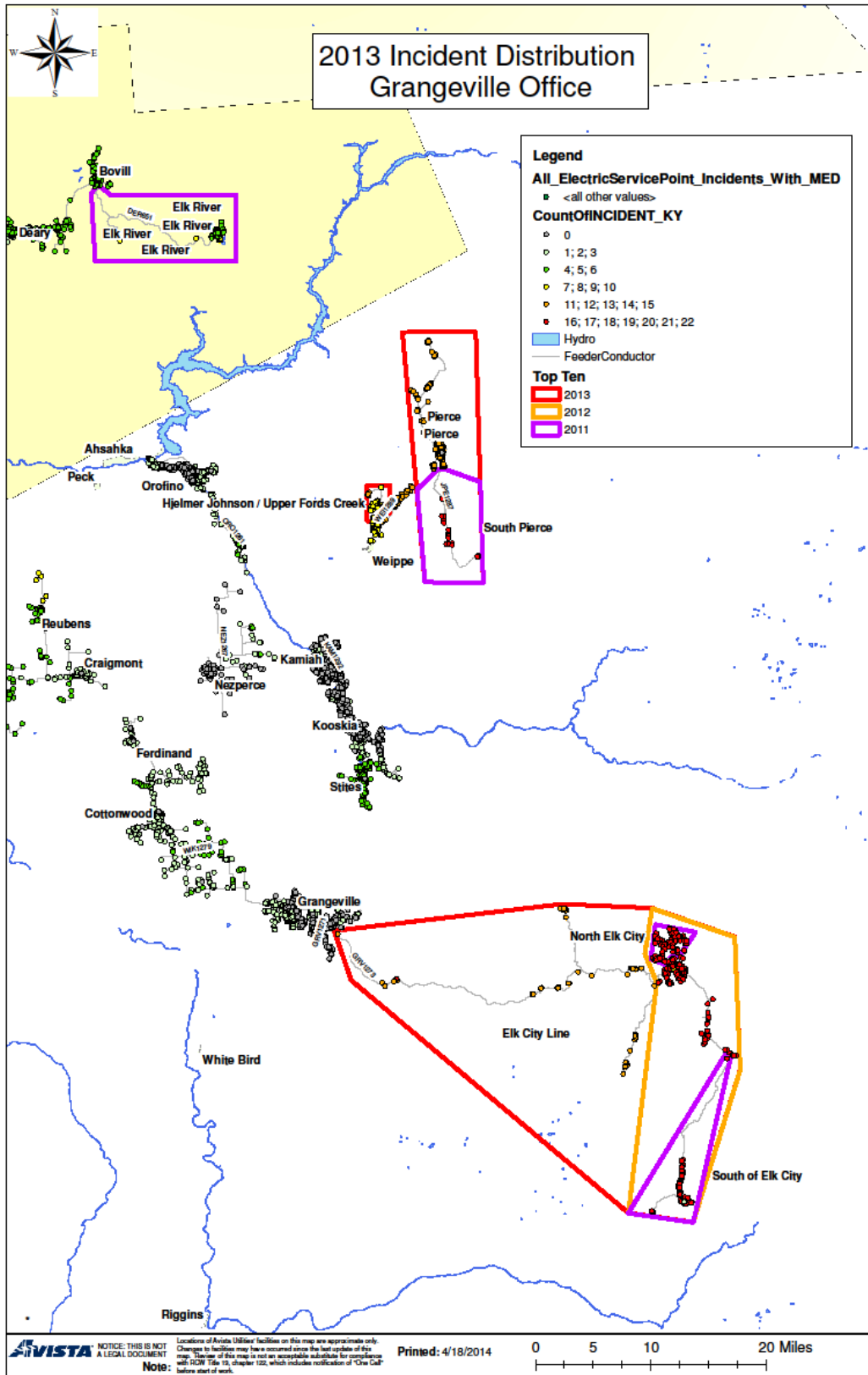


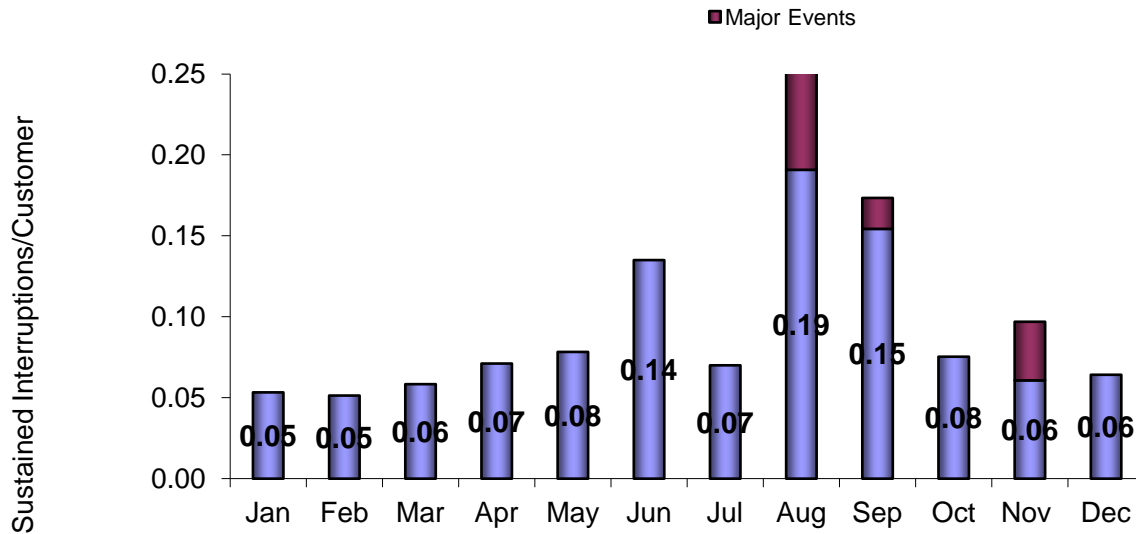
Chart 5.12 - Grangeville Office - CEMI<sub>n</sub>



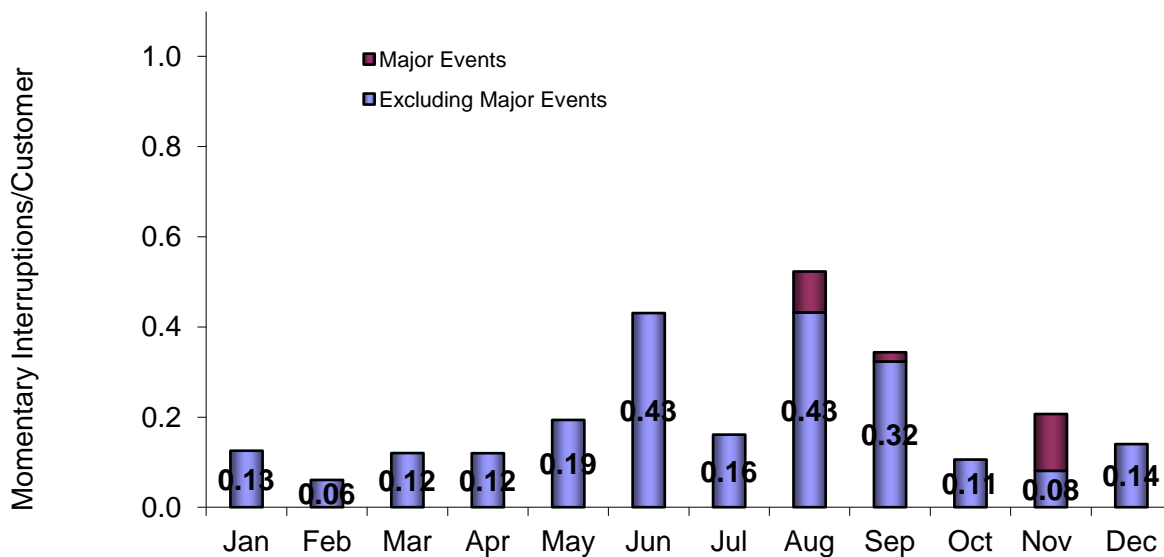
## Monthly Indices

Each of the following indices, reported by month, shows the variations from month to month. These variations are partially due to inclement weather and, in some cases, reflect incidents of winter snowstorms, seasonal windstorms, and mid- and late summer lightning storms. They also reflect varying degrees of animal activity causing disruptions in different months of the year.

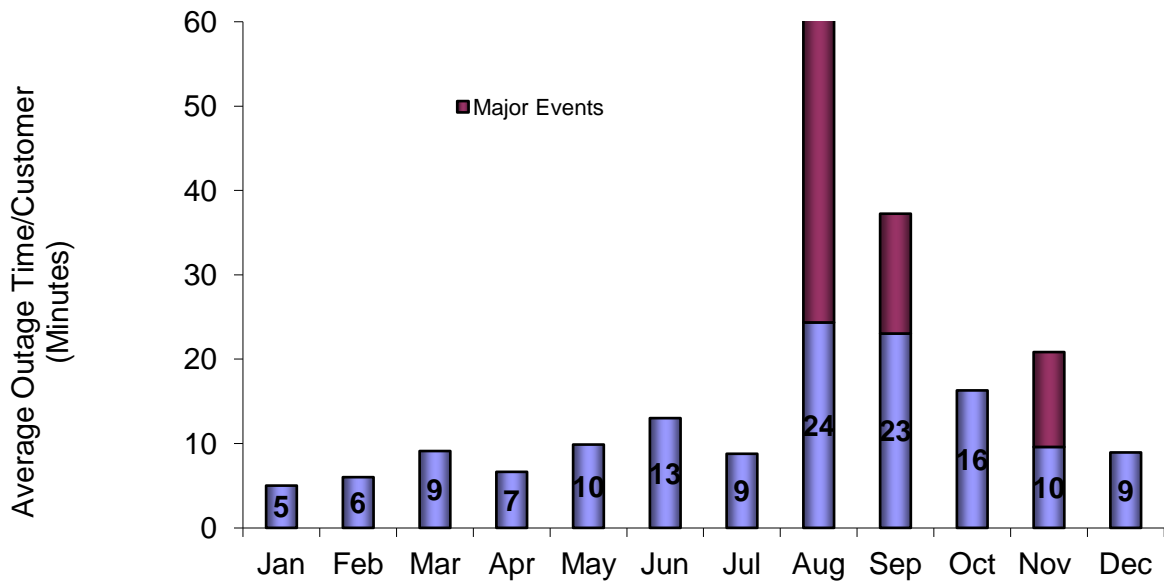
**Chart 6.1 – SAIFI - Sustained Interruptions / Customer**



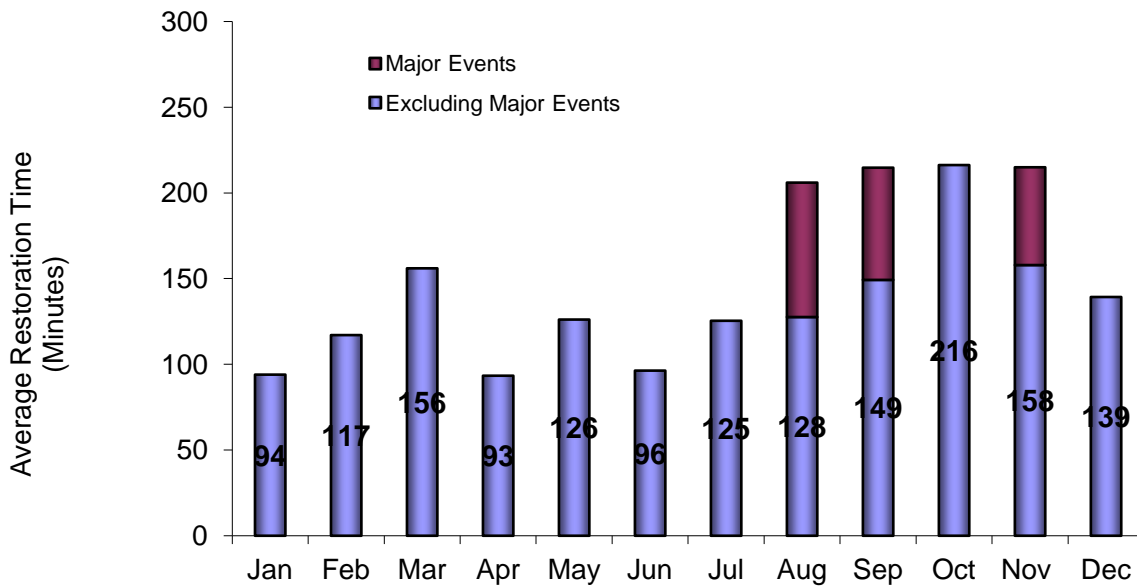
**Chart 6.2 - MAIFI Momentary Interruption Events / Customer**



**Chart 6.3 - SAIDI – Average Outage Time / Customer**



**Chart 6.4 - CAIDI – Average Restoration Time**



## Customer Complaints

**Table 7.1 - Commission Complaints**

The following is a list of complaints made to the Commission during 2013.

<b>Customer / Feeder</b>	<b>Complaint</b>	<b>Complaint Category</b>	<b>Resolution</b>
Valley WA VAL12F1	Customer has been experiencing frequent power outages for over a year now, and most recently, he has had almost weekly outages that are not weather related. Customer would like to know what is causing the outages and what the company is doing to try and resolve the recurring issues. He has spoken to the company, but has not received any information on a solution to the outages.	Outages	Commission closed complaint - Company Upheld

**Table 7.2 - Customer Complaints**

The following is a list of complaints made to our Customer Service Representatives during 2013.

<b>Office /State /Feeder</b>	<b>Complaint</b>	<b>Complaint Category</b>	<b>Resolution</b>
Colville WA SPT4S21	Customer reports 7 outages due to weather in last 3 weeks, some lasting 9 hours. If service is that fragile, Avista needs to do something different. Customer wants email response to: ctrenfro@gmail.com	Outages	Area Operations manager emailed customer requesting that customer calls so he can explain the outage- waiting for customer to call back.
Spokane WA SIP12F4	Customer concerned about 2 recent power outages- wanted to know if we found reason behind both and if we keep historical record and take action if outages are considered excessive.	Outages	Email sent to customer from Area Engineer explaining reasons for outages and tracking of our system for repeated outages.



Deer Park WA DEE12F1	Customer has a CPAP machine and is concerned about the number of outages that occur in her area that only seem to affect her and a few of her neighbors. She cannot sleep without the CPAP, so when the power goes out (if at night) she always wakes up.	Outages	CSR Spoke with Area Engineer regarding customer concerns. Advised that customers farther away from substation and closer to the end of the line take longer to restore. It is a rural area so animals can be a factor. BPA uses lines and does work as well.
Palouse WA LEO611	Three times this year you have shut off the power in our town and we have never been notified, as there is a 3yr old and my wife has MS this is not acceptable, also the last time when it came back on it was only 60 in our house.	Outages	CSR got information from operations on the calls that went out on 2 of the 3 outages here. 2 were planned and calls, media were issued. One was an emergency shutdown for repairs with no time for warning. Left VM for customer.
Spokane WA OPT12F1	Customer says his power and neighbors frequently go out. He thinks something is wrong with a section of the grid or distribution lines within 4 block radius and would like to know if something can be replaced or done to prevent this. Would like a call back.	Outages	CSR spoke to customer and looked at outage history at his location - 3 were weather related this year, 1 was car hit pole and 4 other outages in previous years. # of outages is about right compared to SV.
Kellogg ID MIS431	Customer complaining heavily about our poor service during outages. She calling the PUC & media. Customer just doesn't understand why she is always out & how bad our service is. Calling her Senator to get her some other companies & options in the area.	Outages	Discussed outages with customer; customer has not filed commission complaint.
Davenport WA FOR12F1	Customer upset power keeps going out and rates keep going up. Suggests we use smart grid meters for everything. Suggests using geothermal energy from Yellowstone to power the country. No call back required.	Outages	Emailed Engineering Department suggestions per customer request
Coeur d'Alene ID HUE141	Customer upset about power blips off and on and says he has had multiple outages this year; advised if he has a power outage to contact us and we can start tracking any problems.	Outages	Customer information shows 3 outages this year. Gary will stay in touch if he has any type of outage so we can track and find out what the cause is.
Davenport WA LL12F1	Continued power outages, 2 this month and customer wants to know why we are not bypassing things. He wants someone in Avista to be honest with him. He is quite disgruntled about the way he feels we handle our business.	Outages	Area Engineer called customer to discuss outages. Outages are momentary with 2 in the last month. We will patrol feeder looking for tree issues, etc.

Colville WA GIF34F1	Customer upset that the power keeps going out in their area.	Outages	Let her know that due to the wind storms, trees might have come down on the lines. Customer has seen frequent outage due to weather.
Palouse ID DER652	Customer feels like this outage is the same if not related to the one on Saturday and wants to make sure we are looking into repeated outages to make sure it isn't equipment that needs to be upgraded	Outages	Assured that we do upgrade our equipment if it is needed but will add this comment to his acct so we are aware of his concerns.
Spokane WA 3HT12F2	Customer wanted to complain that there was a power outage and that there are a lot of outages that are affecting his residence. He stated that his residence is where he runs his business from and the constant outages are affecting it. He stated that he is concerned that it is Avista's infrastructure and not weather related issues causing the outages at his home.	Outages	Referred to Spokane area engineer

## Sustained Interruption Causes

**Table 8.1 - % SAIFI per Cause by Office**

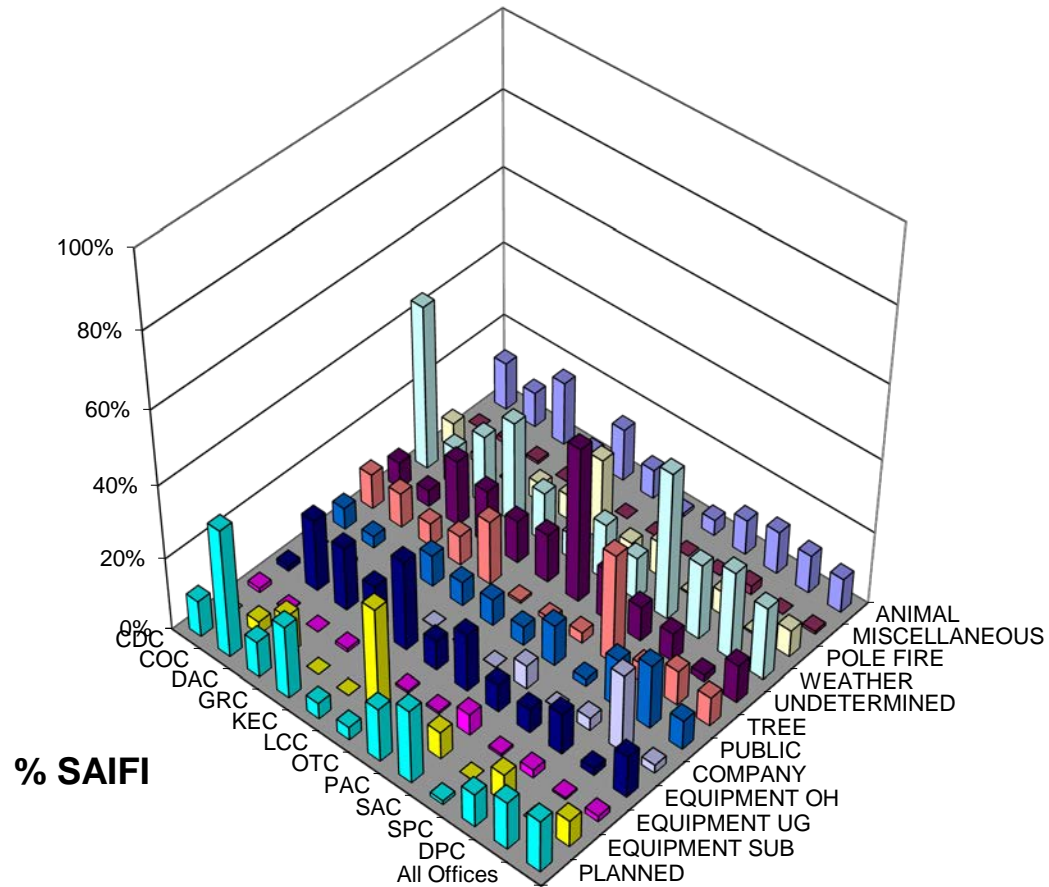
The following table lists the percentage SAIFI contribution by causes for outages excluding major event days.

<b>Reason</b>	<b>CDC</b>	<b>COC</b>	<b>DAC</b>	<b>GRC</b>	<b>KEC</b>	<b>LCC</b>	<b>OTC</b>	<b>PAC</b>	<b>SAC</b>	<b>SPC</b>	<b>DPC</b>	<b>All Offices</b>
ANIMAL	13.0%	9.5%	17.3%	2.7%	14.2%	7.9%	0.9%	4.2%	9.5%	11.6%	10.4%	9.3%
MISCELLANEOUS	0.0%	1.3%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.8%
POLE FIRE	7.0%	2.0%	0.4%	5.1%	6.7%	22.4%	4.3%	9.3%	0.4%	6.4%	0.5%	7.3%
WEATHER	44.9%	10.6%	19.1%	28.0%	13.6%	6.7%	15.5%	11.6%	40.3%	20.7%	24.1%	19.9%
UNDETERMINED	7.1%	4.4%	17.9%	14.8%	11.7%	13.3%	42.2%	13.8%	9.4%	7.6%	1.8%	10.2%
TREE	9.6%	9.4%	6.2%	8.1%	17.5%	0.6%	1.1%	2.9%	30.1%	4.8%	9.3%	7.9%
PUBLIC	5.9%	3.2%	0.5%	8.6%	6.6%	7.2%	5.1%	11.2%	1.9%	13.0%	17.3%	8.0%
COMPANY	0.1%	1.0%	0.0%	0.0%	0.0%	0.0%	0.1%	6.3%	0.1%	3.4%	21.2%	2.2%
EQUIPMENT OH	1.4%	19.7%	17.4%	12.2%	24.5%	8.1%	15.5%	7.5%	6.6%	11.2%	1.9%	11.4%
EQUIPMENT UG	1.2%	0.2%	0.0%	0.9%	0.8%	0.6%	0.6%	5.7%	0.6%	2.2%	0.5%	1.5%
EQUIPMENT SUB	0.0%	3.4%	10.6%	0.0%	0.0%	29.7%	0.0%	7.4%	0.0%	7.7%	0.0%	7.2%
PLANNED	9.9%	35.1%	9.8%	19.8%	4.3%	3.5%	14.6%	20.2%	1.0%	9.1%	13.1%	14.2%

CDC	Coeur d' Alene	LCC	Lewiston-Clarkston
COC	Colville	OTC	Othello
DAC	Davenport	PAC	Palouse
DPC	Deer Park	SAC	Sandpoint
GRC	Grangeville	SPC	Spokane
KEC	Kellogg/ St. Maries		

### Chart 8.1 – % SAIFI per Cause by Office

The following chart shows the percentage SAIFI contribution by causes for outages excluding major event days.



**Table 8.2 - % SAIDI per Cause by Office**

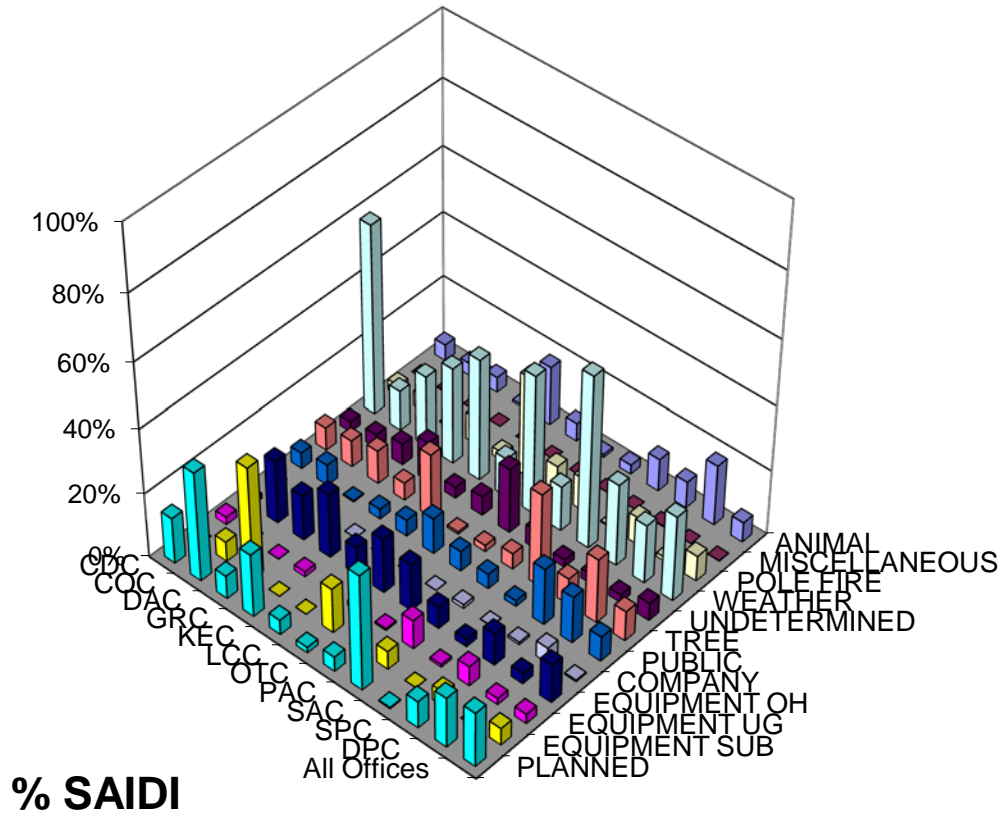
The following table lists the percentage SAIDI contribution by causes for outages excluding major event days.

Reason	CDC	COC	DAC	GRC	KEC	LCC	OTC	PAC	SAC	SPC	DPC	All Offices
ANIMAL	5.0%	3.8%	4.6%	0.7%	18.1%	5.5%	0.9%	2.8%	10.0%	8.1%	18.6%	6.1%
MISCELLANEOUS	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
POLE FIRE	3.2%	4.7%	0.3%	8.3%	2.4%	31.2%	8.9%	10.0%	0.3%	8.4%	1.2%	7.8%
WEATHER	58.5%	12.3%	21.9%	29.6%	37.4%	11.9%	42.7%	13.8%	53.1%	25.3%	18.1%	26.4%
UNDETERMINED	3.1%	4.2%	6.6%	12.2%	3.4%	5.8%	19.9%	5.8%	2.2%	2.9%	2.4%	5.4%
TREE	7.1%	8.2%	10.3%	5.4%	19.7%	0.7%	1.9%	4.8%	29.0%	8.1%	19.9%	9.2%
PUBLIC	4.9%	6.3%	0.3%	3.1%	5.0%	11.0%	6.2%	4.5%	1.8%	17.5%	14.4%	7.7%
COMPANY	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	0.1%	0.7%	4.7%	0.4%
EQUIPMENT OH	1.6%	19.4%	14.0%	19.8%	8.6%	16.8%	14.5%	6.8%	2.4%	9.9%	3.3%	11.9%
EQUIPMENT UG	2.3%	0.5%	0.0%	1.5%	0.8%	1.6%	0.5%	8.9%	0.8%	6.0%	1.9%	2.9%
EQUIPMENT SUB	0.0%	6.1%	34.8%	0.0%	0.0%	13.8%	0.0%	5.6%	0.0%	4.5%	0.0%	5.2%
PLANNED	14.2%	33.9%	7.1%	19.5%	4.5%	1.7%	4.5%	35.9%	0.3%	8.3%	15.5%	16.9%

CDC	Coeur d' Alene	LCC	Lewiston-Clarkston
COC	Colville	OTC	Othello
DAC	Davenport	PAC	Palouse
DPC	Deer Park	SAC	Sandpoint
GRC	Grangeville	SPC	Spokane
KEC	Kellogg/ St. Maries		

### Chart 8.2 – % SAIDI per Cause by Office

The following chart shows the percentage SAIDI contribution by causes for outages excluding major event days.



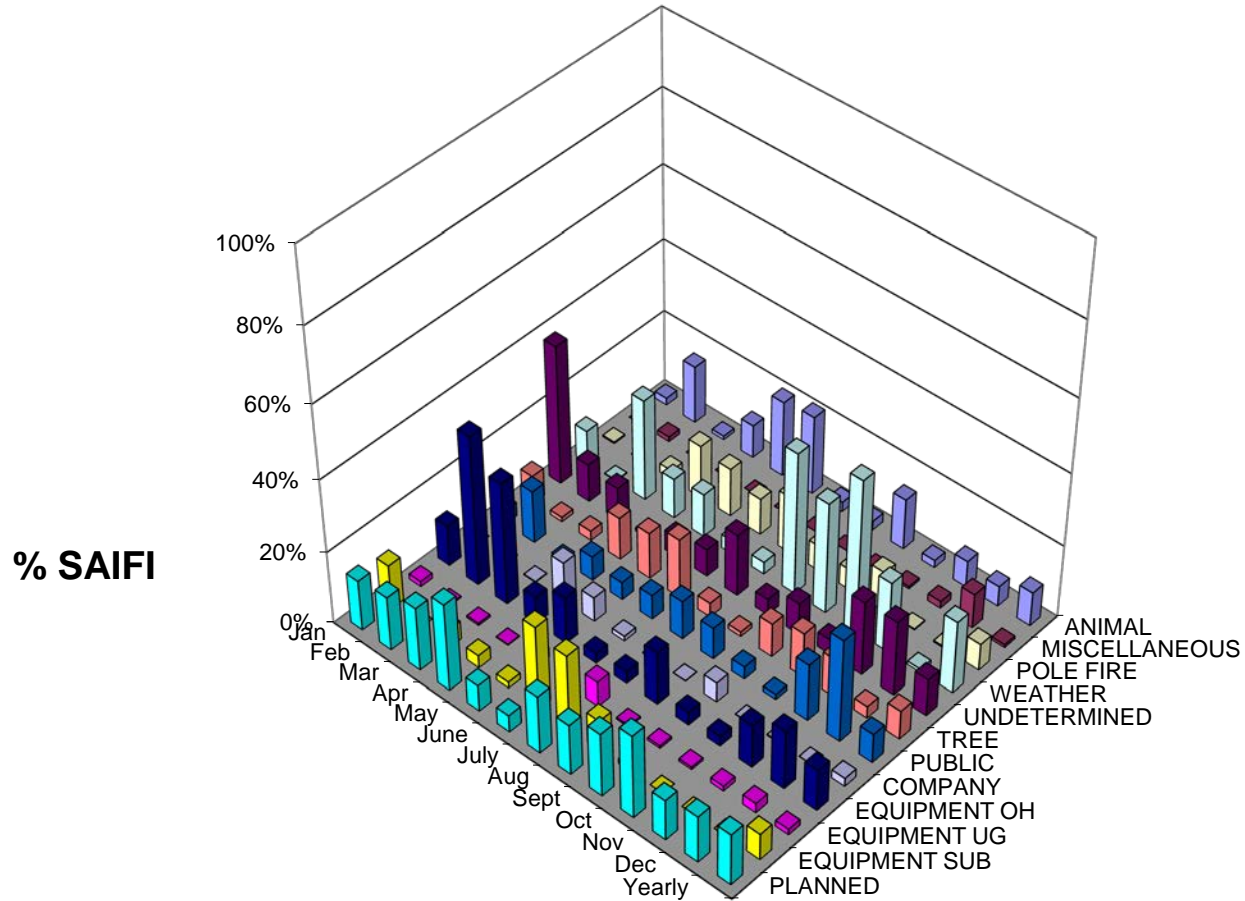
**Table 8.3 - % SAIFI per Cause by Month**

The following table lists the percentage SAIFI contribution by causes for all outages, excluding major event days.

<b>Reason</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Yearly</b>
ANIMAL	1.9%	15.8%	1.0%	9.1%	20.8%	21.6%	2.6%	2.5%	13.9%	2.0%	7.2%	5.5%	9.3%
MISCELLANEOUS	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	1.9%	9.5%	0.8%
POLE FIRE	0.4%	0.0%	2.4%	14.6%	13.3%	10.0%	15.7%	6.9%	5.6%	10.8%	0.2%	0.4%	7.3%
WEATHER	9.2%	0.2%	27.9%	11.0%	11.9%	3.7%	3.3%	39.1%	30.6%	42.3%	19.5%	0.8%	19.9%
UNDETERMINED	38.5%	10.4%	8.9%	0.9%	5.6%	7.5%	17.0%	4.4%	8.7%	4.0%	20.4%	20.5%	10.2%
TREE	7.7%	1.2%	2.6%	11.7%	12.8%	16.4%	3.9%	1.2%	9.2%	12.2%	10.5%	3.2%	7.9%
PUBLIC	3.8%	14.5%	0.3%	6.6%	4.8%	6.7%	10.6%	8.7%	3.4%	1.4%	15.6%	28.3%	8.0%
COMPANY	0.0%	0.0%	0.2%	11.0%	6.6%	1.3%	0.1%	0.1%	5.3%	0.1%	0.3%	0.0%	2.2%
EQUIPMENT OH	11.2%	41.4%	33.7%	7.4%	12.8%	2.8%	3.4%	14.5%	3.6%	2.7%	11.8%	16.3%	11.4%
EQUIPMENT UG	1.4%	0.3%	0.5%	0.2%	2.6%	2.4%	6.9%	0.4%	0.7%	0.6%	1.3%	2.6%	1.5%
EQUIPMENT SUB	12.1%	0.0%	5.0%	3.4%	1.7%	23.0%	20.7%	8.4%	1.4%	0.0%	0.0%	0.0%	7.2%
PLANNED	13.9%	14.8%	17.4%	24.1%	7.2%	4.6%	15.9%	13.9%	17.5%	23.1%	11.2%	12.9%	14.2%

### Chart 8.3 – % SAIFI per Cause by Month

The following chart shows the percentage SAIFI contribution by causes for all outages, excluding major event days.





**Table 8.4 - % SAIDI per Cause by Month**

The following table lists the percentage SAIDI contribution by causes for outages excluding major event days.

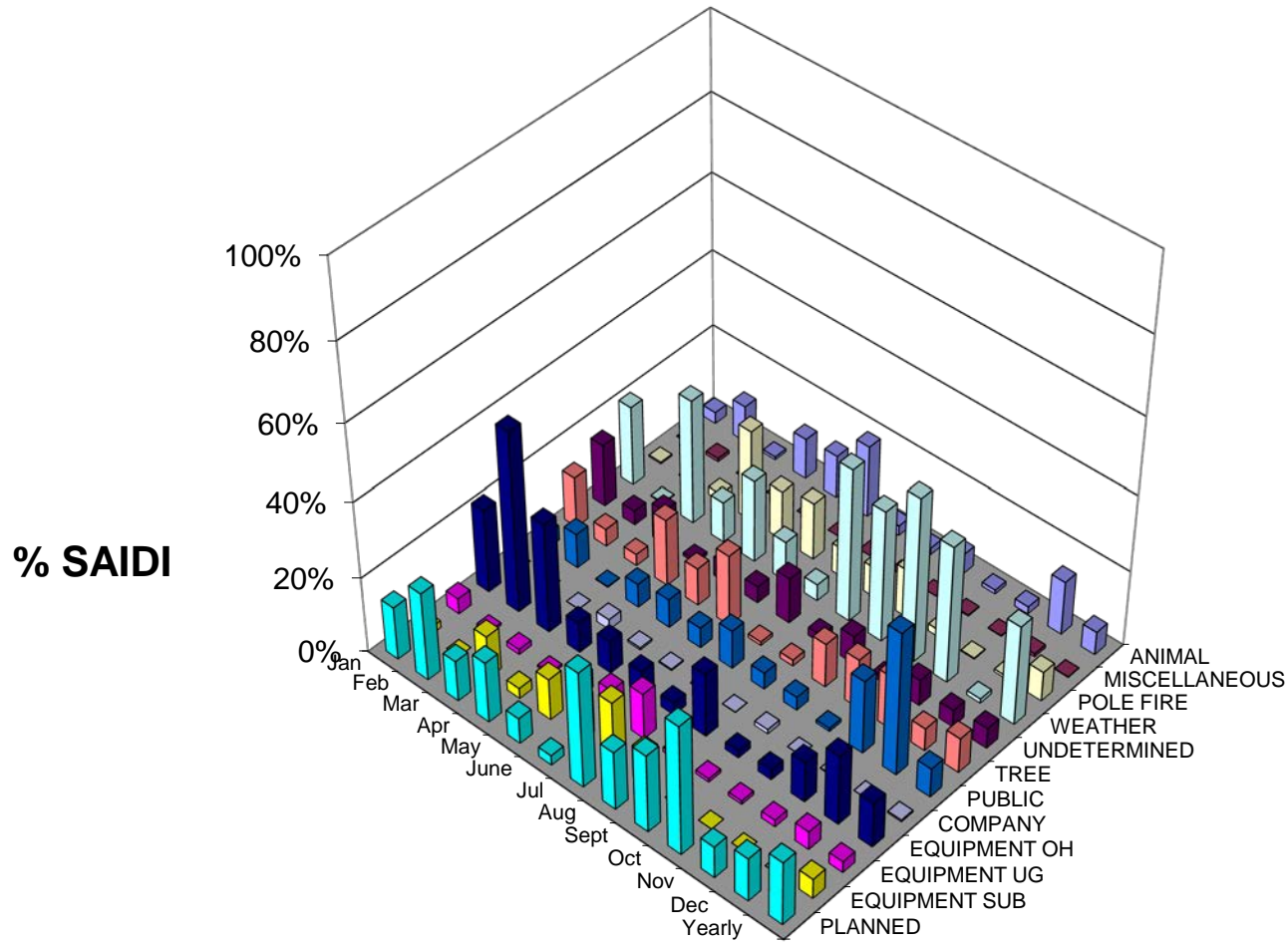
<b>REASON</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>June</b>	<b>Jul</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Yearly</b>
ANIMAL	3.0%	9.6%	0.7%	10.7%	11.2%	18.9%	2.6%	1.8%	5.3%	1.0%	1.9%	14.2%	6.1%
MISCELLANEOUS	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%	0.8%	0.1%
POLE FIRE	0.4%	0.0%	2.0%	24.1%	13.0%	15.1%	7.6%	7.9%	12.7%	1.9%	0.2%	0.7%	7.8%
WEATHER	21.1%	0.2%	32.8%	10.7%	21.6%	10.5%	4.3%	40.3%	34.7%	43.5%	36.2%	1.1%	26.4%
UNDETERMINED	16.4%	3.8%	9.1%	0.8%	5.1%	4.4%	12.1%	2.1%	7.4%	1.5%	6.9%	4.5%	5.4%
TREE	13.3%	4.6%	3.0%	17.7%	9.9%	18.8%	0.9%	1.6%	11.6%	13.1%	14.0%	6.0%	9.2%
PUBLIC	3.9%	9.1%	0.2%	6.3%	7.6%	5.3%	10.1%	4.3%	3.5%	0.8%	19.5%	37.9%	7.7%
COMPANY	0.0%	0.0%	0.0%	2.7%	0.5%	0.3%	0.1%	0.0%	1.1%	0.0%	0.2%	0.0%	0.4%
EQUIPMENT OH	22.0%	47.8%	29.0%	7.9%	8.5%	5.9%	3.2%	16.9%	1.9%	2.7%	10.7%	18.5%	11.9%
EQUIPMENT UG	4.1%	0.6%	1.3%	0.5%	4.9%	7.3%	12.1%	1.2%	0.9%	0.9%	1.8%	4.8%	2.9%
EQUIPMENT SUB	1.8%	0.0%	11.1%	2.7%	10.9%	11.0%	16.2%	8.4%	0.2%	0.0%	0.0%	0.0%	5.2%
PLANNED	14.0%	23.4%	10.7%	16.0%	6.7%	2.5%	30.8%	15.5%	20.6%	34.5%	8.4%	11.5%	16.9%

**Table 8.4.1 – Average Outage Time (HH:MM)**

REASON	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yearly
ANIMAL	2:27	1:11	1:59	1:50	1:08	1:23	2:03	1:14	0:56	1:51	0:42	5:57	1:25
COMPANY	1:08	1:13	0:43	0:22	0:09	0:23	2:39	1:31	0:31	0:36	2:06	1:03	0:24
EQUIPMENT OH	3:05	2:15	2:14	1:39	1:23	3:23	1:57	2:28	1:16	3:30	3:00	2:38	2:20
EQUIPMENT SUB	0:14		5:45	1:14	13:51	0:46	1:38	2:07	0:26				1:35
EQUIPMENT UG	4:34	3:47	6:22	4:59	3:58	4:49	3:41	6:04	3:21	5:01	3:50	4:16	4:15
MISCELLANEOUS		1:21								1:25	0:12	0:12	0:21
PLANNED	1:34	3:04	1:35	1:02	1:58	0:52	4:02	2:21	2:55	5:22	1:58	2:04	2:37
POLE FIRE	1:44		2:05	2:33	2:03	2:24	1:00	2:25	5:36	0:37	2:36	4:18	2:21
PUBLIC	1:36	1:13	1:43	1:28	3:18	1:16	2:00	1:04	2:33	2:04	3:16	3:06	2:06
TREE	2:41	7:17	3:01	2:21	1:38	1:50	0:29	2:34	4:03	3:51	3:59	4:18	2:49
UNDETERMINED	0:40	0:42	2:39	1:18	1:54	0:55	1:29	1:00	2:07	1:21	0:53	0:30	1:09
WEATHER	3:35	2:25	3:03	1:30	3:50	4:32	2:45	4:24	5:25	3:42	5:00	3:11	4:26

### Chart 8.4 – % SAIDI per Cause by Month

The following chart shows the percentage SAIDI contribution by causes for outages excluding major event days.



## Momentary Interruption Causes

The cause for many momentary interruptions is unknown. Because faults are temporary, the cause goes unnoticed even after the line is patrolled. Momentary outages are recorded using our SCADA system (System Control and Data Acquisition). On average, about 88% of Avista's customers are served from SCADA controlled stations.

**Table 9.1 - % MAIFI per Cause by Office**

The following table lists the percentage MAIFI contribution by causes for outages excluding major event days.

Reason	CDC	COC	DAC	GRC	KEC	LCC	OTC	PAC	SAC	SPC	DPC	All Offices
ANIMAL	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
POLE FIRE	0.0%	2.6%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	1.3%	0.1%	0.0%	0.4%
WEATHER	22.5%	10.3%	30.4%	32.8%	36.7%	22.5%	26.6%	28.3%	34.0%	9.6%	5.8%	22.2%
TREE	0.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.8%	0.0%	0.0%	0.8%
Public	1.0%	0.0%	0.0%	0.7%	2.0%	0.8%	0.0%	0.4%	0.0%	5.9%	5.0%	1.6%
COMPANY	0.0%	0.8%	3.8%	0.0%	0.0%	2.4%	0.0%	4.5%	0.0%	1.7%	0.0%	1.1%
UNDETERMINED	76.5%	82.5%	65.8%	66.5%	59.2%	72.6%	72.0%	66.8%	54.3%	78.8%	89.3%	72.5%
EQUIPMENT OH	0.0%	0.0%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	2.0%	3.8%	0.0%	0.8%
PLANNED	0.0%	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.3%

CDC	Coeur d'Alene	LCC	Lewiston-Clarkston
COC	Colville	OTC	Othello
DAC	Davenport	PAC	Palouse
DPC	Deer Park	SAC	Sandpoint
GRC	Grangeville	SPC	Spokane
KEC	Kellogg/ St. Maries		

**Table 9.1.1 - % MAIFI per Cause by Office (Washington only)**

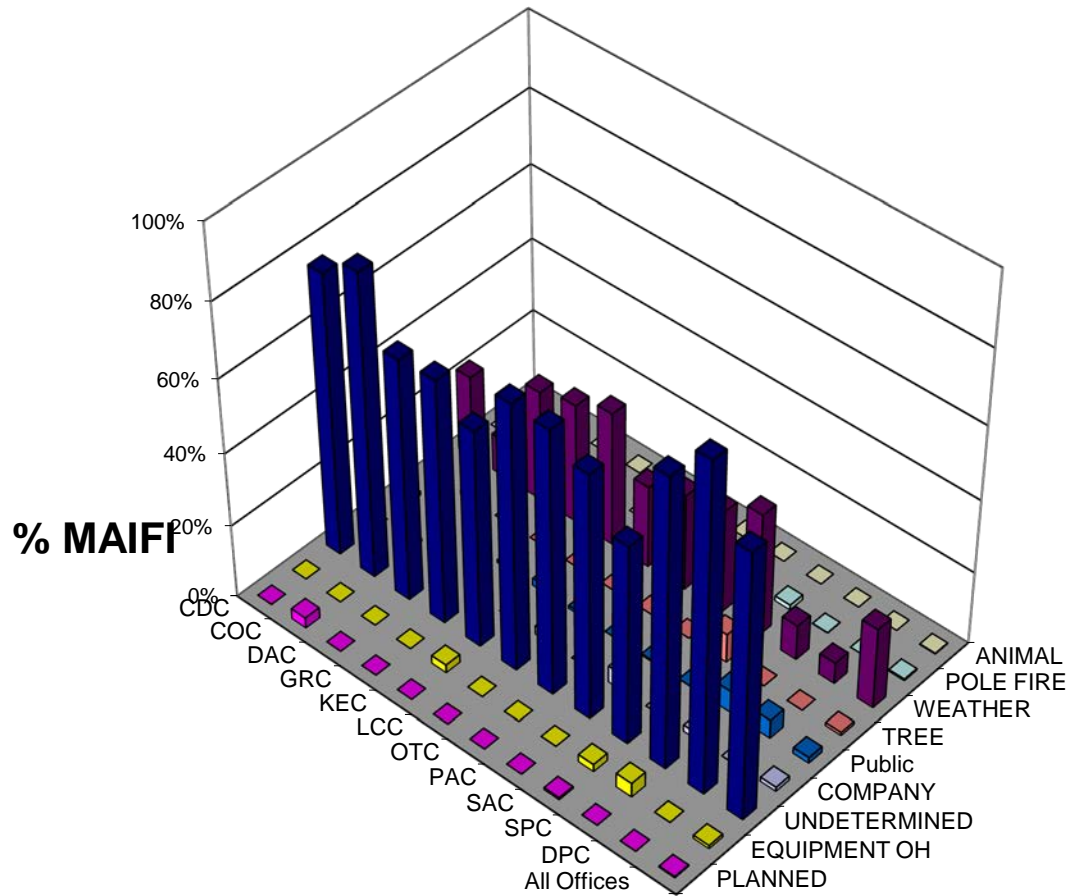
The following table lists the percentage MAIFI contribution by causes for outages excluding major event days.

Reason	COC	DAC	GRC	LCC-WA	OTC	PAC-WA	SPC	DPC	Grand Total
ANIMAL	0.0%	0.0%	0.0%	3.7%	0.0%	0.0%	0.0%	0.0%	0.5%
POLE FIRE	2.6%	0.0%	0.0%	0.0%	1.4%	0.0%	0.1%	0.0%	0.7%
WEATHER	10.3%	30.4%	0.0%	32.7%	26.6%	29.7%	9.6%	5.8%	16.5%
TREE	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
Public	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.9%	5.0%	2.5%
COMPANY	0.8%	3.8%	0.0%	0.0%	0.0%	2.9%	1.7%	0.0%	1.2%
UNDETERMINED	82.5%	65.8%	100.0%	63.6%	72.0%	67.3%	78.8%	89.3%	76.5%
EQUIPMENT OH	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.8%	0.0%	1.3%
PLANNED	2.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%

COC	Colville	OTC	Othello
DAC	Davenport	PAC-WA	Palouse Washington
DPC	Deer Park	SPC	Spokane
LCC-WA	Lewiston-Clarkston Washington		

### Chart 9.1 – % MAIFI per Cause by Office

The following chart shows the percentage MAIFI contribution by causes for outages excluding major event days.



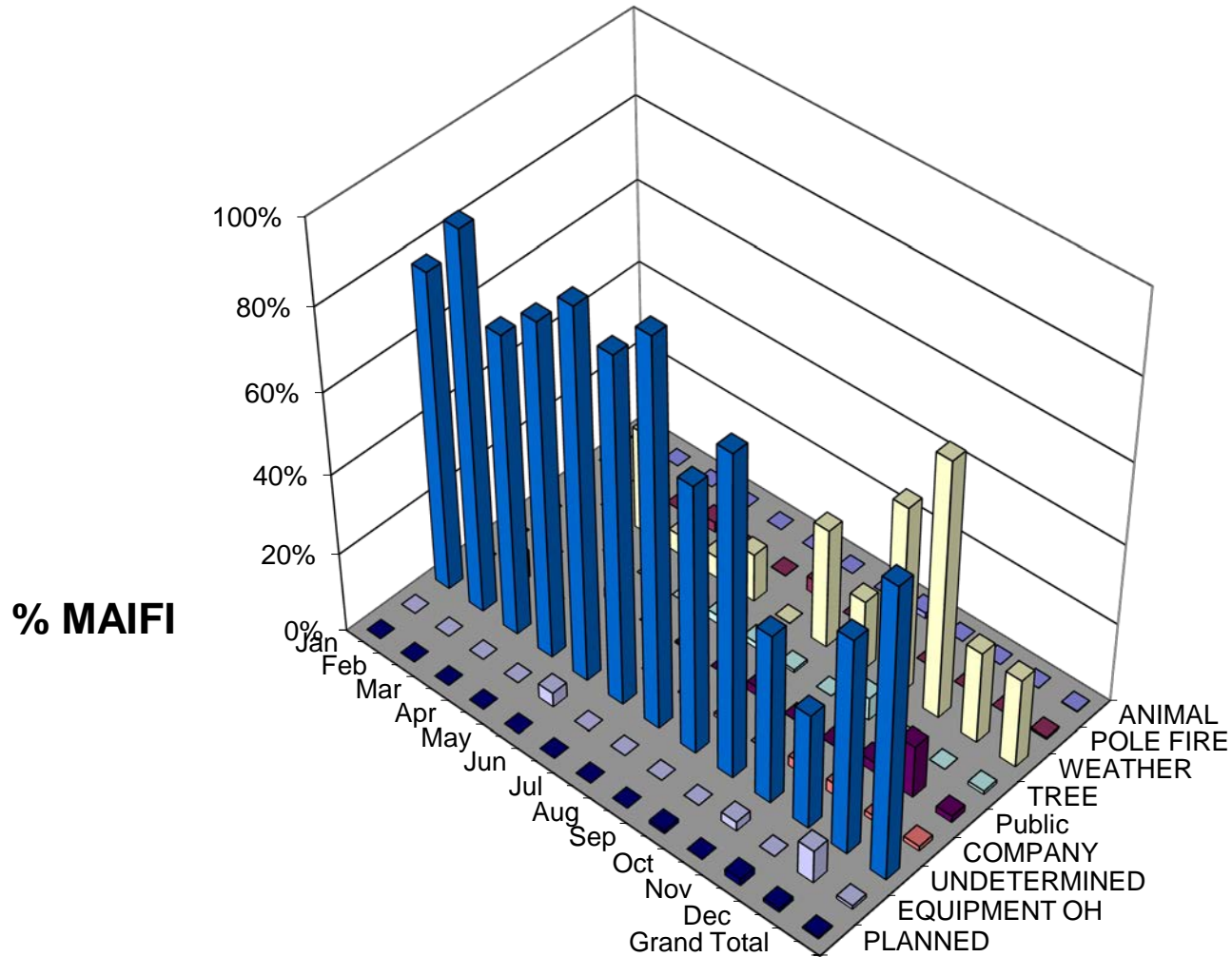
**Table 9.2 - % MAIFI per Cause by Month**

The following table lists the percentage MAIFI contribution by causes for outages excluding major event days.

Reason	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Grand Total
ANIMAL	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	1.42%	0.00%	0.00%	0.00%	0.20%
POLE FIRE	0.00%	0.00%	0.00%	2.50%	0.00%	0.07%	3.53%	0.00%	0.41%	0.00%	0.00%	0.00%	0.42%
WEATHER	21.66%	0.00%	25.86%	4.97%	5.32%	12.06%	0.04%	29.96%	17.71%	47.23%	64.20%	22.84%	22.20%
TREE	0.00%	0.00%	0.00%	0.06%	0.00%	2.10%	1.39%	0.66%	0.00%	5.59%	0.00%	0.00%	0.82%
Public	0.00%	0.00%	0.00%	2.54%	0.00%	0.31%	0.01%	2.12%	0.00%	0.07%	2.46%	13.05%	1.57%
COMPANY	0.00%	6.98%	0.00%	7.47%	0.00%	0.00%	0.00%	0.85%	0.00%	2.49%	2.91%	1.24%	1.12%
UNDETERMINED	78.33%	93.02%	74.13%	82.45%	91.16%	85.46%	95.00%	66.39%	79.59%	42.35%	28.83%	53.75%	72.53%
EQUIPMENT OH	0.00%	0.00%	0.00%	0.00%	3.51%	0.00%	0.00%	0.00%	0.00%	2.26%	0.00%	8.24%	0.83%
PLANNED	0.01%	0.00%	0.01%	0.01%	0.00%	0.00%	0.04%	0.00%	0.86%	0.00%	1.59%	0.88%	0.31%

### Chart 9.2 – % MAIFI per Cause by Month

The following chart shows the percentage MAIFI contribution by causes for outages excluding major event days.

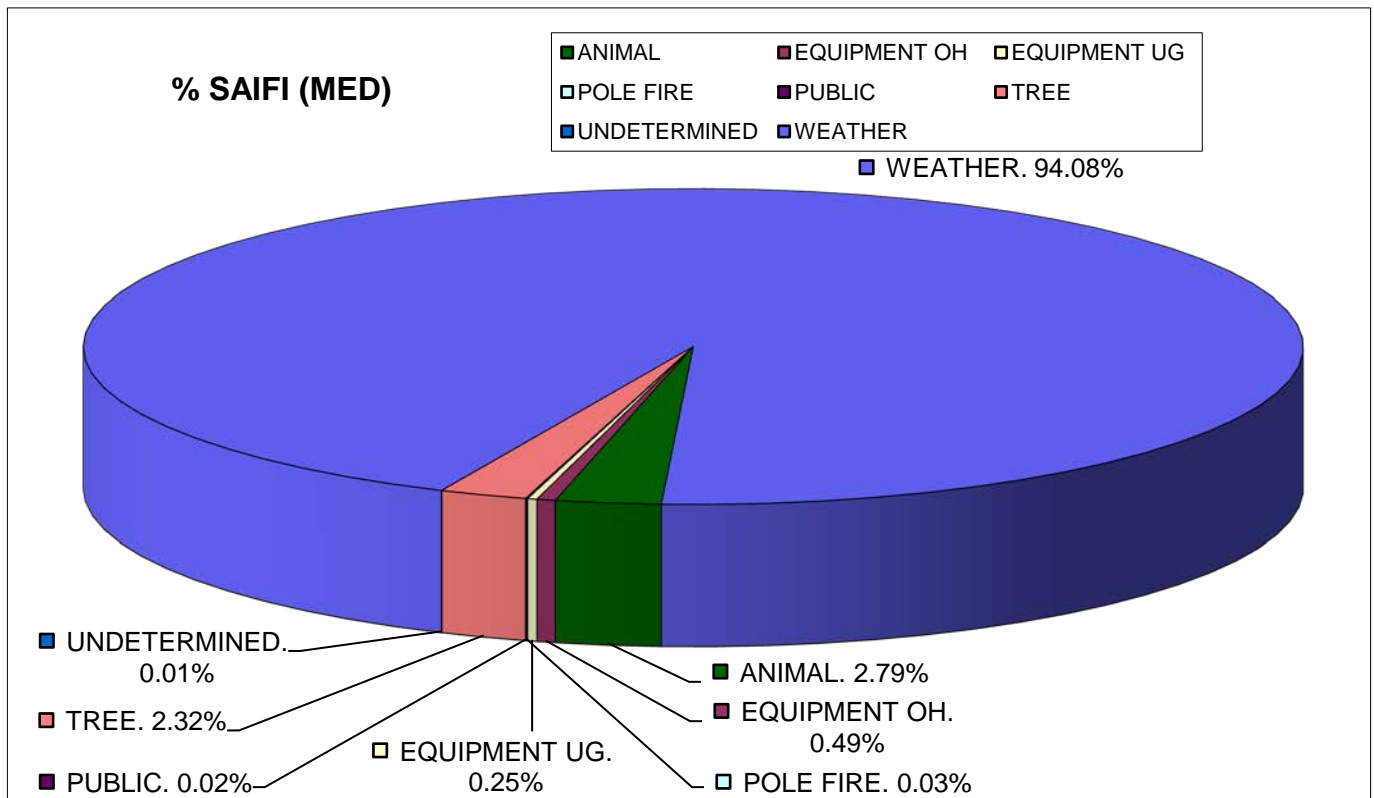




## Major Event Day Causes

Chart 10.1 – % SAIFI by Cause Code for the Major Event Days

The following chart shows the percentage SAIFI contribution by causes for outages during major event days.



**Table 10.1 – % SAIFI by Sub Cause Code for the Major Event Days**

The following table shows the SAIFI contribution and Customer hours by cause for the 2013 major event days.

Reason	Sum of Ni	Sum of ri x Ni
ANIMAL	1626	1507:57
COMPANY	0	0:00
EQUIPMENT OH	287	2493:32
EQUIPMENT SUB	0	0:00
EQUIPMENT UG	145	738:14
MISCELLANEOUS	0	0:00
PLANNED	0	0:00
POLE FIRE	19	23:07
PUBLIC	14	29:18
TREE	1352	11023:15
UNDETERMINED	7	11:10
WEATHER	54798	360147:30
Total	58248	375974:07

**Table 10.2 – Yearly Summary of the Major Event Days**

Table 10.2 is provided as an initial review of Major Event Day information. The main premise of the IEEE Major Event Day calculation is that using the 2.5b method should classify 2.3 days each year as MED's. The following table shows the previous major event days, the daily SAIDI value and the relationship of the yearly  $T_{MED}$ .

Year	Date	SAIDI	$T_{MED}$
2004	05-21-2004	7.11	6.35
	08-02-2004	7.36	
	12-08-2004	31.00	
2005	06-21-2005	39.53	4.916
	06-22-2005	9.03	
	08-12-2005	19.60	
2006	01-11-2006	12.10	7.058
	03-09-2006	8.58	
	11-13-2006	30.79	
	12-14-2006	29.26	
2007	12-15-2006	158.31	8.017
	01-06-2007	9.98	
	06-29-2007	32.64	
	07-13-2007	12.79	
	08-31-2007	21.30	

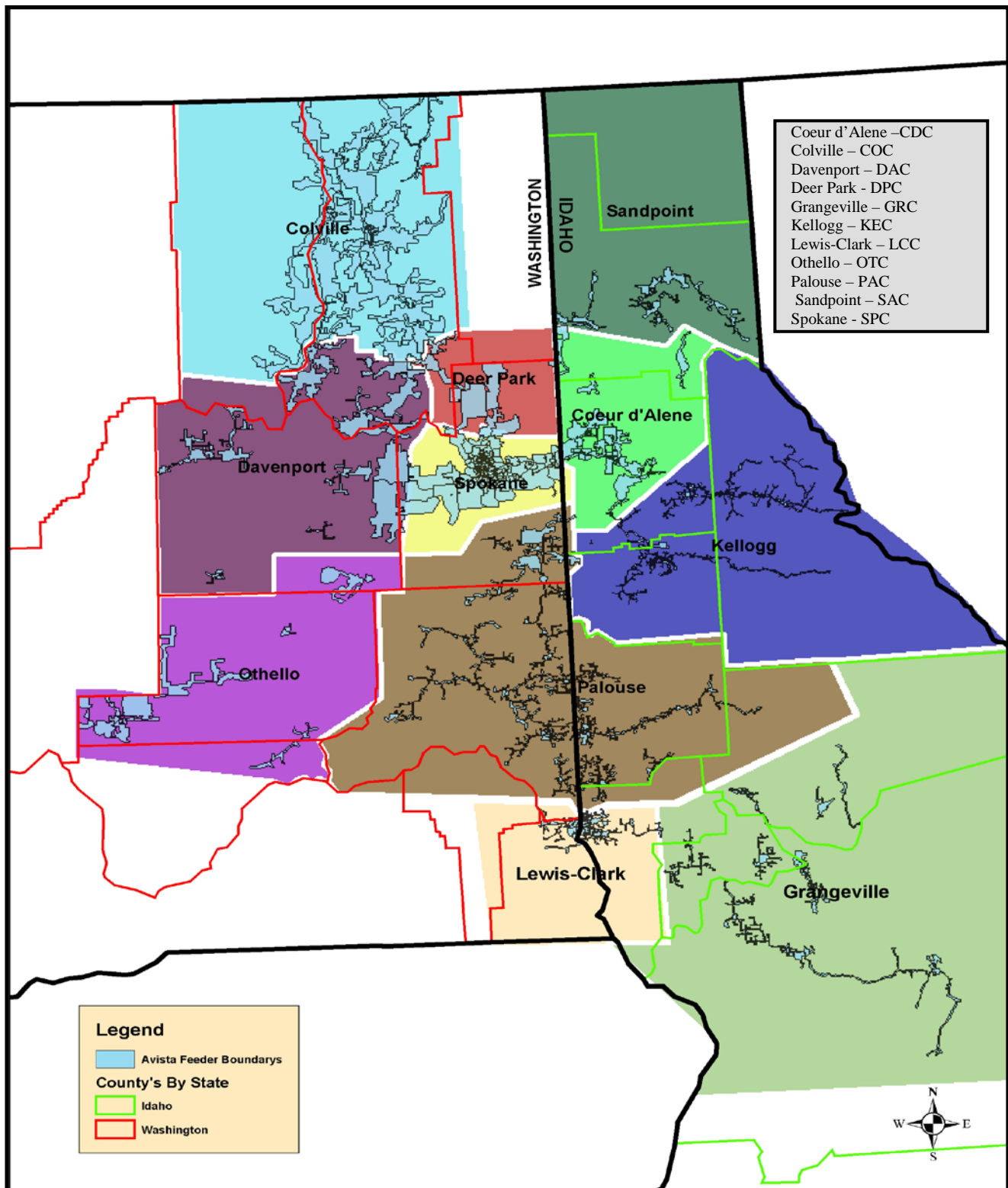
2008	01-27-2008	17.57	9.224
	07-10-2008	36.74	
	08-18-2008	9.49	
2009	None		9.925
2010	5/3/2010	21.04	11.110
	11/16/2010	68.67	
2011	None		10.848
2012	1/19/2012	9.93	9.489
	12/17/2012	14.35	
2013	8/25/2013	24.97	8.956
	8/26/2013	11.78	
	9/15/2013	14.01	
	11/16/2013	11.09	
2014			8.719



<b>MAIN CATEGORY</b>	<b>Proposed (Changes Only)</b>	<b>SUB CATEGORY</b>	<b>Proposed (Changes Only)</b>	<b>Definition</b>
EQUIPMENT SUB		High side fuse Bus Insulator High side PCB High side Swt / Disc Low side OCB/Recloser Low side Swt / Disc Relay Misoperation Regulator Transformer Other		
MISCELLANEOUS		SEE REMARKS		For causes not specifically listed elsewhere
NOT OUR PROBLEM <i>(Outages in this category are not included in reported statistics)</i>		Customer Equipment SEE REMARKS  Other Utility		Customer equipment causing an outage to their service. If a customer causes an outage to another customer this is covered under Public.  Outages when another utility's facilities cause an outage on our system.
POLE FIRE				Used when water and contamination causes insulator leakage current and fire. If insulator is leaking due to material failure list under equipment failure. If cracked due to gunfire use customer caused other.
PLANNED		Maintenance / Upgrade Forced		Outage, normally prearranged, needed for normal construction work Outage scheduled to repair outage damage
TREE		Tree fell  Tree growth  Service  Weather		For outages when a tree falls into distribution primary/secondary or transmission during normal weather Tree growth causes a tree to contact distribution primary/secondary or transmission during normal weather. For outages when a tree falls or grows into a service. When snow and wind storms causes a tree or branch to fall into, or contact the line. Includes snow loading and unloading.
UNDETERMINED				Use when the cause cannot be determined
WEATHER		Snow / Ice  Lightning  Wind		Outages caused by snow or ice loading or unloading on a structure or conductor. Use weather tree for snow and ice loading on a tree.  Lightning flashovers without equipment damage. Equipment failures reported under the equipment type. Outages when wind causes conductors to blow into each other, another structure, building etc.

# Office Areas

Chart 12.1 – Office Areas



## Index Calculations

### Sustained Interruption

- An interruption lasting longer than 5 minutes.

### Momentary Interruption Event

- An interruption lasting 5 minutes or less. The event includes all momentary interruptions occurring within 5 minutes of the first interruption. For example, when an interrupting device operates two, three, or four times and then holds, it is considered a single event.

### SAIFI – System Average Interruption Frequency Index

- The average number of sustained interruptions per customer
- = 
$$\frac{\text{The number of customers which had *sustained interruptions*}}{\text{Total number of customers served}}$$
- = 
$$\frac{\sum N_i}{N_T}$$

### MAIFI<sub>E</sub> – Momentary Average Interruption Event Frequency Index

- The average number of momentary interruption events per customer
- = 
$$\frac{\text{The number of customers which had *momentary interruption events*}}{\text{Total number of customers served}}$$
- = 
$$\frac{\sum ID_E N_i}{N_T}$$
- MAIFI can be calculated by one of two methods. Using the number of momentary interruptions or the number momentary events. This report calculates MAIFI<sub>E</sub> using momentary events. The event includes all momentary interruptions occurring within 5 minutes of the first interruption. For example, when an automatic interrupting device opens and then recloses two, or three times before it remains closed, it is considered a single event.

### SAIDI – System Average Interruption Duration Index

- Average sustained outage time per customer
- = 
$$\frac{\text{Outage duration multiplied by the customers effected for all *sustained interruptions*}}{\text{Total number of customers served}}$$
- = 
$$\frac{\sum r_i N_i}{N_T}$$

### CAIDI – Customer Average Interruption Duration Index

- Average restoration time
- = 
$$\frac{\text{Outage duration multiplied by the customers effected for all *sustained interruptions*}}{\text{The number of customers which had *sustained interruptions*}}$$
- = 
$$\frac{\sum r_i N_i}{\sum N_i}$$

#### Quantities

$i$  = An interruption event;

$r_i$  = Restoration time for each interruption event;

$T$  = Total;

$ID_E$  = Number of interrupting device events;

$N_i$  = Number of interrupted customers for each interruption event during the reporting period;

$N_T$  = Total number of customers served for the area being indexed;

### CEMI<sub>n</sub> – Customers Experiencing Multiple Sustained Interruptions more than n.

- CEMI<sub>n</sub>
- = 
$$\frac{\text{Total Number of Customers that experience more than } n \text{ *sustained interruptions*}}{\text{Total Number of Customers Served}}$$
- = 
$$\frac{CN_{(k>n)}}{N_T}$$

### CEMSMI<sub>n</sub> – Customers experiencing multiple sustained interruption and momentary interruption events.

- CEMSMIn
- = 
$$\frac{\text{Total Number of Customers experiencing more than } n \text{ *interruptions*}}{\text{Total Number of Customers Served}}$$
- = 
$$\frac{CNT_{(k>n)}}{N_T}$$



## MED - Major Event Day

A major event day is a day in which the daily system SAIDI exceeds a threshold value. Its purpose is to allow major events to be studied separately from daily operation, and in the process, to better reveal trends in daily operation that would be hidden by the large statistical effect of major events.

$T_{MED}$  is calculated (taken from the IEEE 1366-2003 Standard)

The major event day identification threshold value,  $T_{MED}$ , is calculated at the end of each reporting period (typically one year) for use during the next reporting period as follows:

- a) Collect values of daily SAIDI for five sequential years ending on the last day of the last complete reporting period. If fewer than five years of historical data are available, use all available historical data until five years of historical data are available.
- b) Only those days that have a SAIDI/Day value will be used to calculate the  $T_{MED}$  (do not include days that did not have any interruptions).
- c) Take the natural logarithm (ln) of each daily SAIDI value in the data set.
- d) Find a(Alpha), the average of the logarithms (also known as the log-average) of the data set.
- e) Find b(Beta), the standard deviation of the logarithms (also known as the log-standard deviation) of the data set.
- f) Compute the major event day threshold,  $T_{MED}$ , using equation (25).

$$T_{MED} = e^{(a + 2.5 b)} \quad (25)$$

g) Any day with daily SAIDI greater than the threshold value  $T_{MED}$  that occurs during the subsequent reporting period is classified as a major event day. Activities that occur on days classified as major event days should be separately analyzed and reported.

## **Numbers of Customers Served**

The following numbers of customers were based on the customers served at the beginning of the year. These numbers were used to calculate indices for this report.

**Table 13.1 – Numbers of Customers Served**

<b>Office</b>	<b>Customers</b>	<b>% of Total</b>
Coeur d'Alene	51655	14.0%
Colville	19365	5.3%
Davenport	5907	1.6%
Deer Park	10817	2.9%
Grangeville	10202	2.8%
Kellogg/St. Maries	14441	3.9%
Lewis-Clark	29597	8.0%
Othello	6809	1.8%
Palouse	39123	10.6%
Sandpoint	14826	4.0%
Spokane	166019	45.0%
<b>System Total</b>	<b>368761</b>	

## **Attachment 1 – SAIDI and SAIFI Historical Summary**

See attachment.

## **Company Contact**

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