

NNSS Lightning Climatology



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**U.S. Department of Commerce (DOC)
National Oceanic and Atmospheric Administration (NOAA)
Office of Oceanic and Atmospheric Research (OAR)
Air Resources Laboratory (ARL)**

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1.0 INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory/Special Operations and Research Division (ARL/SORD) operates a lightning detection network, Figure 1, consisting of four Vaisala Advanced Total Lightning Sensors (LS7001), Figure 2, tuned to detect lightning flashes on the Nevada National Security Site (NNSS). This report describes the lightning climatology products for the NNSS developed with the Vaisala Fault Analysis and Lightning Location Software Client for Windows (FALLS® 5.4.0) using data from the ARL/SORD network.

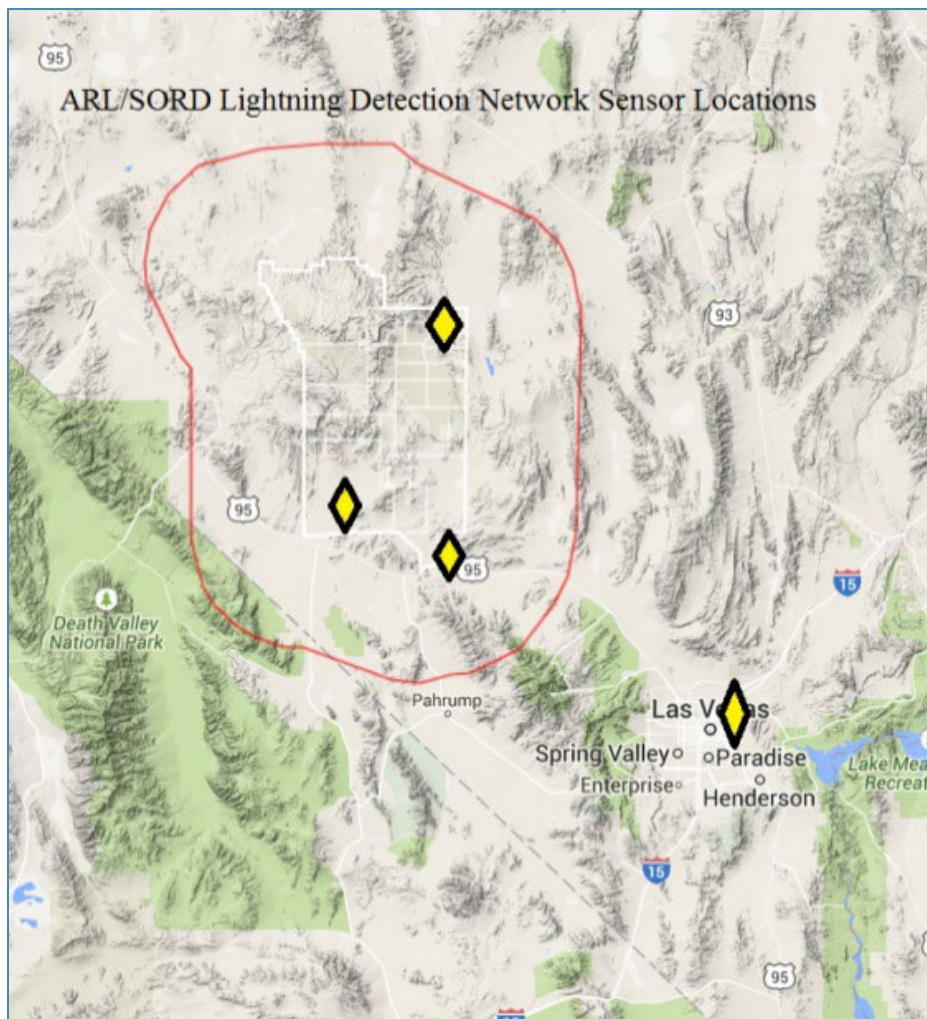


Figure 1. ARL/SORD Lightning Detection Network Sensor Locations.

The local database contains 206,391 flashes from 2012-01-01 00:00:00 through 2022-12-31 23:59:59 within the area bounded by longitudes 116.945°W and 115.550°W and latitudes 36.280°N and 37.683°N, Figure 3.

The analysis was conducted using all available data. When using an 11-year period of record, a single storm or series of storms during a particularly active monsoon can significantly influence the climatology. Approximately 67.8 percent of all flashes recorded in the local database occurred during the July and August. By comparison November, December, January, February and March account for 1.4% of the total lightning activity and are barely perceptible on the histograms.



Figure 2. LS7001 Lightning Sensor at the Desert Rock Weather Observatory.

Three types of plots and one table were produced to illustrate the lightning climatology of selected high hazard and elevated risk facilities on the NNSS:

- 1) Flash density maps: indicate the flash density per square kilometer per year and are rendered at a 1 km by 1 km resolution.
- 2) Hourly histograms: indicate the total number of flashes as a percentage of the total by hour-of-the-day (PST).
- 3) Monthly histograms: indicate the total number of flashes plotted by month as a percentage of the total.
- 4) Historical tables: display the number of flashes by month and year across the period of record.

Flashes can be positively or negatively charged (described in section 2.2.1 & 2.2.2).

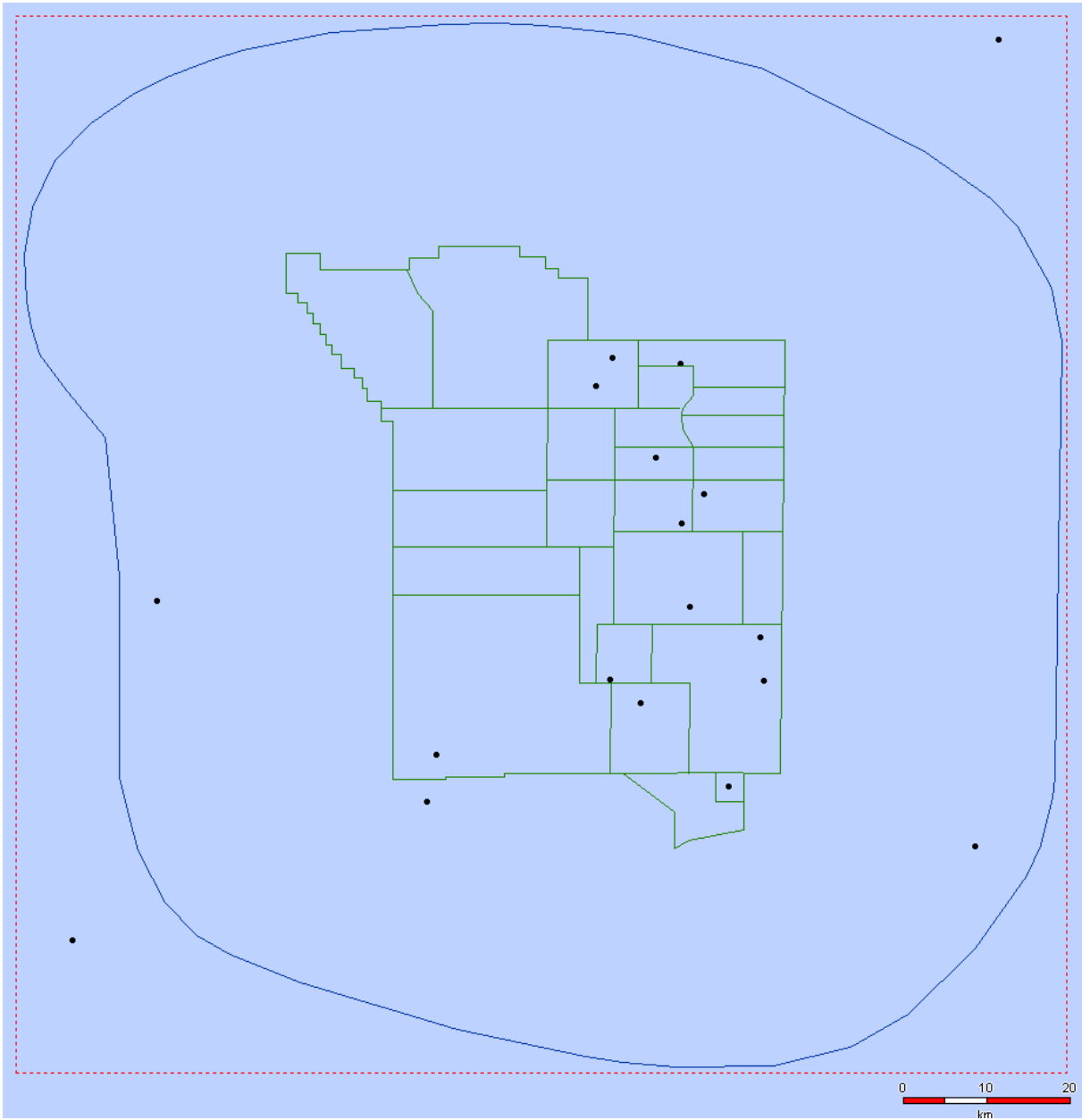


Figure 3. NNSS Lightning Climatology Area [Bounded by Dashed Red Line].

2.0 DESCRIPTION OF LIGHTNING

There are two main types of lightning, intra-cloud and cloud-to-ground. The ARL/SORD lightning detection system is capable of detecting both types. The following is a brief discussion of the different types of lightning.

2.1 *Intra-cloud (IC) lightning*

Intra-cloud or cloud-to-cloud lightning, Figure 4, is an electrical discharge between oppositely charged areas within a thunderstorm or between nearby thunderstorms. When they occur, these flashes are displayed on the ARL/SORD Website Lightning pages (click hyperlink or paste into browser <http://www.sord.nv.doe.gov/Lightning.php?Location=Southwest&Ltime=30>) as colored circles without black outlines. In some cases, intra-cloud or cloud-to-cloud lightning is a precursor to cloud-to-ground lightning flashes.

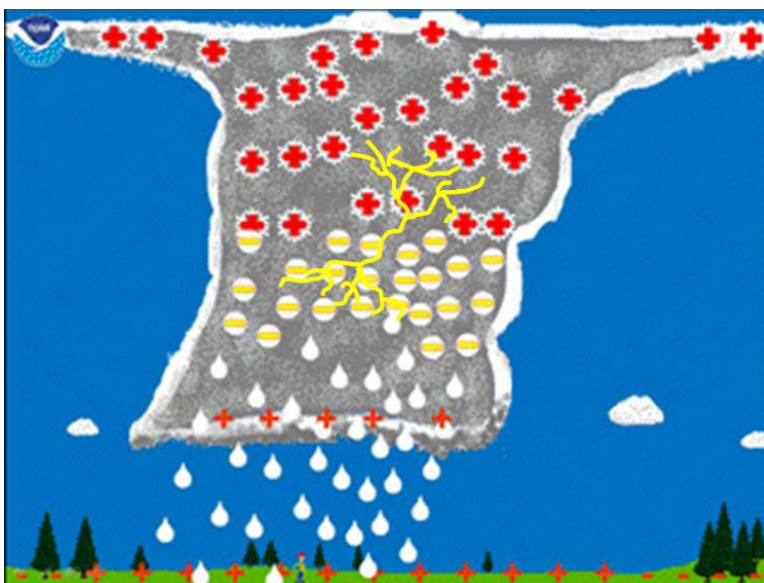


Figure 4. Intra-cloud Lightning

2.2 *Cloud-to-ground (CG) lightning*

Cloud-to-ground (CG) lightning is an electrical discharge between opposite charges in the cloud and on the ground. When cloud-to-ground lightning occurs, the flashes are displayed on the ARL/SORD Website Lightning pages by colored circles with black outlines (click hyperlink or paste into browser <http://www.sord.nv.doe.gov/Lightning.php?Location=Southwest&Ltime=30>). CG lightning can occur between negative charges in the cloud and positive charges on the ground (a negative flash) or vice versa, between positive charges in the cloud and negative charges on the ground (a positive flash). A CG lightning flash consists of one or more *leaders* followed by one or more *return strokes*. The *leader* is the initial step in the lightning flash and establishes the conductive channel that the electrical discharge (lightning flash) will take. The *return stroke* is

the large electrical discharge we see as the bright light. The return stroke occurs very quickly (about 200 million miles per hour) and the channel appears to light up all at once (this is because our eyes cannot perceive things moving at these speeds).

There are two types of CG lightning, negative flashes and positive flashes. The ARL/SORD lightning detection system is capable of detecting both types.

2.2.1 *CG lightning – Negative Flash*

A negative flash, Figure 5, is the most common and occurs when the leaders originate from the negatively charged area of the thunderstorm.

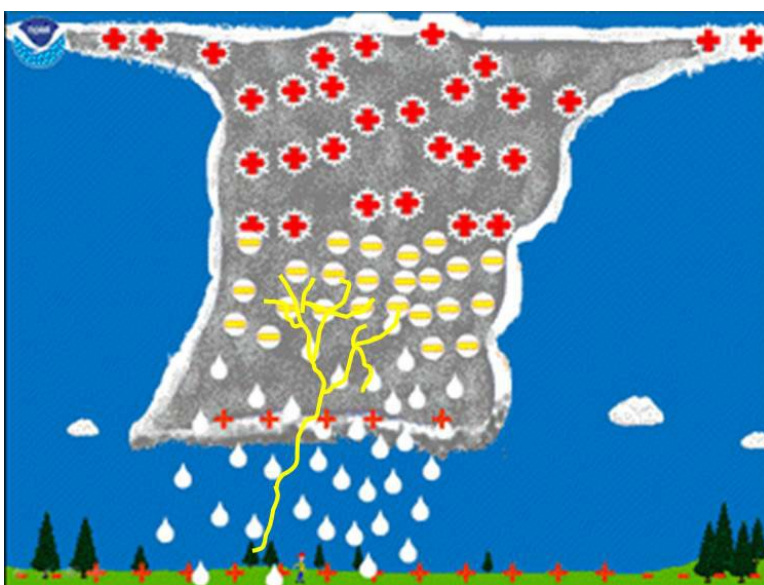


Figure 5. Negative Flash Cloud-to-Ground Lightning

2.2.2 *CG lightning – Positive Flash*

A positive flash, Figure 6, occurs when the leaders originate from a positively charged area of the thunderstorm, typically the upper part of a thunderstorm. Most of the time, these positive leaders are shielded from the ground by the negatively charged central area of the cloud. However, if the storm becomes tilted or if the anvil spreads out in front of or behind the main thunderstorm cloud, the ground is no longer shielded from this upper positive charge. If a large charge differential develops between the upper cloud and the ground, a downward moving positive leader can develop. Since a positive leader usually is the result of a tilted cloud or an anvil cloud out in front or behind the main storm and rain area, positive flashes can occur at significant distances from the main storm. These distances can be at least 5 to 10 miles. These distant flashes are sometimes called “blue sky” lightning since the sky directly above the ground impact may not be experiencing stormy conditions. In addition, since the genesis area of the positive leader usually is at the top of the cloud and higher in the atmosphere, a much greater charge differential is required to initiate a

positive flash as compared to a negative flash. As a result, positive flashes occur much less frequently with much greater distances between flashes. On average positive flashes make up only about 14% of the total flashes on the NNSS.

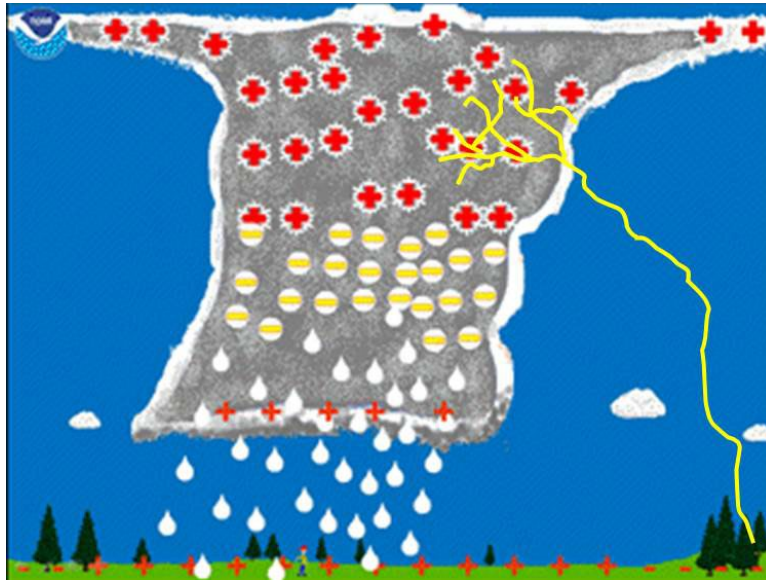


Figure 6. Positive Flash Cloud-to-Ground Lightning

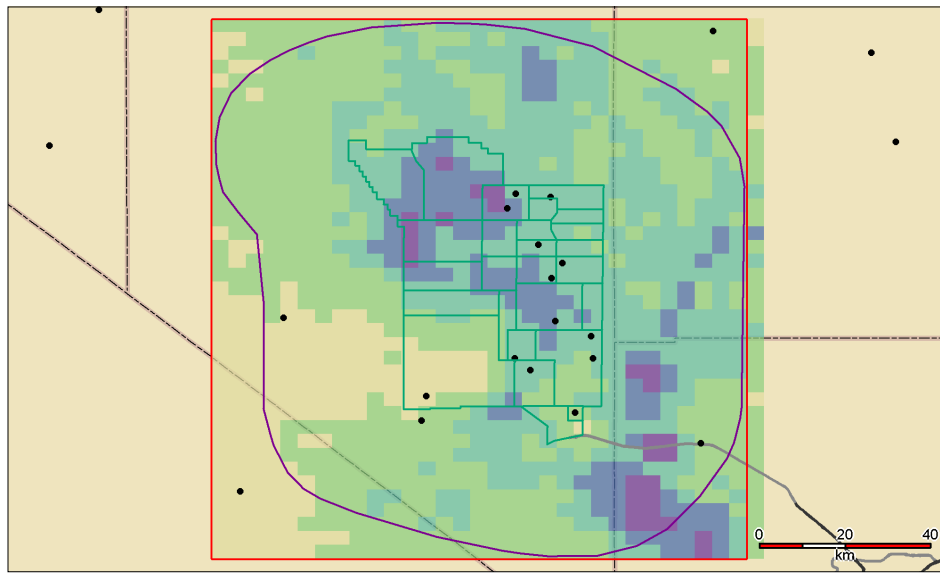
Information in Section 2 of this document was obtained from the following source:
Jensenijs, John S. Jr., Lightning Safety Specialist, National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (DOC). [Accessed August 1, 2023].
Understanding Lightning. <https://www.weather.gov/safety/lightning-science-scienceintro>

3.0 FACILITY REPORTS

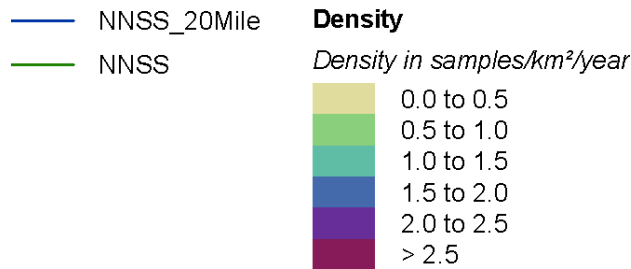
3.1.1	Nevada National Security Site	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 20 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

206,391 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were recorded over the 11-year period of record. The maximum flash density revealed are $>2.0 \text{ km}^2/\text{per year}$ and occur over the elevated terrain of the Spring Mountain range Southeast of the NNSS, over Rainer Mesa, as well as the Belted Range north of NNSS. The maximum flash densities on the NNSS occurred over the northern areas [Areas 12, 19 and 20].

83,805 – CG Flashes / 122,586 – IC Flashes

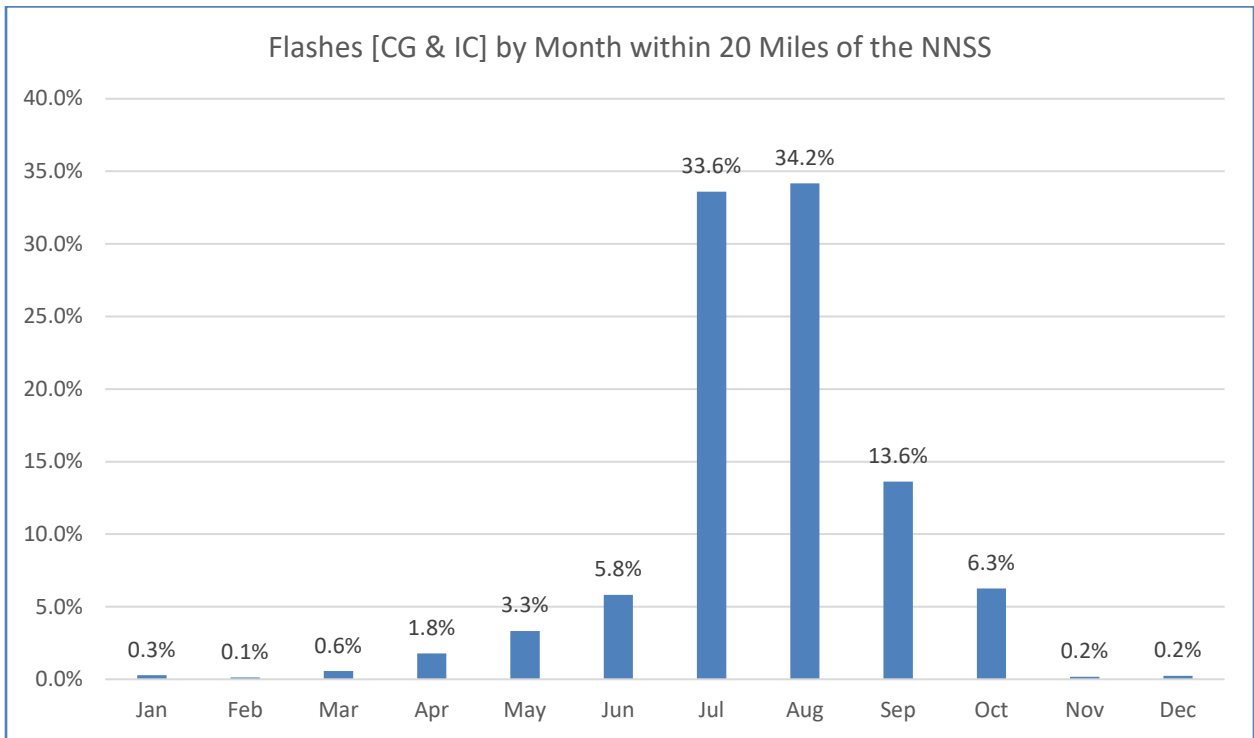
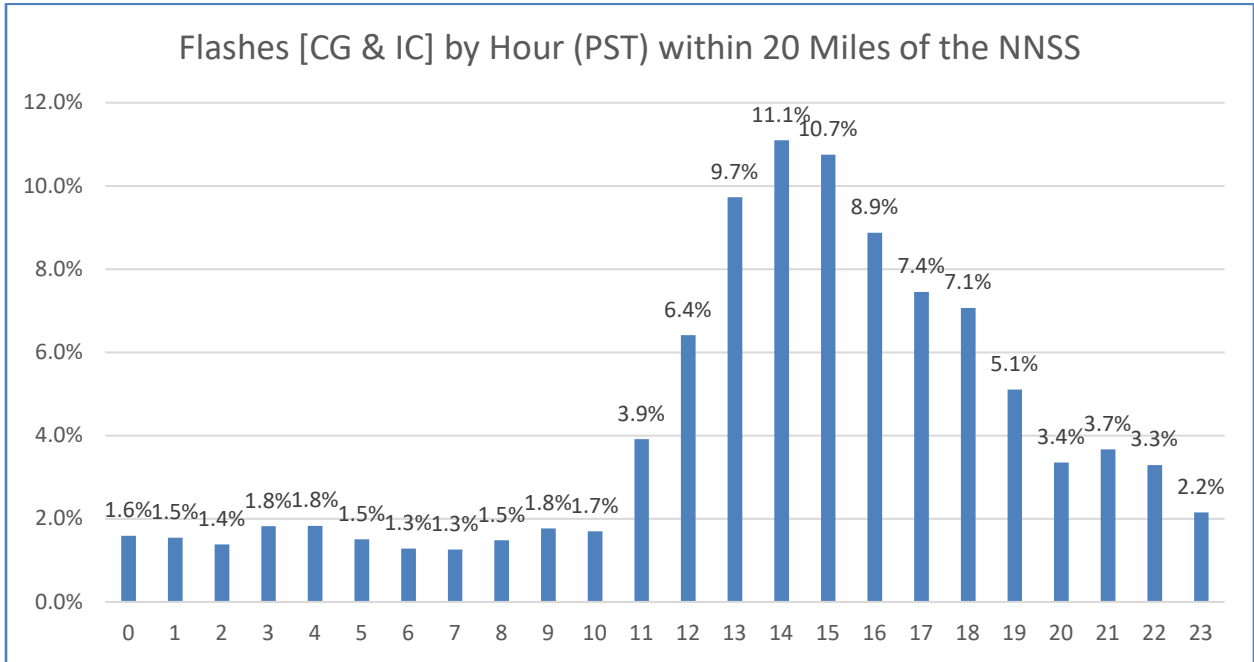


Legend

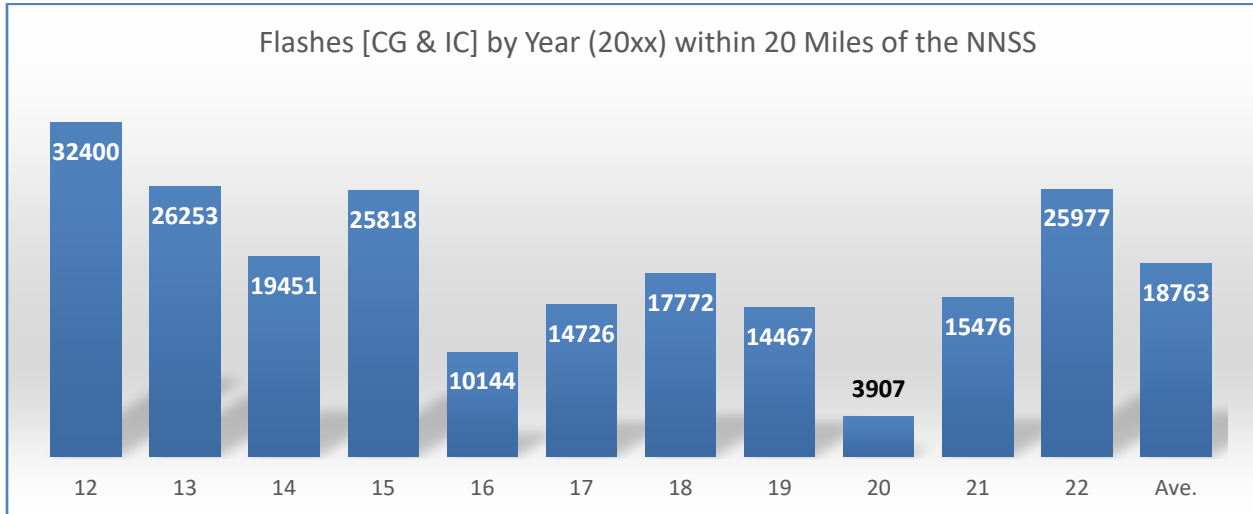


Thunderstorms over the NNSS occur mostly during the summer season, July and August, as the southwest monsoon sends deep tropical moisture north and west from the Gulf of Mexico at the mid-levels of the atmosphere, and from the Gulf of California at the lower levels. Most of the lightning the region starts around mid-day over the higher terrain and moves outward to lower elevations in the late afternoon and early evening hours.

3.1.2	Nevada National Security Site	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 20 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.1.3	Nevada National Security Site	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 20 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

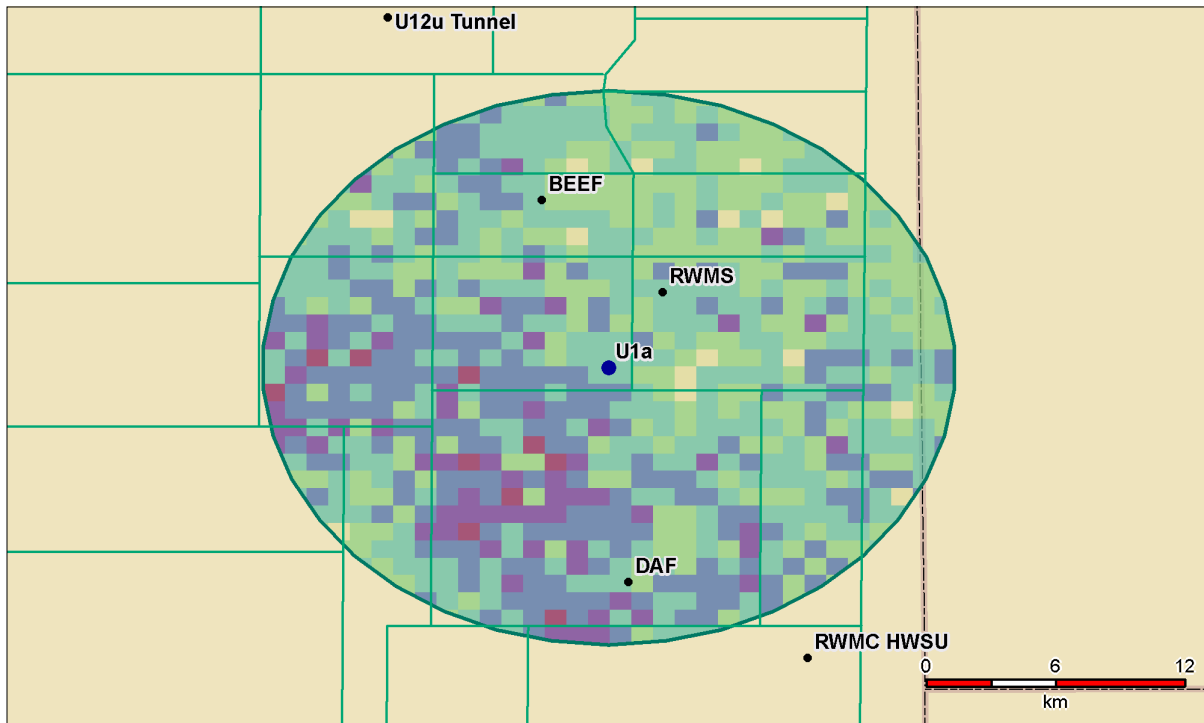


NNSS	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	25	1	0	0	451	17	14	59	0	34	0	601
Feb	45	0	84	41	8	1	1	7	42	33	0	262
Mar	35	6	184	185	129	305	48	119	75	62	21	1169
Apr	20	120	17	482	242	66	58	2256	309	102	6	3678
May	25	844	136	1953	575	196	460	2123	106	418	24	6860
Jun	0	7	18	359	3872	39	1	3591	681	3112	331	12011
Jul	10965	7613	6455	7261	3193	3237	11014	2628	0	9237	7729	69332
Aug	17342	10920	8302	6835	1301	4773	2831	3053	2623	2148	10420	70548
Sep	2242	6683	4237	286	147	6084	863	347	0	239	6999	28127
Oct	1610	59	5	8317	208	2	2443	0	0	89	204	12937
Nov	3	0	7	9	8	6	25	31	69	0	197	355
Dec	88	0	6	90	10	0	14	253	2	2	46	511
Totals	32400	26253	19451	25818	10144	14726	17772	14467	3907	15476	25977	206391

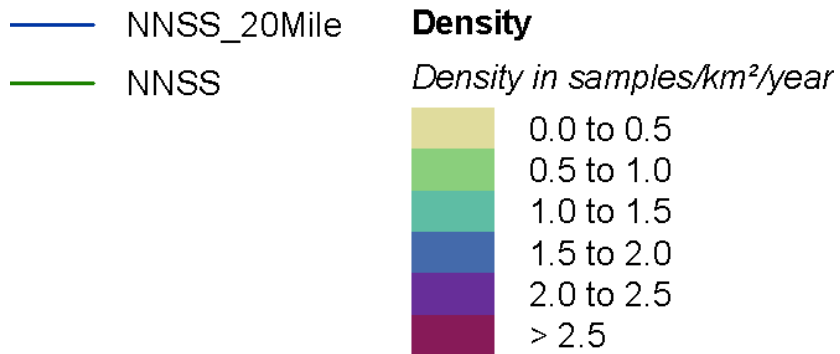
3.2.1	Area 1S - U1a	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 12,114 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of U1a. The highest flash densities occur at the elevated terrain South-Southwest and West of U1a.

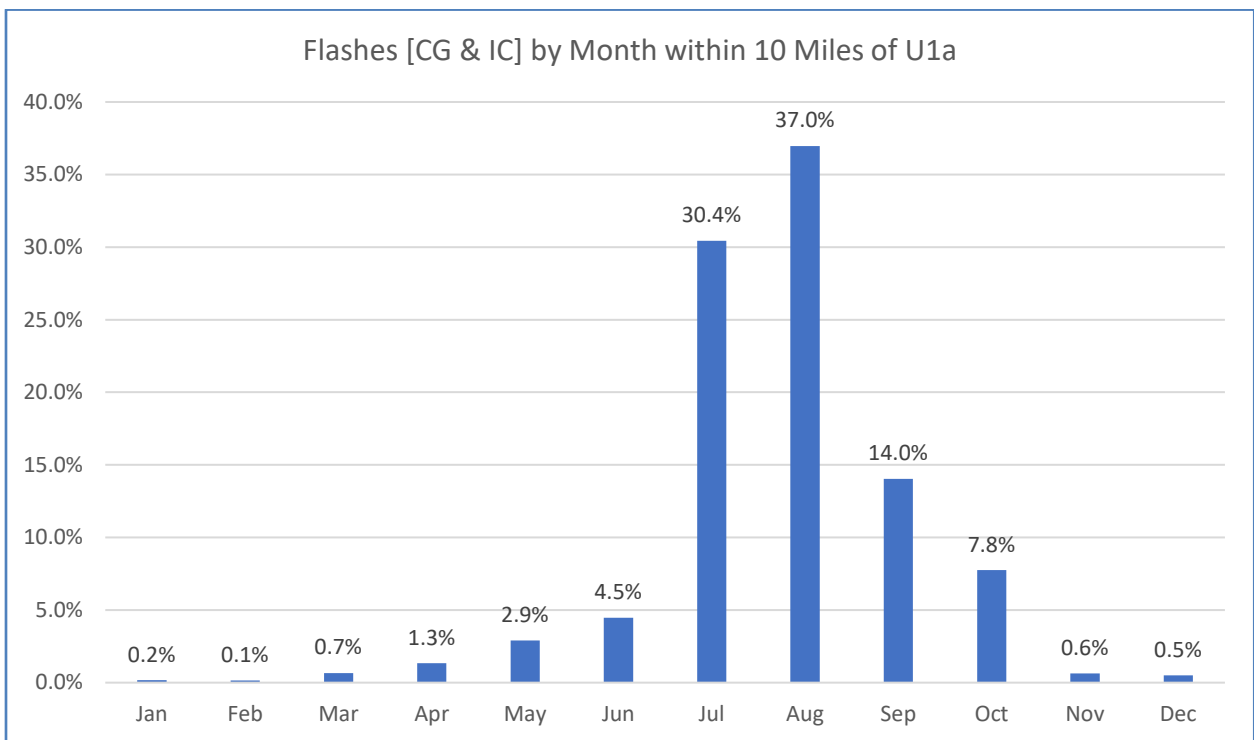
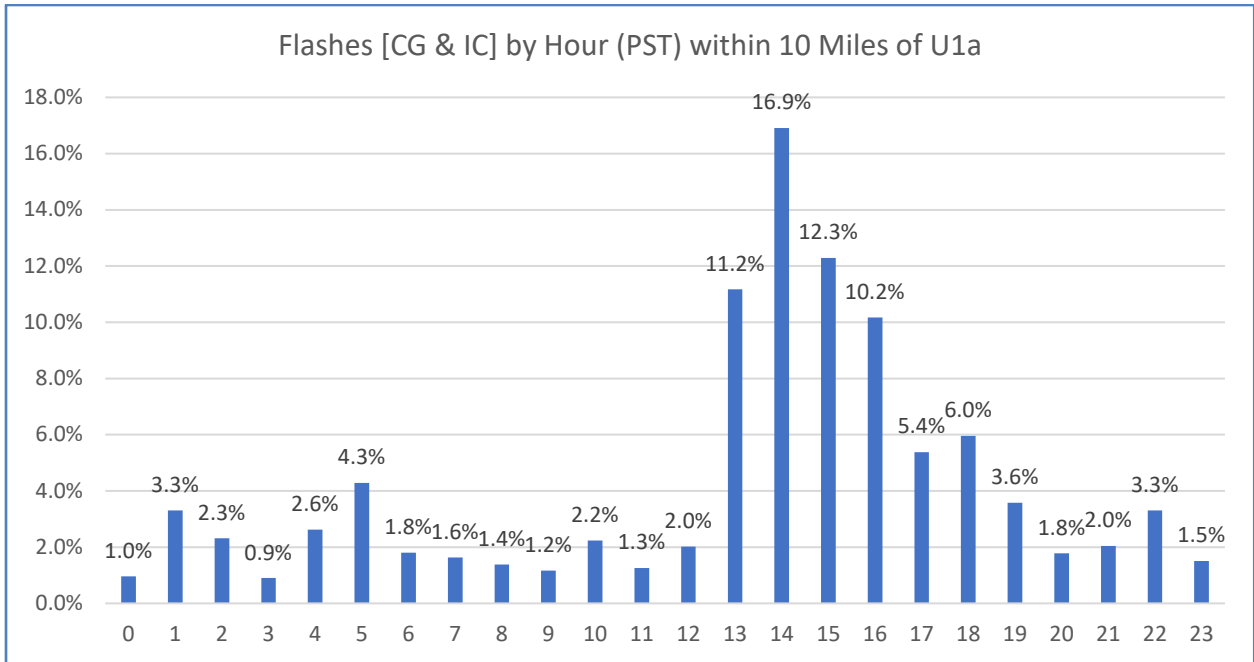
3,495 – CG Flashes / 8,619 – IC Flashes



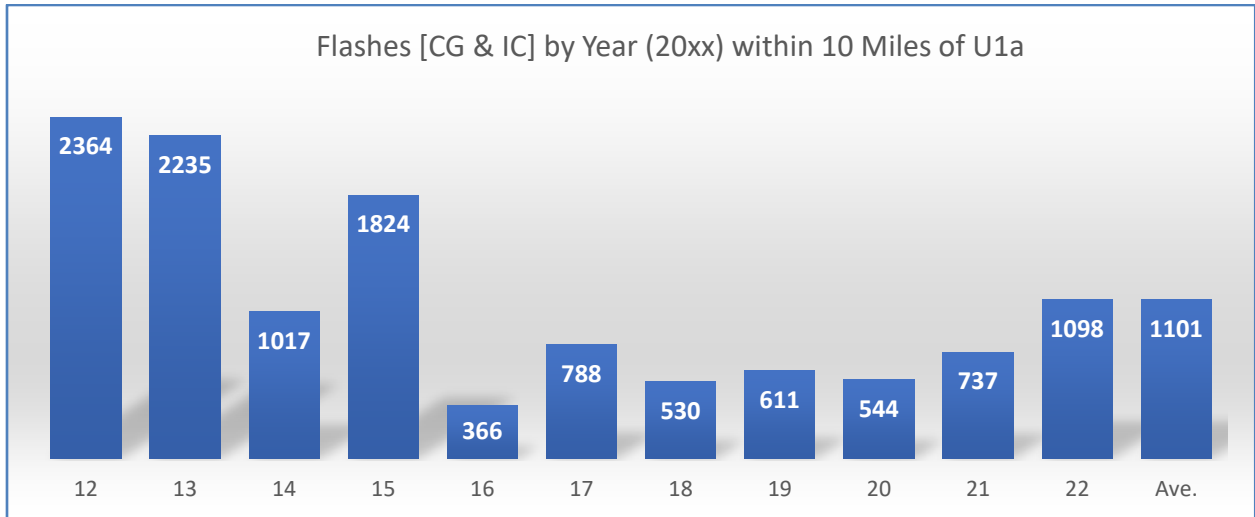
Legend



3.2.2	Area 1S - U1a	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.2.3	Area 1S - U1a	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

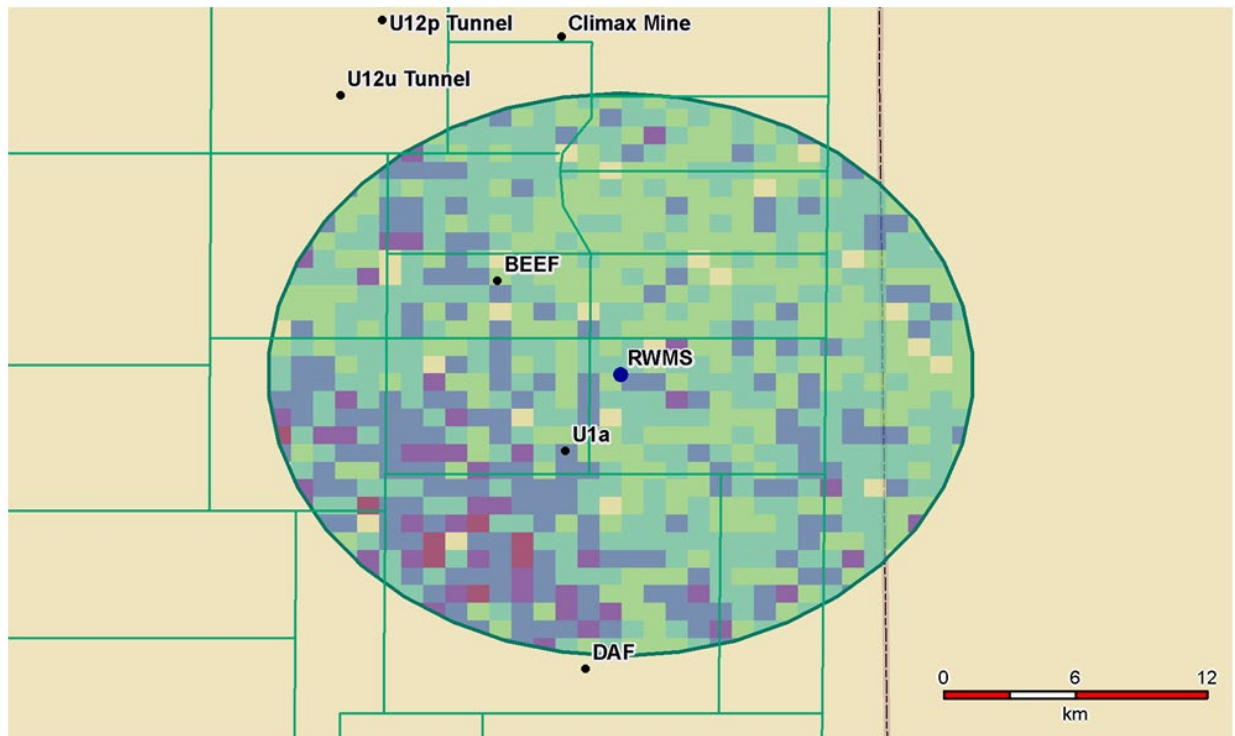


U1a	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	20	0	0	0	0	0	0	20
Feb	14	0	3	0	0	0	0	0	0	0	0	17
Mar	0	0	50	0	0	14	0	2	14	0	0	80
Apr	0	10	0	8	1	2	1	83	37	20	0	162
May	0	32	2	210	2	22	14	64	0	6	0	352
Jun	0	0	0	11	158	0	0	201	4	137	30	541
Jul	951	545	466	380	31	226	381	72	0	426	209	3687
Aug	1227	707	341	540	116	253	21	130	489	135	519	4478
Sep	25	923	155	0	16	271	85	1	0	9	216	1701
Oct	145	18	0	670	22	0	28	0	0	4	52	939
Nov	0	0	0	0	0	0	0	6	0	0	70	76
Dec	2	0	0	5	0	0	0	52	0	0	2	61
Totals	2364	2235	1017	1824	366	788	530	611	544	737	1098	12114

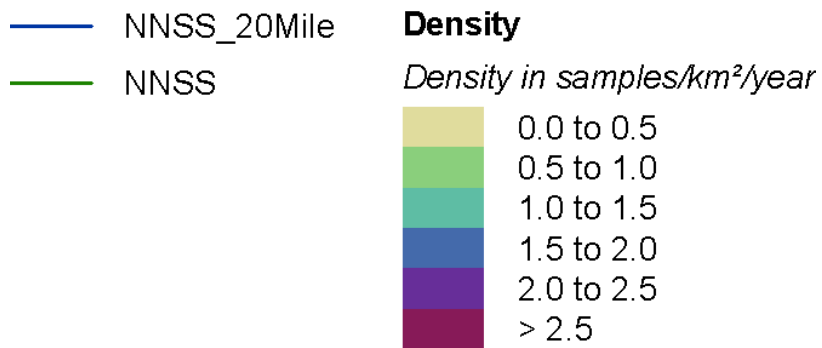
3.3.1	Area 3 - RWMS	Data Date Range
ARL\SORD NNSL Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 11,382 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of RWMS. The highest flash densities occur at the elevated terrain West and Southwest of RWMS, with an isolated peak just southeast of the facility.

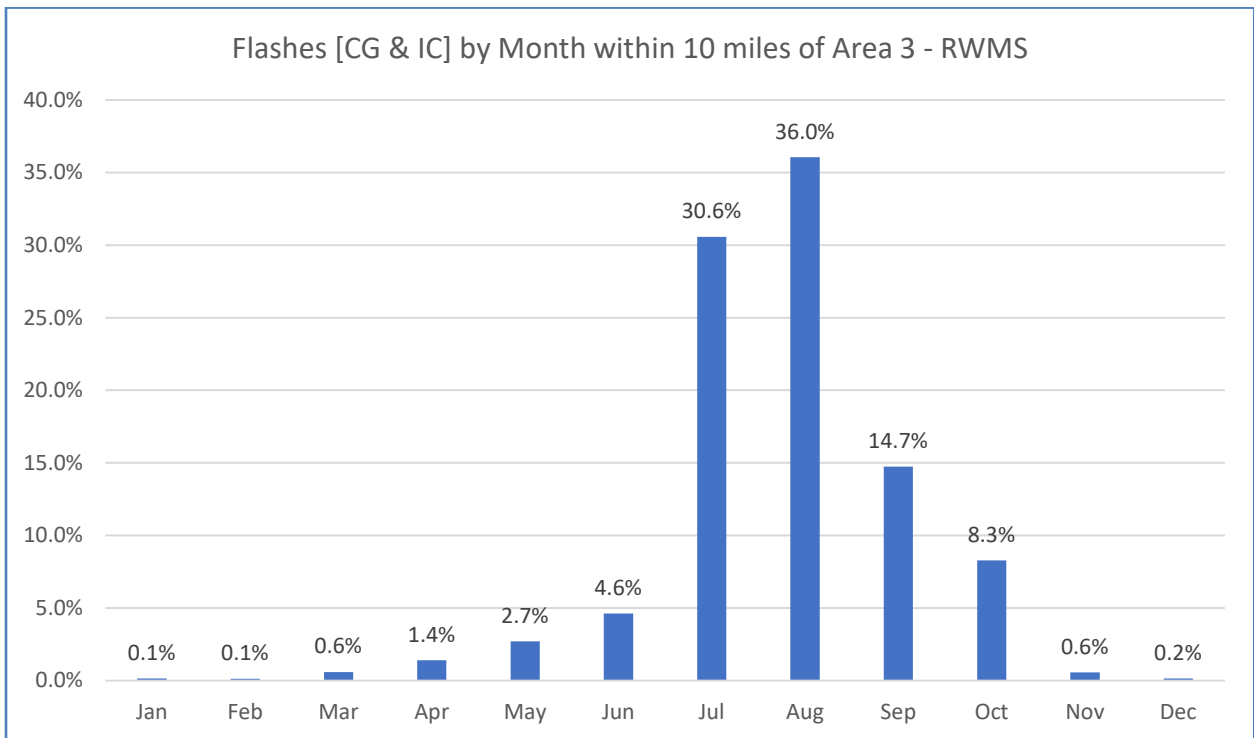
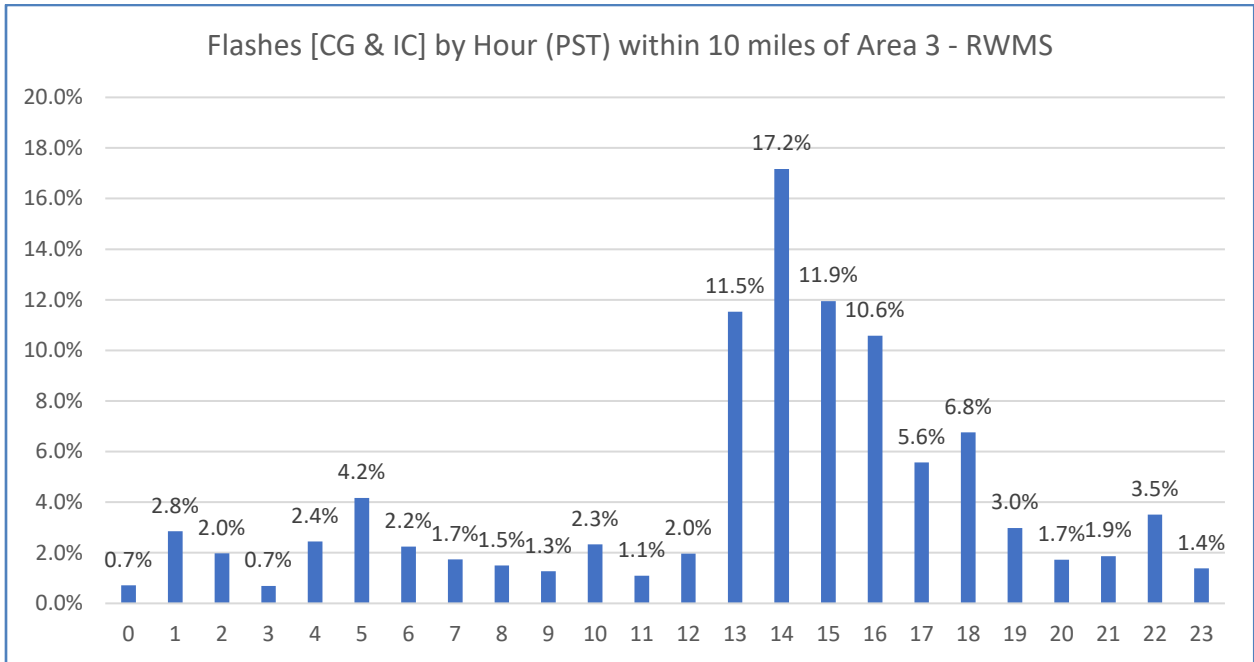
3,401 – CG Flashes / 7,981 – IC Flashes



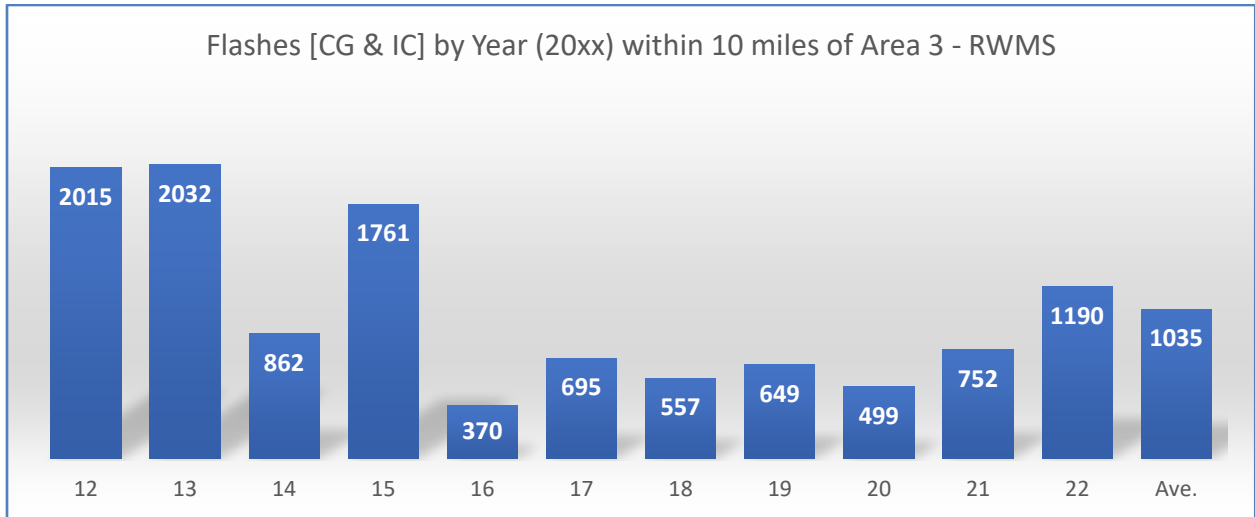
Legend



3.3.2	Area 3 - RWMS	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.3.3	Area 3 - RWMS	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

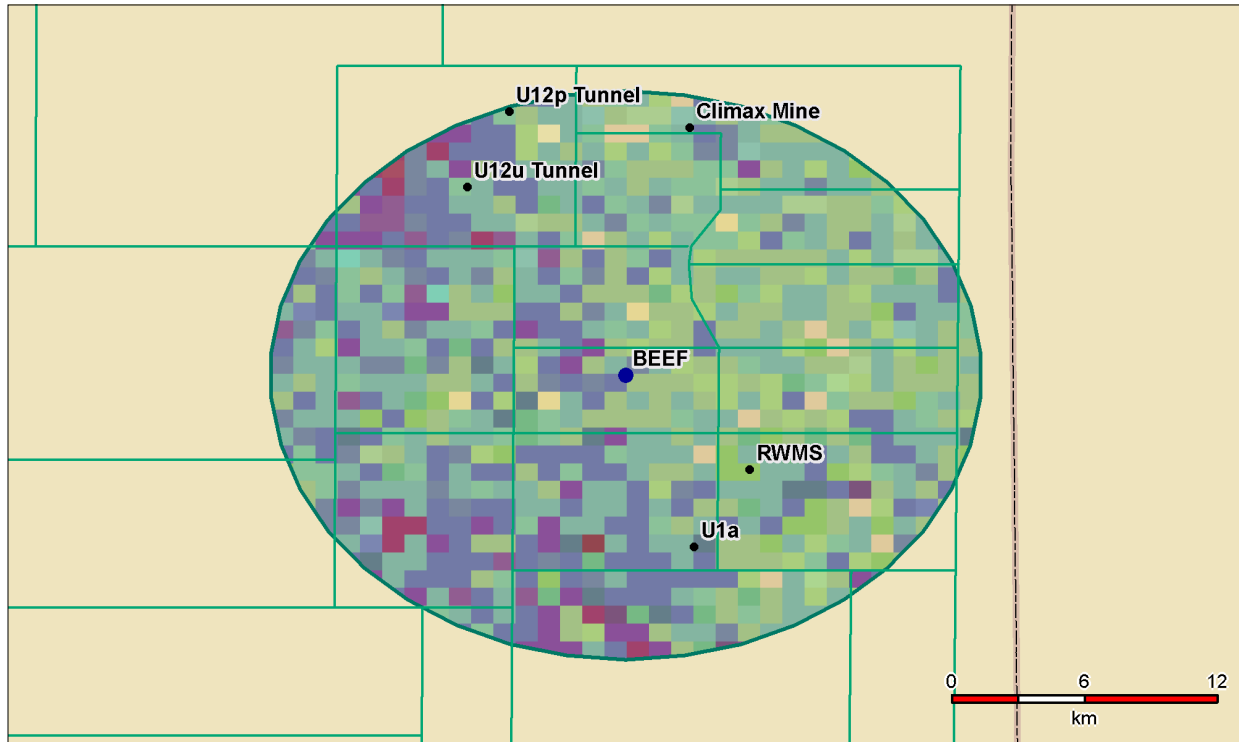


A3	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	16	0	0	0	0	0	0	16
Feb	10	0	3	0	0	0	0	2	0	0	0	15
Mar	0	0	35	0	0	7	2	0	24	0	0	68
Apr	0	10	0	7	1	1	1	89	25	27	0	161
May	0	34	3	178	1	7	7	72	4	2	0	308
Jun	0	0	0	12	153	0	0	266	5	73	18	527
Jul	712	601	414	390	39	158	422	62	0	511	170	3479
Aug	1111	502	299	496	115	229	28	142	441	125	615	4103
Sep	28	868	108	0	23	293	59	0	0	12	287	1678
Oct	152	17	0	672	22	0	38	0	0	2	41	944
Nov	0	0	0	0	0	0	0	7	0	0	58	65
Dec	2	0	0	6	0	0	0	9	0	0	1	18
Totals	2015	2032	862	1761	370	695	557	649	499	752	1190	11382

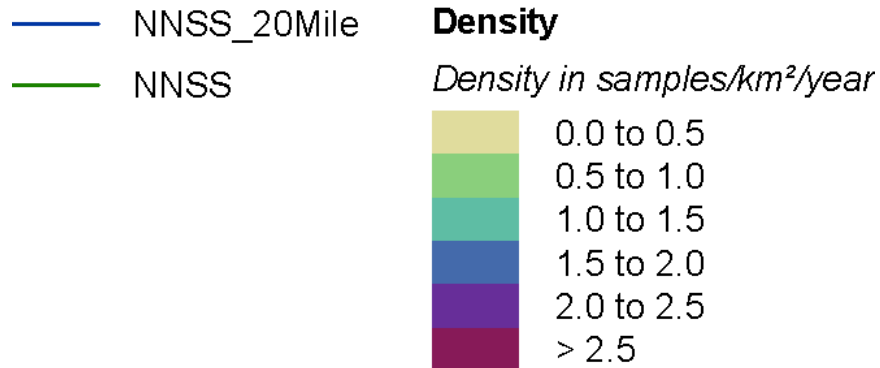
3.4.1	Area 4 - BEEF	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 11,696 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of BEEF. The highest flash densities occur at the elevated terrain Northwest and Southwest of BEEF.

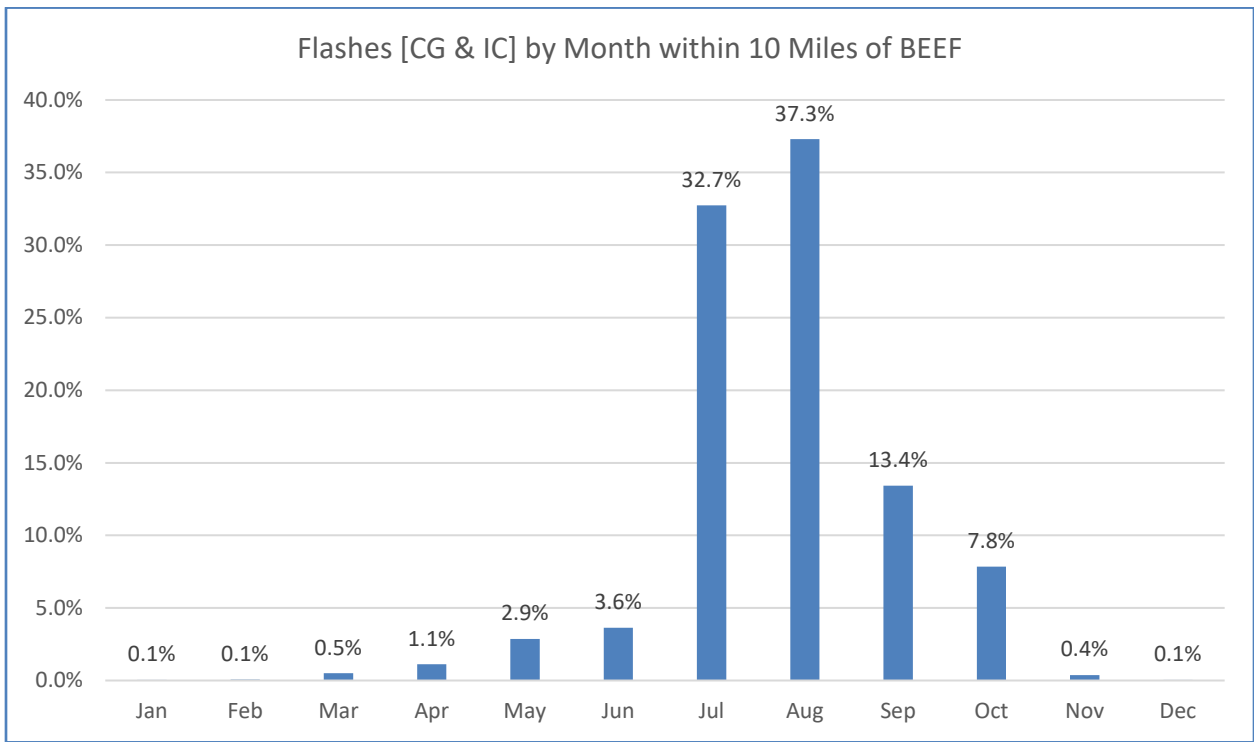
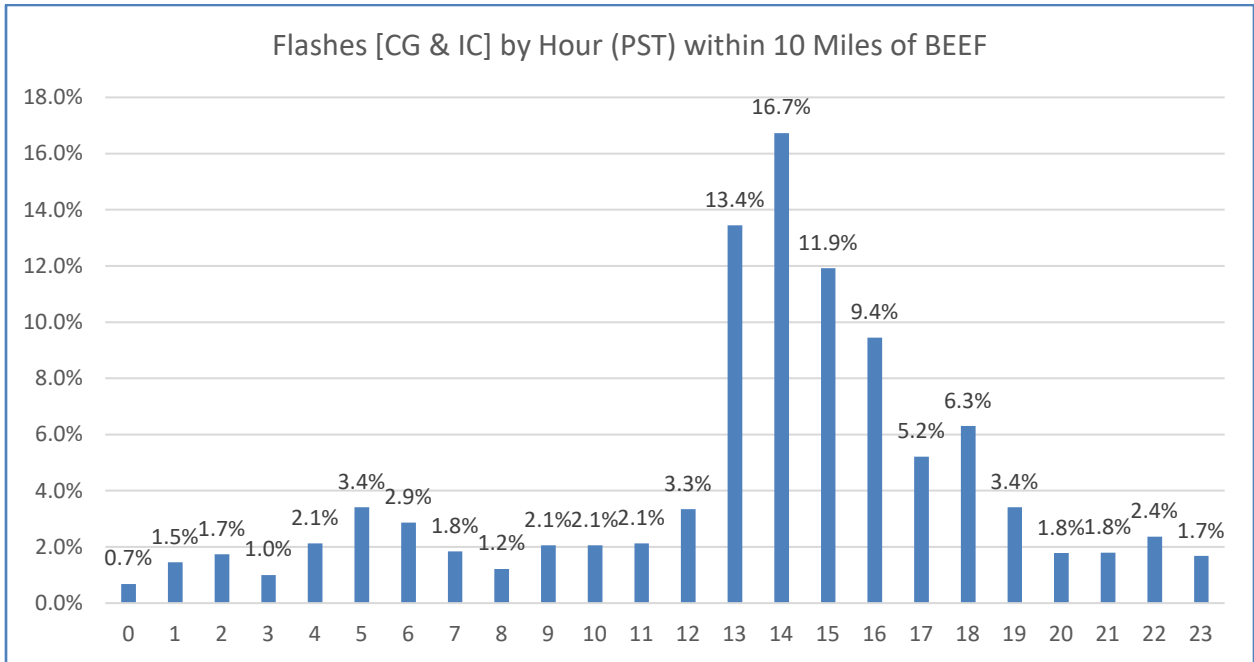
3,711 – CG Flashes / 7,985 – IC Flashes



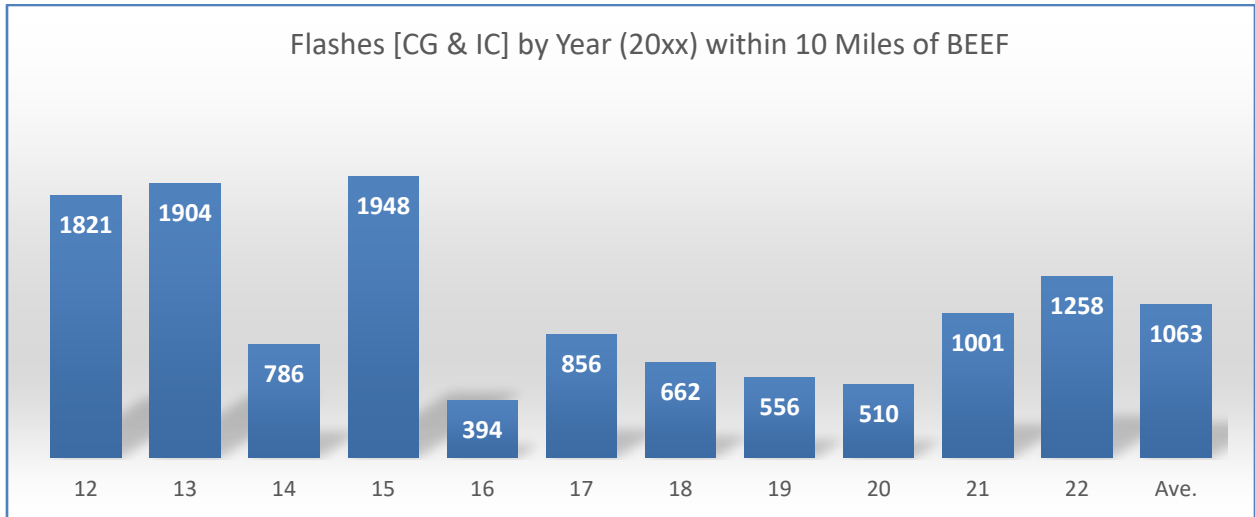
Legend



3.4.2	Area 4 - BEEF	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.4.3	Area 4 - BEEF	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

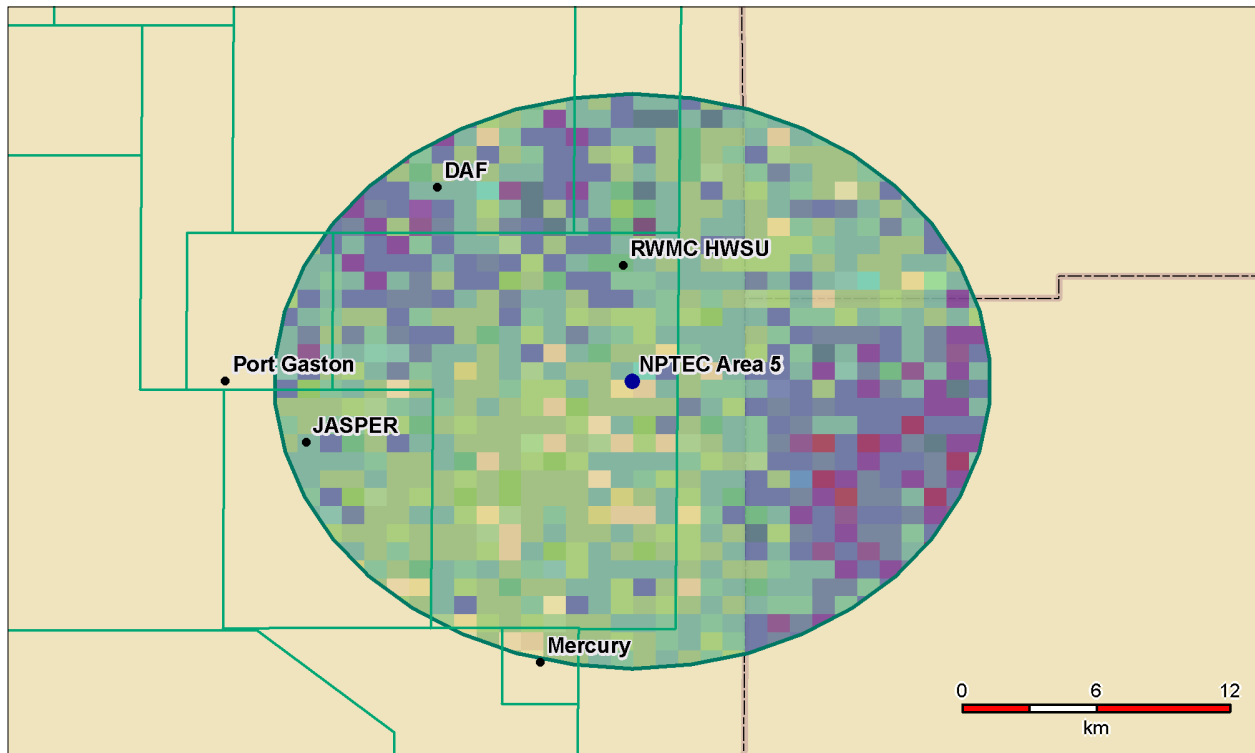


A4	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	6	0	0	0	0	0	0	6
Feb	2	0	3	1	0	0	0	2	0	0	0	8
Mar	0	0	22	0	0	18	4	4	12	0	0	60
Apr	0	2	0	0	5	3	1	63	29	28	0	131
May	0	42	2	162	23	7	10	75	1	14	0	336
Jun	0	0	0	19	141	0	0	141	6	111	8	426
Jul	721	713	385	319	68	174	493	134	0	684	138	3829
Aug	956	430	236	711	119	318	63	126	462	161	781	4363
Sep	34	704	138	0	28	336	62	2	0	3	263	1570
Oct	105	13	0	735	4	0	29	0	0	0	31	917
Nov	1	0	0	0	0	0	0	7	0	0	36	44
Dec	2	0	0	1	0	0	0	2	0	0	1	6
Totals	1821	1904	786	1948	394	856	662	556	510	1001	1258	11696

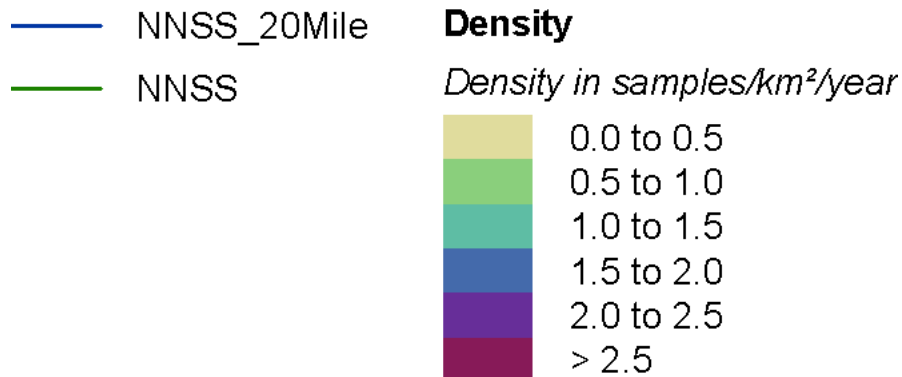
3.5.1	Area 5C - NPTEC	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 11,216 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of NPTEC. The highest flash densities occur at the elevated terrain Southeast and Northwest of NPTEC.

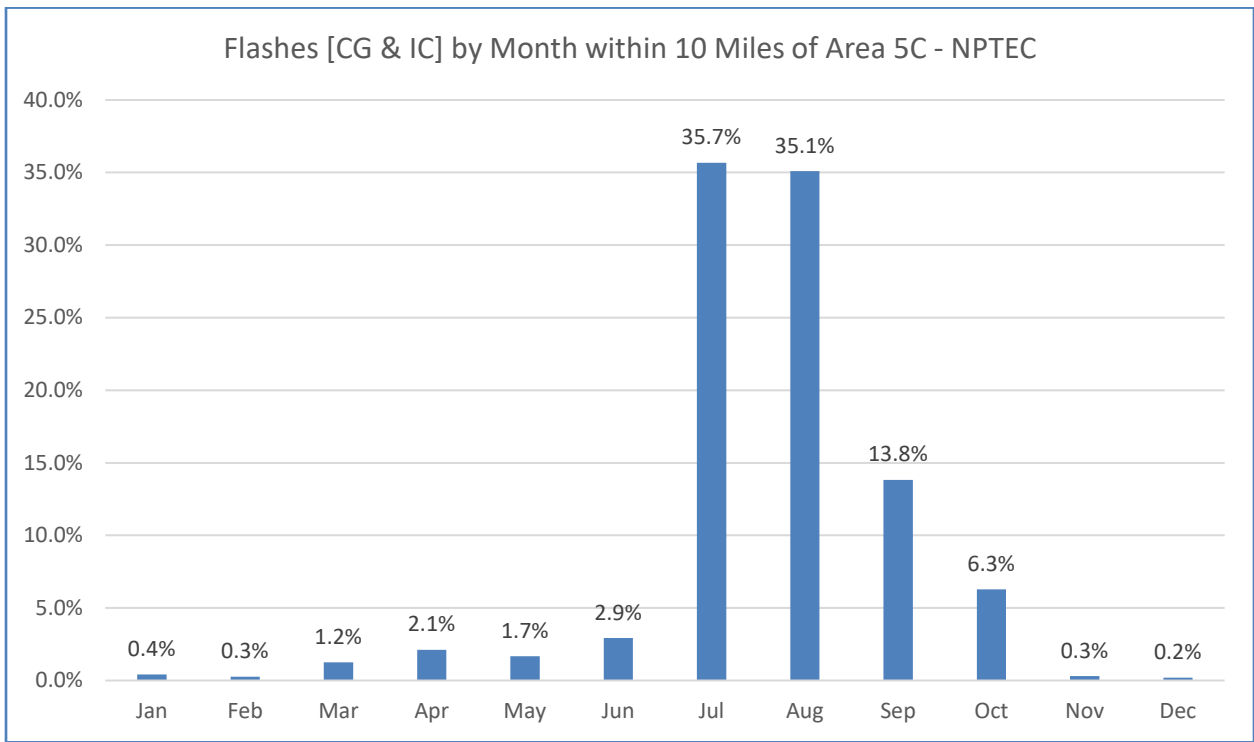
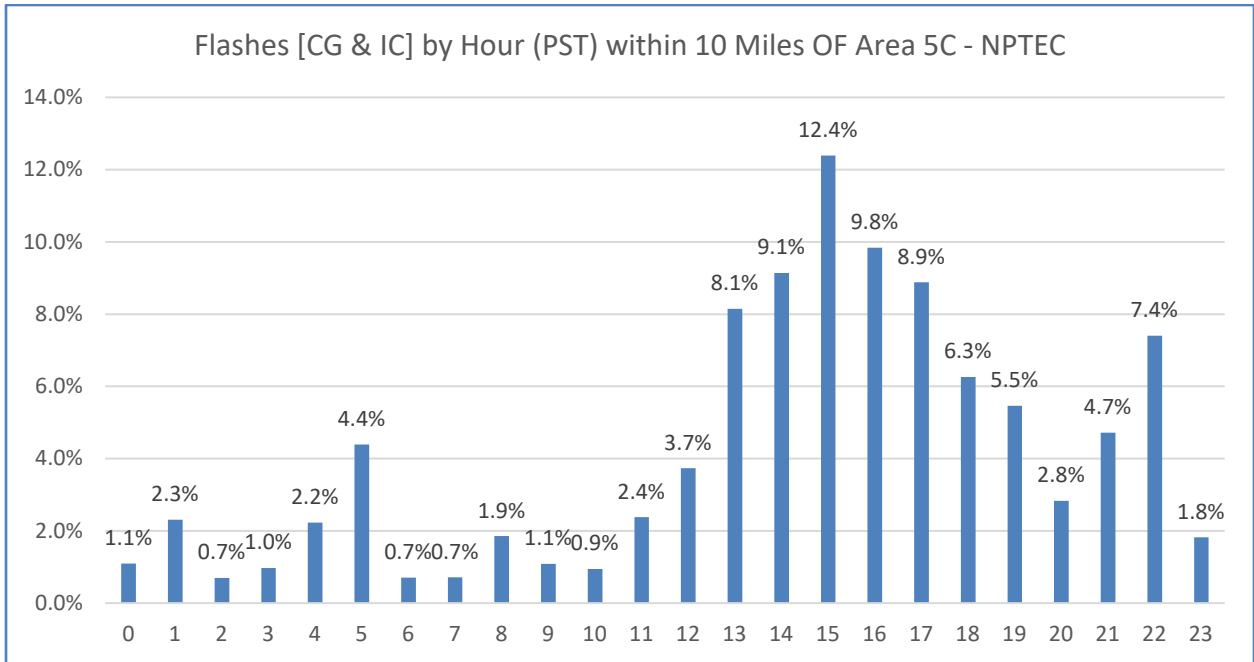
2,884 – CG Flashes / 8,332 – IC Flashes



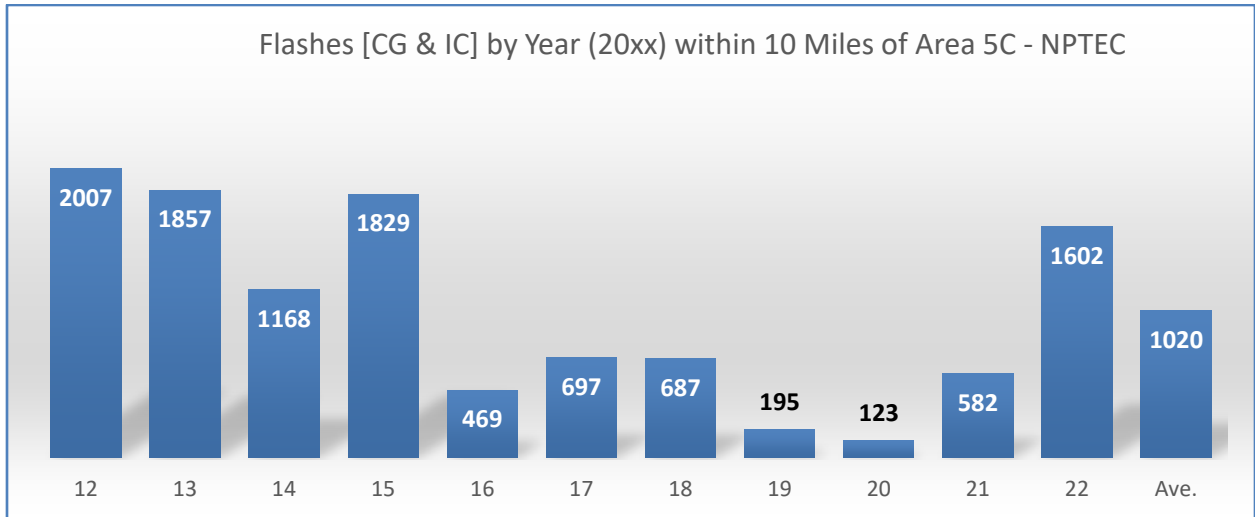
Legend



3.5.2	Area 5C - NPTEC	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.5.3	Area 5C - NPTEC	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

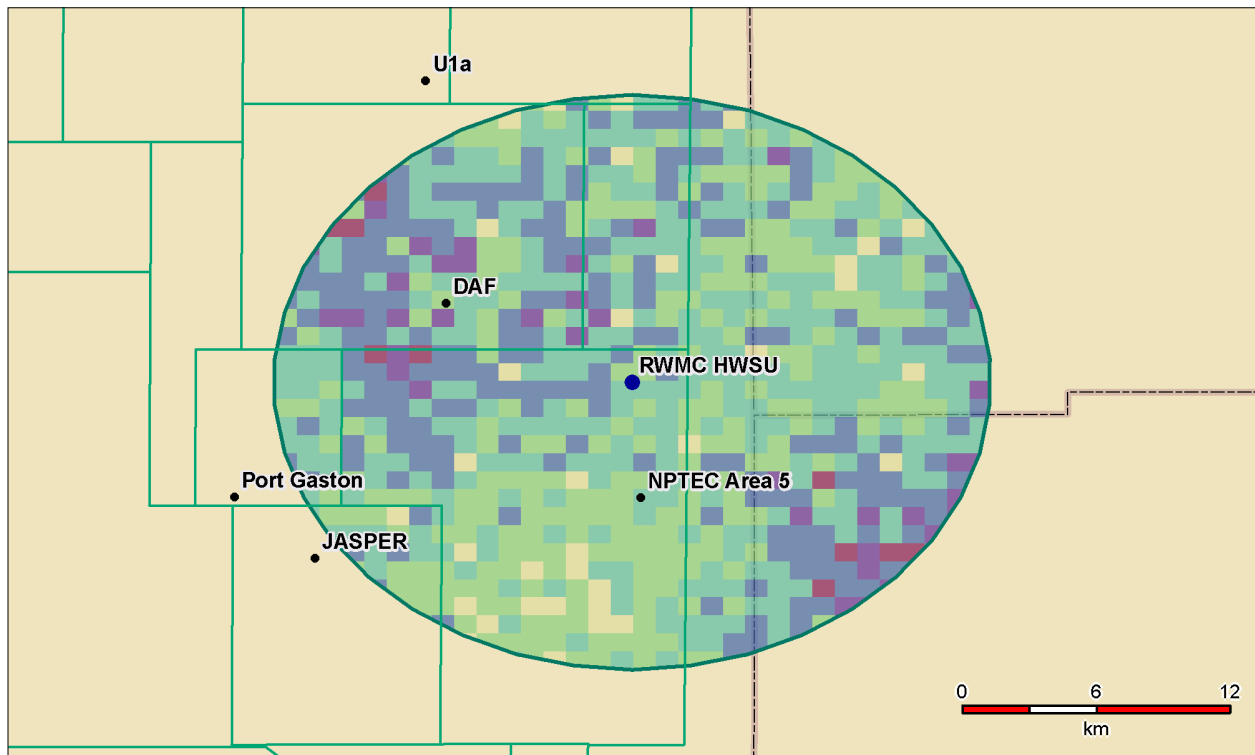


A5C	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	35	0	0	2	0	9	0	46
Feb	17	0	11	0	0	0	0	0	0	2	0	30
Mar	0	0	92	14	0	25	6	0	3	0	0	140
Apr	1	42	0	9	3	18	2	53	104	6	0	238
May	0	35	1	101	5	13	2	30	0	0	0	187
Jun	0	0	0	2	91	0	0	48	5	147	35	328
Jul	393	561	301	1071	216	188	511	22	0	173	564	4000
Aug	1369	711	562	201	62	235	29	32	9	212	514	3936
Sep	90	497	201	8	15	218	54	4	0	18	445	1550
Oct	137	11	0	404	42	0	83	0	0	15	12	704
Nov	0	0	0	0	0	0	0	0	2	0	32	34
Dec	0	0	0	19	0	0	0	4	0	0	0	23
Totals	2007	1857	1168	1829	469	697	687	195	123	582	1602	11216

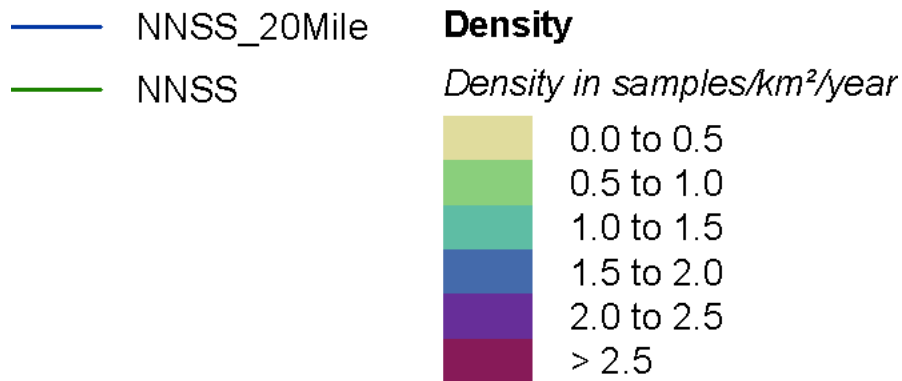
3.6.1	Area 5NE - RWMC & HWSU/HWAA	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 11,338 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of RWMC. The highest flash densities occur at the elevated terrain Northwest and Southeast of RWMC.

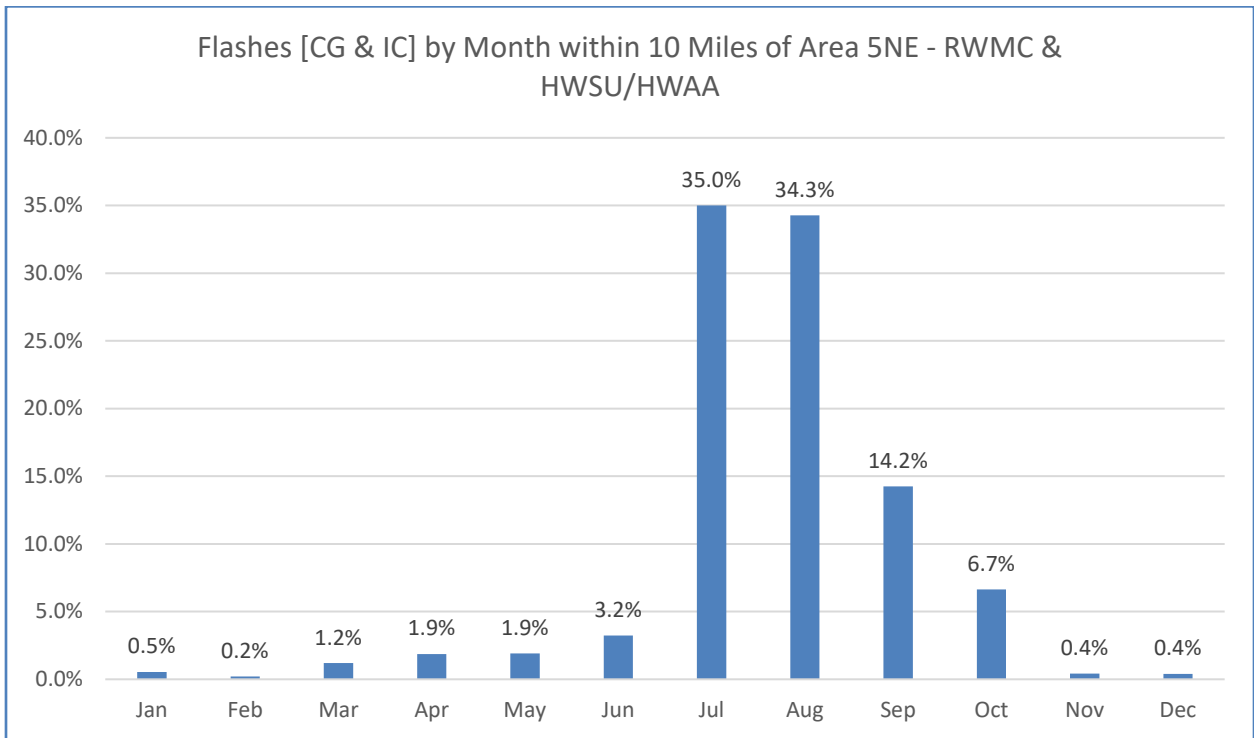
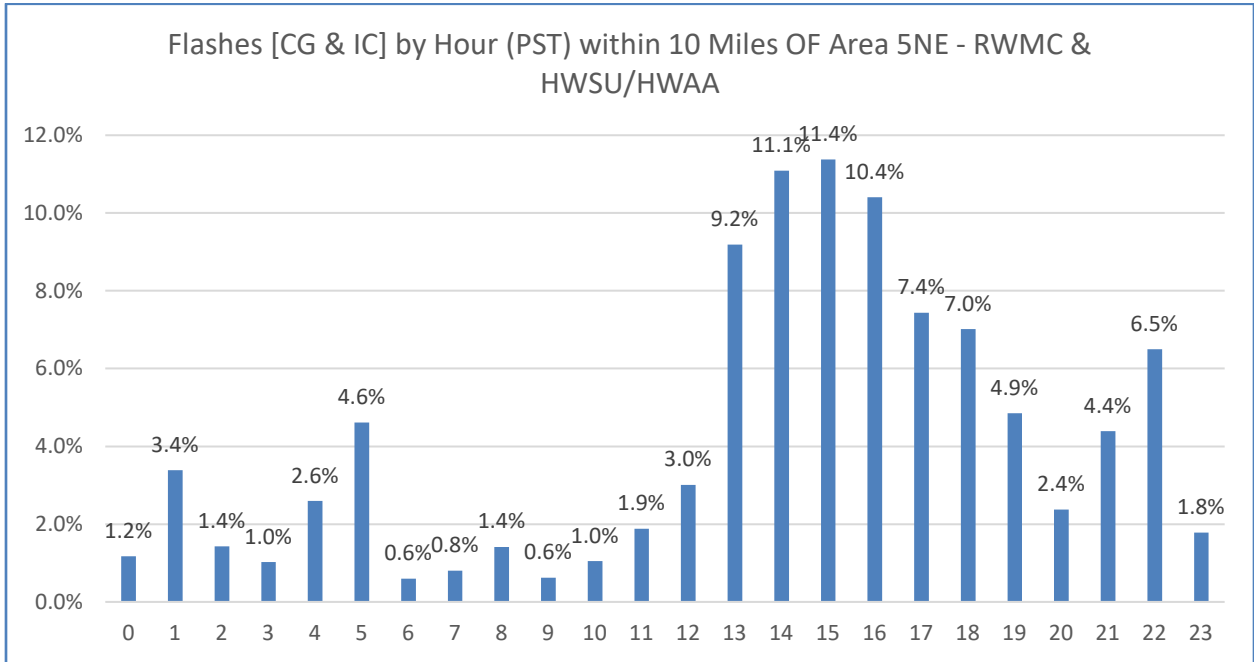
2,952 – CG Flashes / 8,386 – IC Flashes



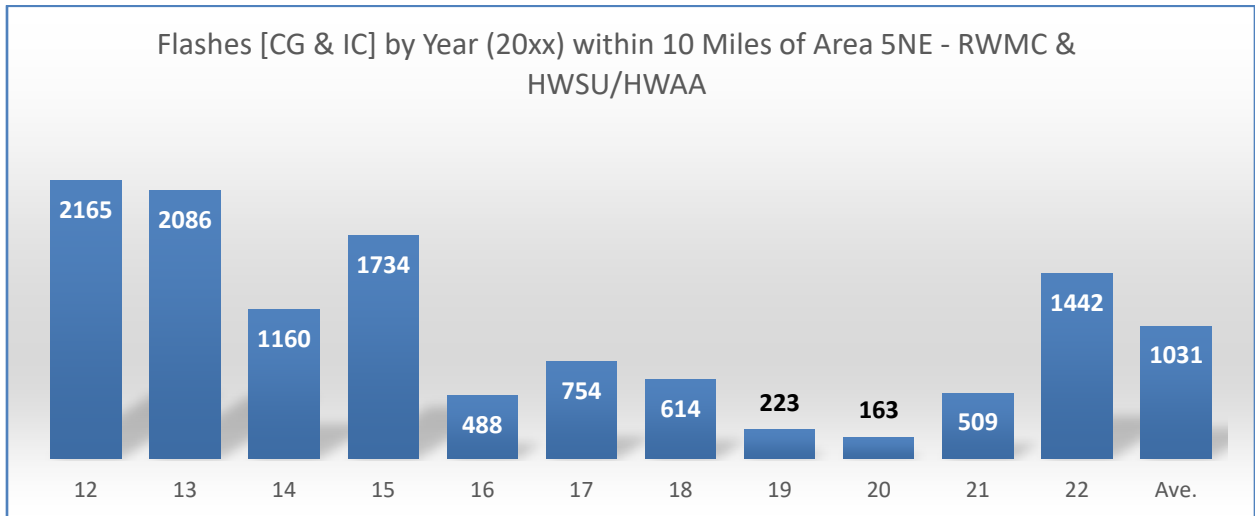
Legend



3.6.2	Area 5NE - RWMC HWSU/HWAA	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.6.3	Area 5NE - RWMC & HWSU/HWAA	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

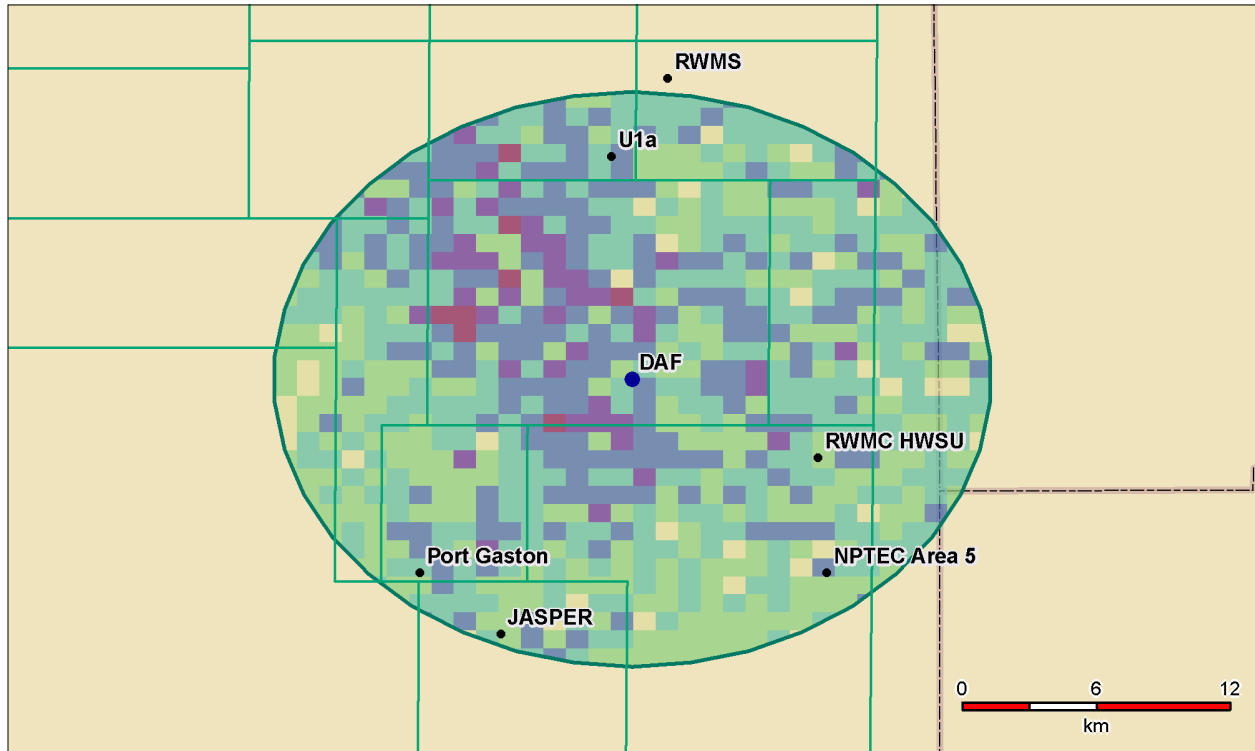


A5NE	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	48	0	0	2	0	12	0	62
Feb	19	0	4	0	0	0	0	0	0	2	0	25
Mar	0	0	93	4	0	31	0	0	7	0	0	135
Apr	1	29	0	12	3	17	3	46	89	12	0	212
May	0	42	2	117	3	17	9	28	0	0	0	218
Jun	0	0	0	4	143	0	0	53	3	122	42	367
Jul	524	654	309	966	172	225	461	26	0	129	504	3970
Aug	1373	745	580	164	65	195	12	39	63	212	438	3886
Sep	83	600	172	3	11	269	69	4	0	14	390	1615
Oct	165	16	0	444	43	0	60	0	0	6	20	754
Nov	0	0	0	0	0	0	0	0	1	0	48	49
Dec	0	0	0	20	0	0	0	25	0	0	0	45
Totals	2165	2086	1160	1734	488	754	614	223	163	509	1442	11338

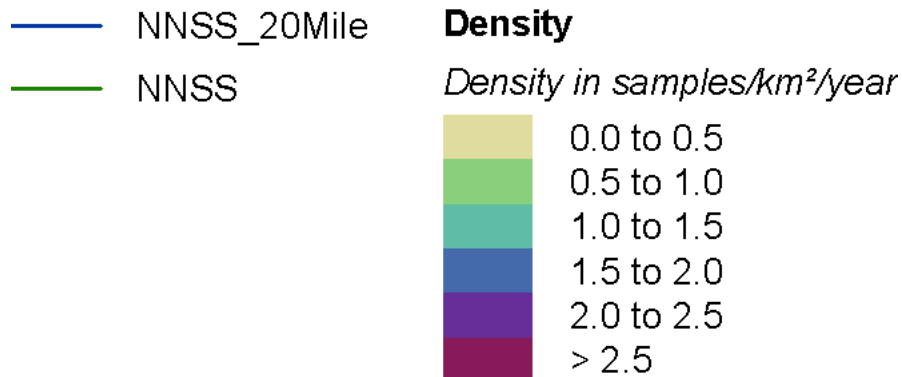
3.7.1	Area 6S - DAF	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 00:00:00

For the 11-year period of record 11,617 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of the Device Assembly Facility. The highest flash densities occur at the elevated terrain West of DAF.

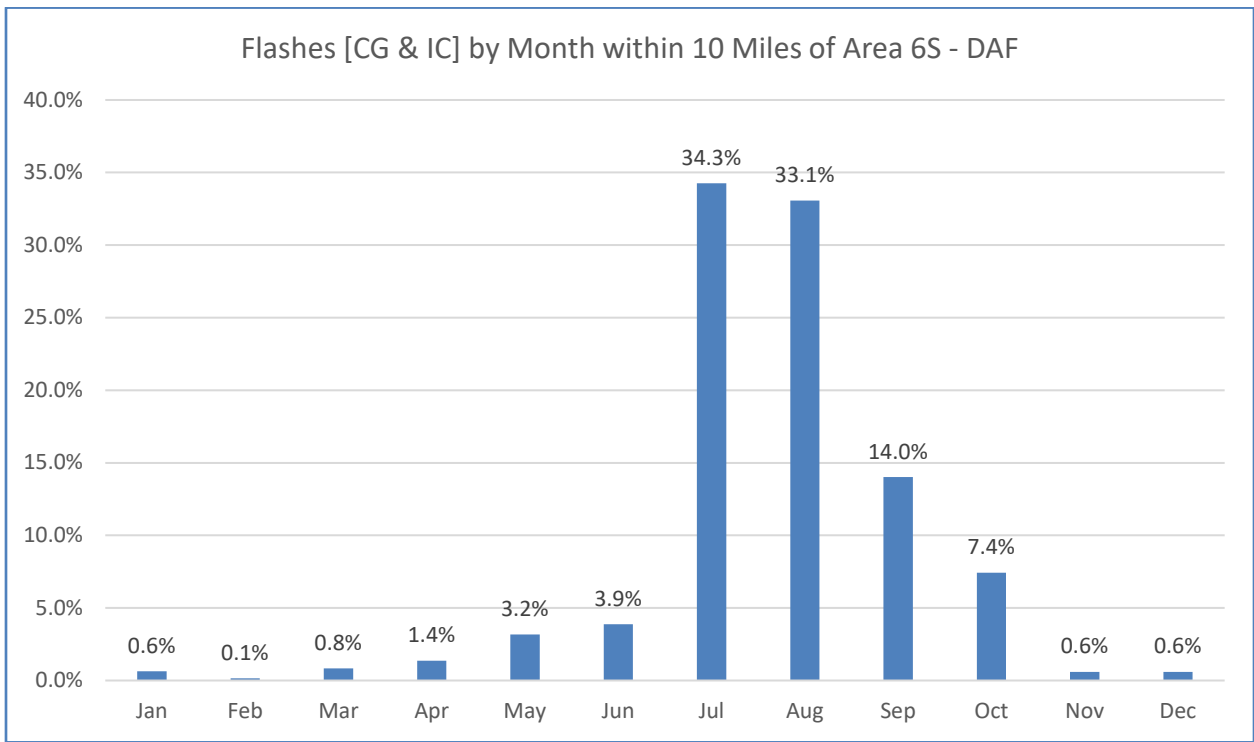
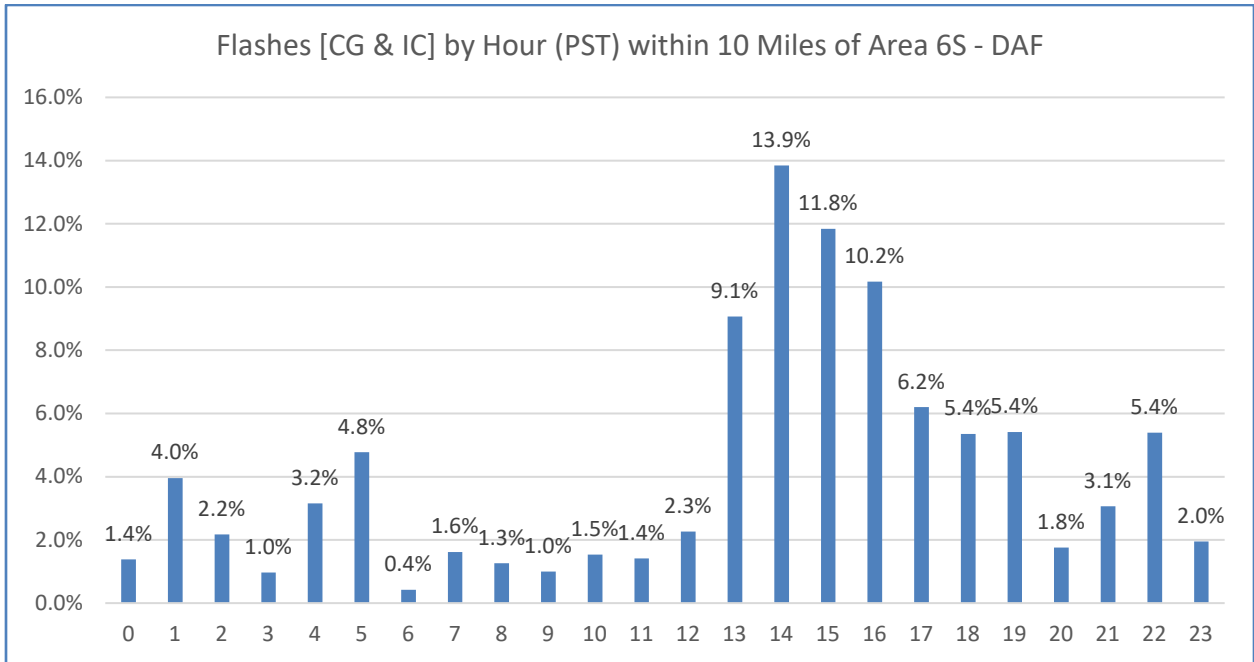
3,291 – CG Flashes / 8,326 – IC Flashes



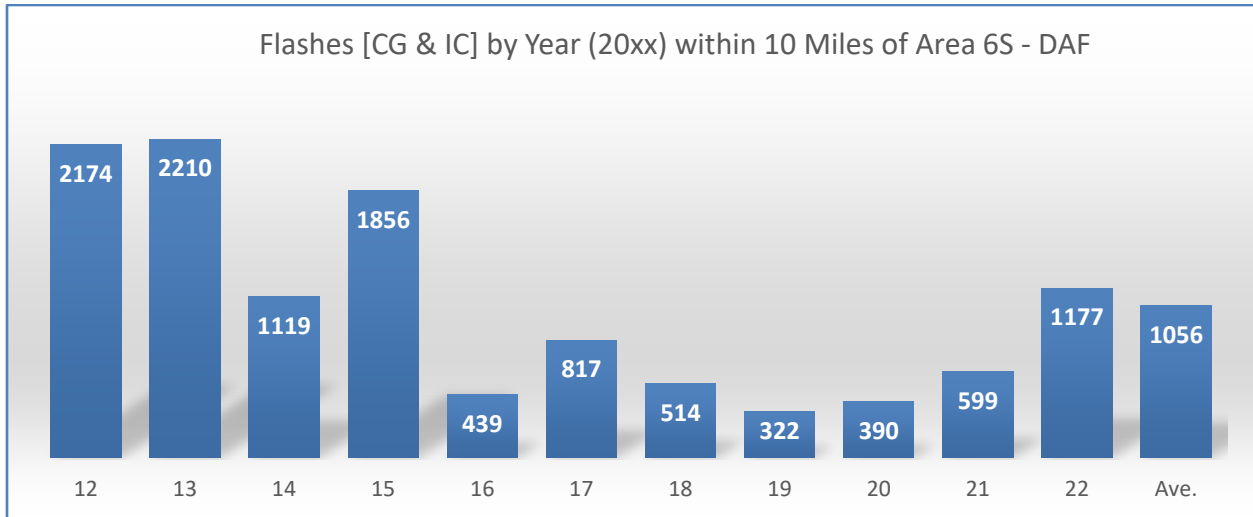
Legend



3.7.1	Area 6S - DAF	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 00:00:00



3.7.3	Area 6S - DAF	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 00:00:00

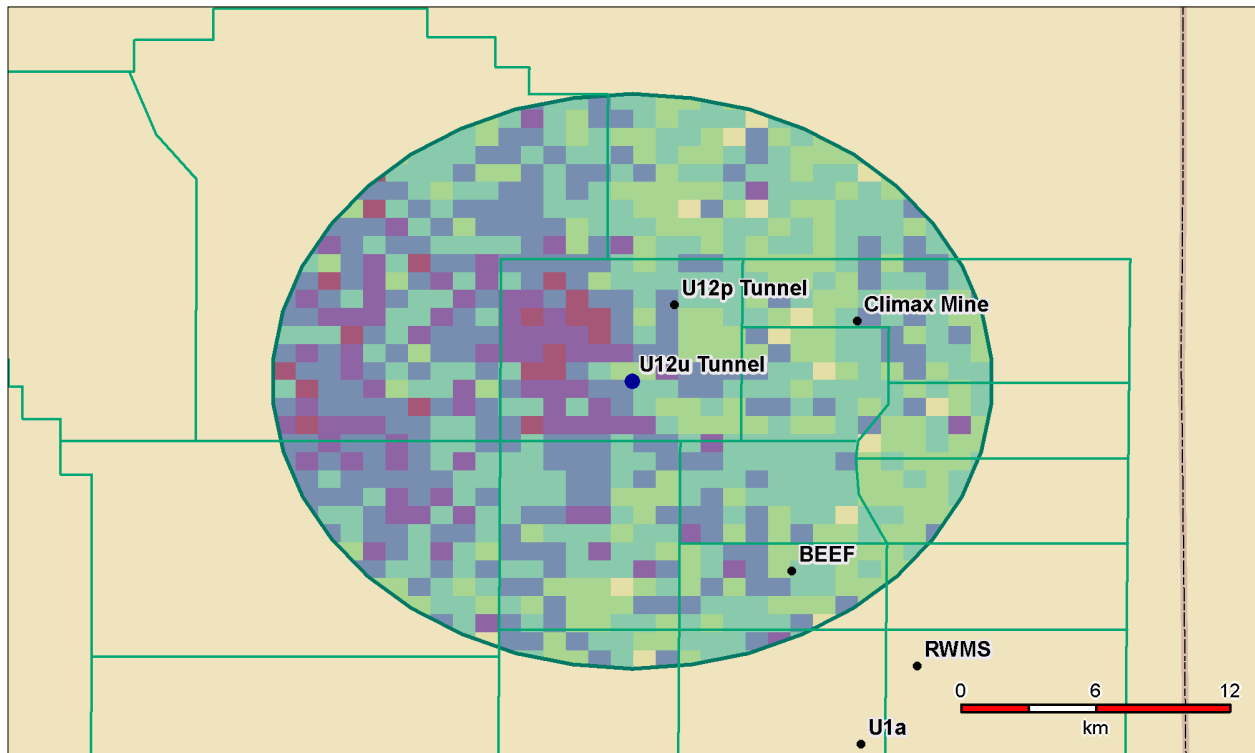


A6S	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	68	0	0	0	0	5	0	73
Feb	16	0	1	0	0	0	0	0	0	0	0	17
Mar	0	0	64	7	0	18	0	2	7	0	0	98
Apr	1	13	0	12	1	12	1	51	50	18	0	159
May	0	59	2	232	2	29	15	29	0	0	0	368
Jun	0	0	0	1	173	0	0	71	0	168	38	451
Jul	778	607	444	748	79	291	367	42	0	235	390	3981
Aug	1237	744	411	230	66	175	20	65	332	158	403	3841
Sep	24	767	197	8	1	292	93	4	0	10	232	1628
Oct	118	20	0	606	49	0	18	0	0	5	48	864
Nov	0	0	0	0	0	0	0	3	1	0	65	69
Dec	0	0	0	12	0	0	0	55	0	0	1	68
Totals	2174	2210	1119	1856	439	817	514	322	390	599	1177	11617

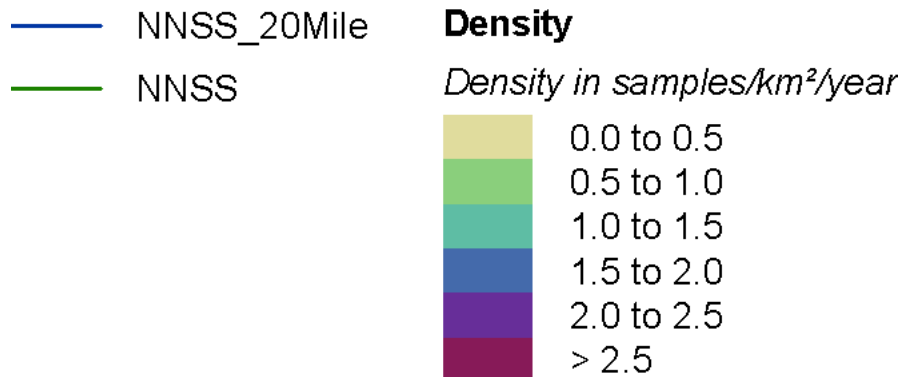
3.8.1	Area 12C - U12u Tunnel	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 12,660 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of U12u Tunnel. The highest flash densities occur at the elevated terrain atop Rainer Mesa just West through Northwest of U12u Tunnel.

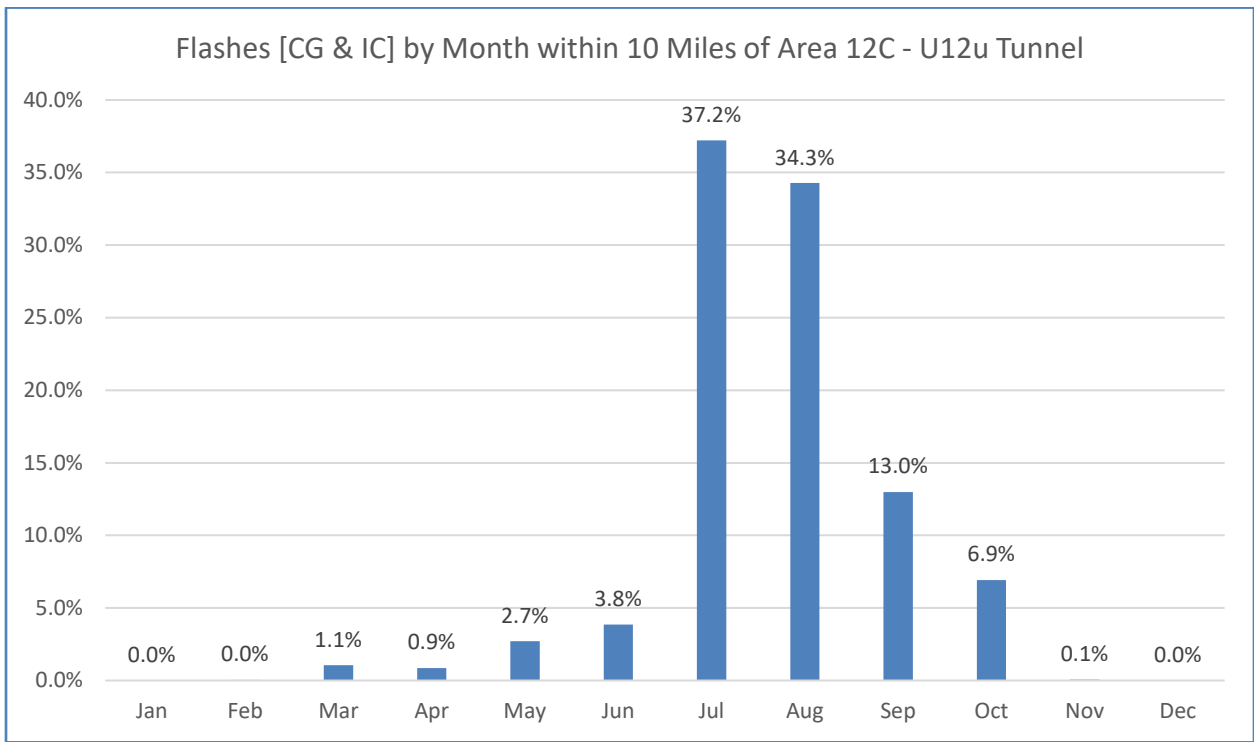
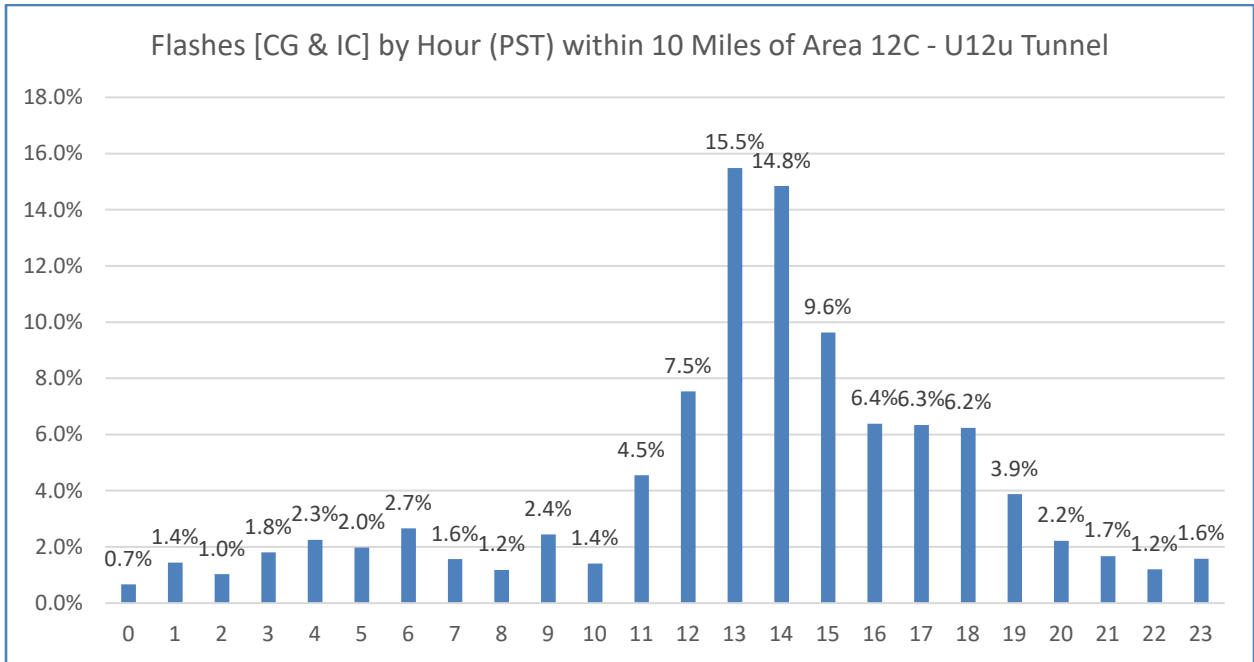
4,346 – CG Flashes / 8,314 – IC Flashes



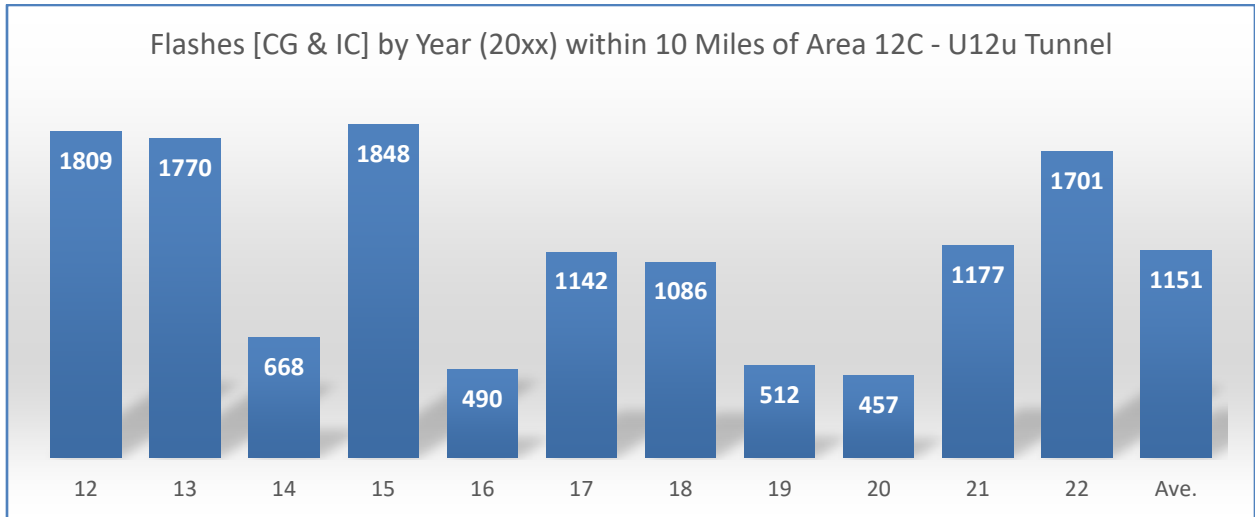
Legend



3.8.2	Area 12C - U12u Tunnel	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.8.3	Area 12C - U12u Tunnel	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

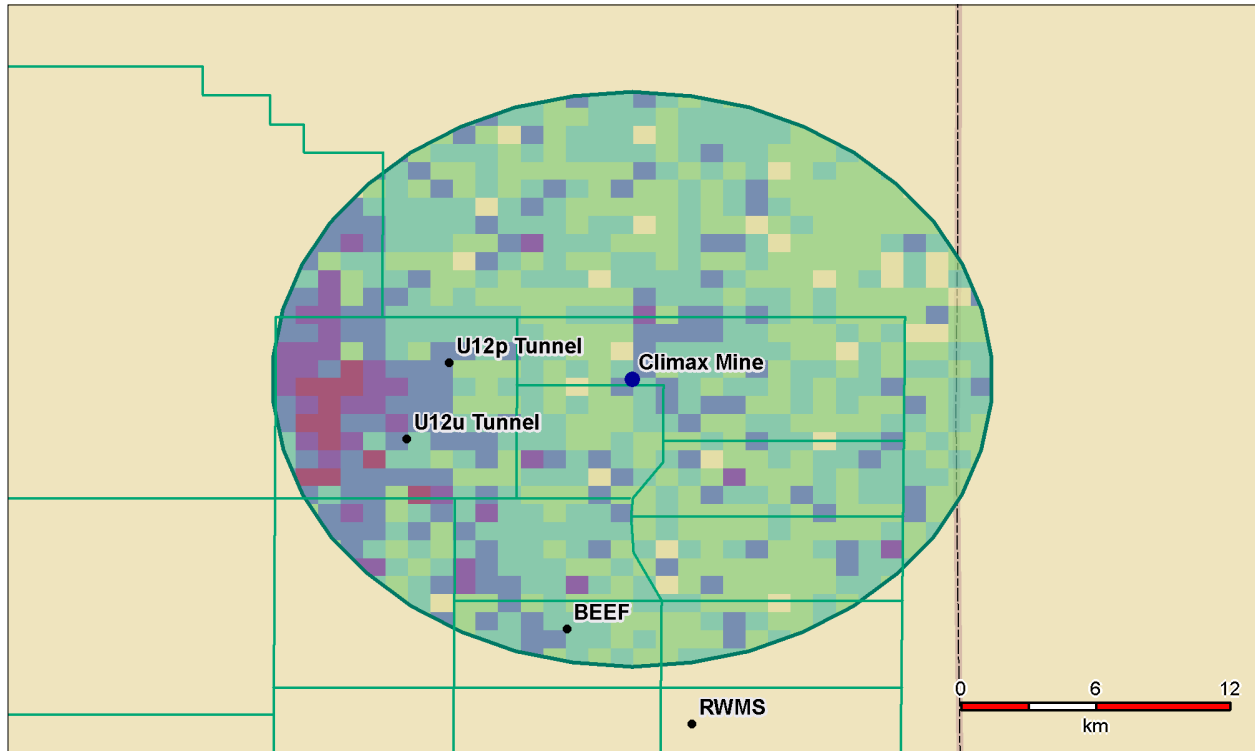


A12C	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	1	0	0	0	0	0	0	1
Feb	0	0	1	3	0	0	0	0	0	0	0	4
Mar	0	0	11	0	0	60	5	43	11	3	1	134
Apr	1	17	0	3	7	3	0	30	24	24	0	109
May	0	83	2	88	49	15	24	69	0	13	0	343
Jun	0	0	0	25	100	0	0	136	22	204	0	487
Jul	807	895	263	364	217	249	738	190	0	727	262	4712
Aug	833	428	214	610	111	384	206	26	400	205	922	4339
Sep	84	341	177	0	5	430	91	15	0	1	500	1644
Oct	83	6	0	755	0	0	22	0	0	0	11	877
Nov	1	0	0	0	0	1	0	3	0	0	2	7
Dec	0	0	0	0	0	0	0	0	0	0	3	3
Totals	1809	1770	668	1848	490	1142	1086	512	457	1177	1701	12660

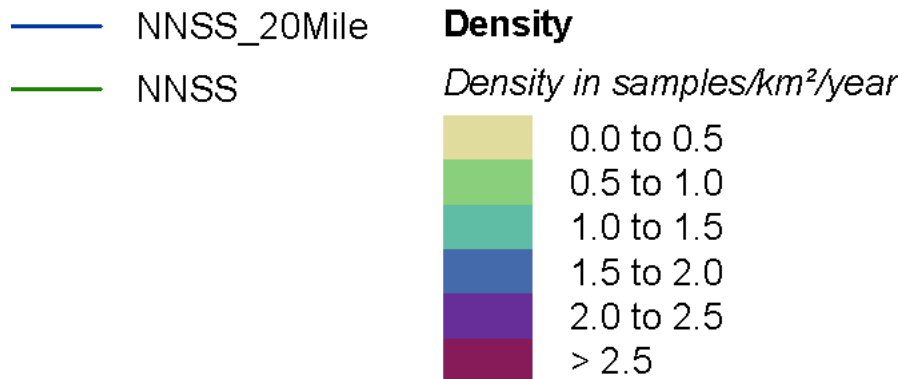
3.9.1	Area 15 - Climax Mine	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 10,619 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of Climax Mine. The highest flash densities occur at the elevated terrain West of Climax Mine over Rainer Mesa.

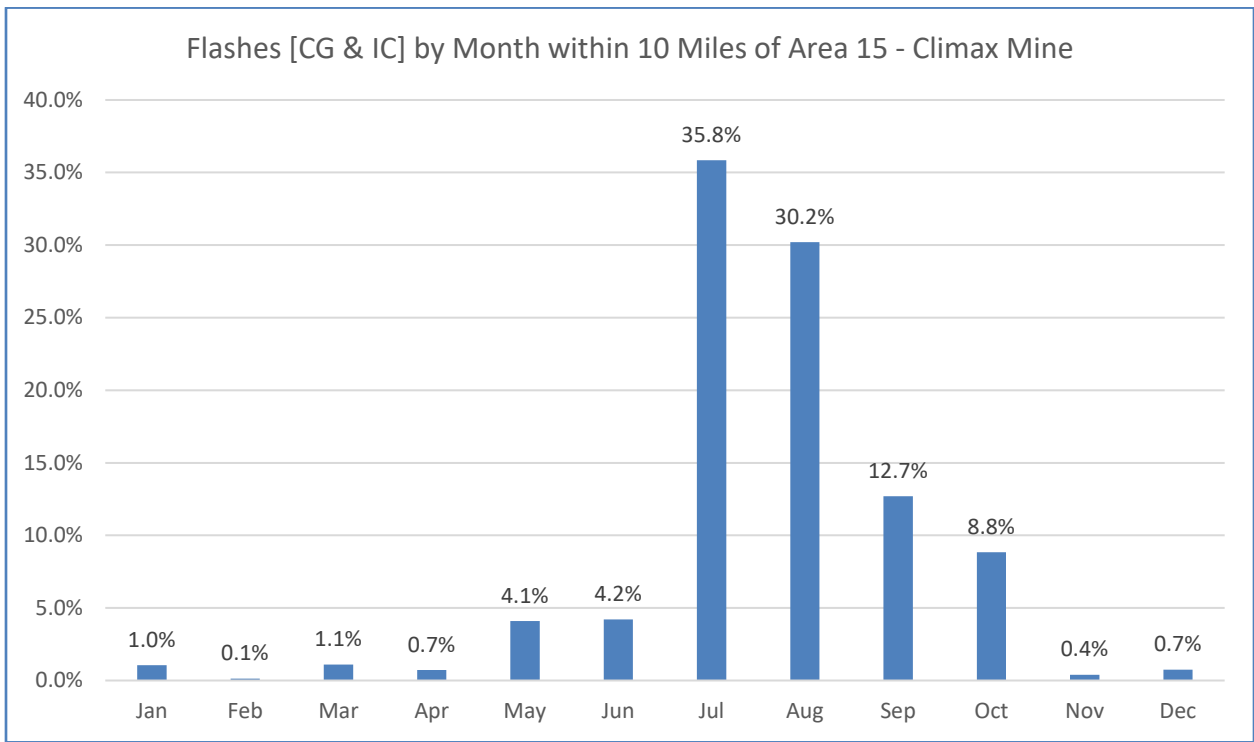
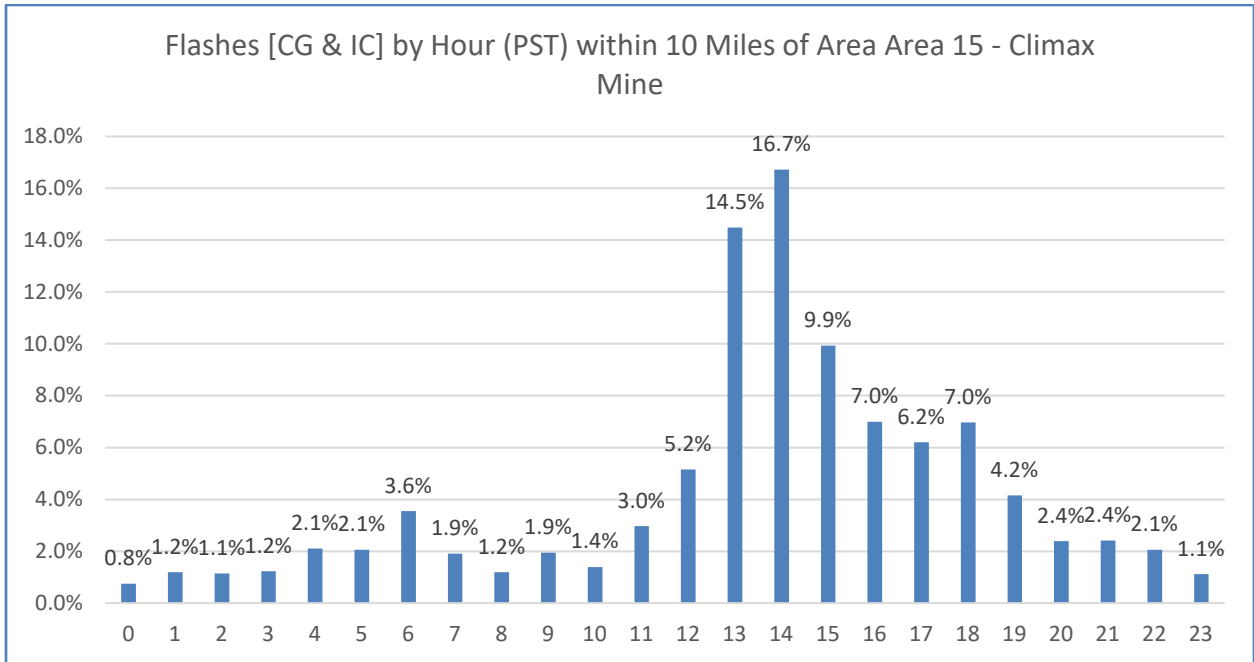
3,841 – CG Flashes / 6,778 – IC Flashes



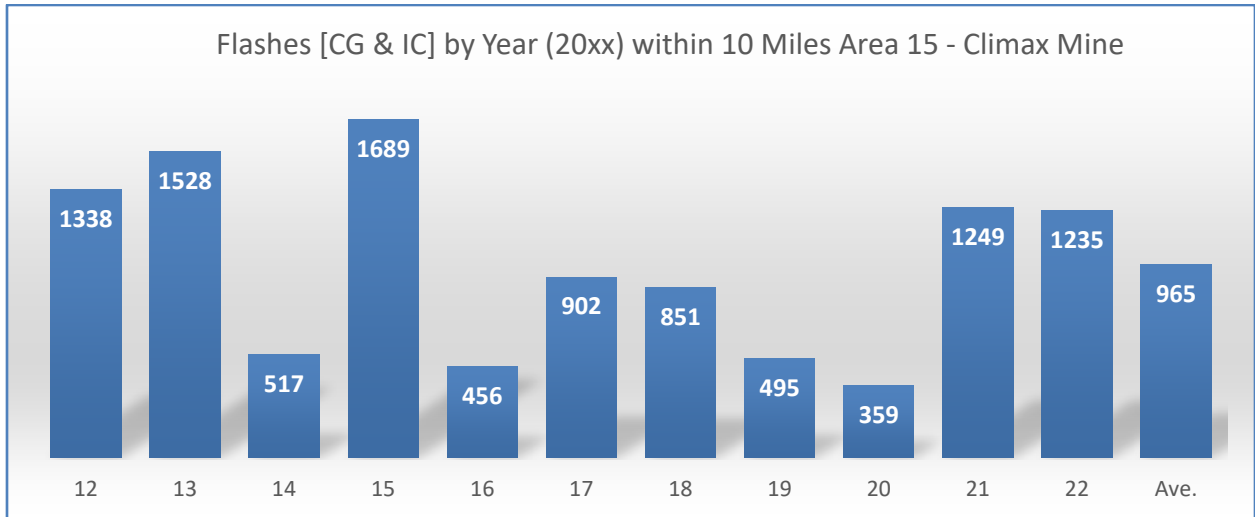
Legend



3.9.2	Area 15 - Climax Mine	Data Date Range
ARL\SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.9.3	Area 15 - Climax Mine	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

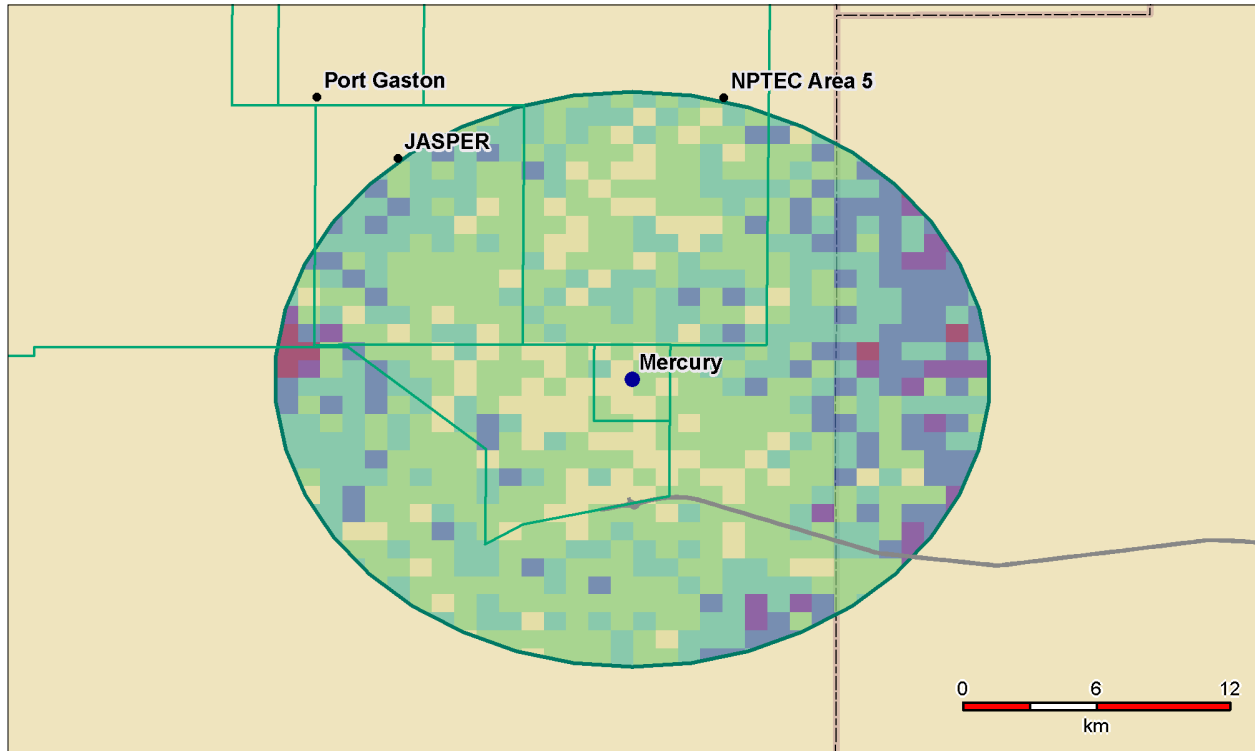


A15	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	0	0	0	0	0	2	0	2
Feb	2	0	1	1	0	0	0	2	0	0	0	6
Mar	0	0	8	0	0	20	5	4	14	0	2	53
Apr	0	3	0	1	5	3	0	32	23	35	0	102
May	0	51	2	102	20	4	16	92	4	2	1	294
Jun	0	0	0	22	82	0	0	136	40	191	0	471
Jul	573	880	204	334	247	193	595	123	0	898	110	4157
Aug	582	225	197	606	82	292	178	96	277	116	830	3481
Sep	89	365	105	0	16	389	40	4	0	5	256	1269
Oct	92	4	0	623	4	0	17	0	0	0	16	756
Nov	0	0	0	0	0	1	0	6	1	0	20	28
Dec	0	0	0	0	0	0	0	0	0	0	0	0
Totals	1338	1528	517	1689	456	902	851	495	359	1249	1235	10619

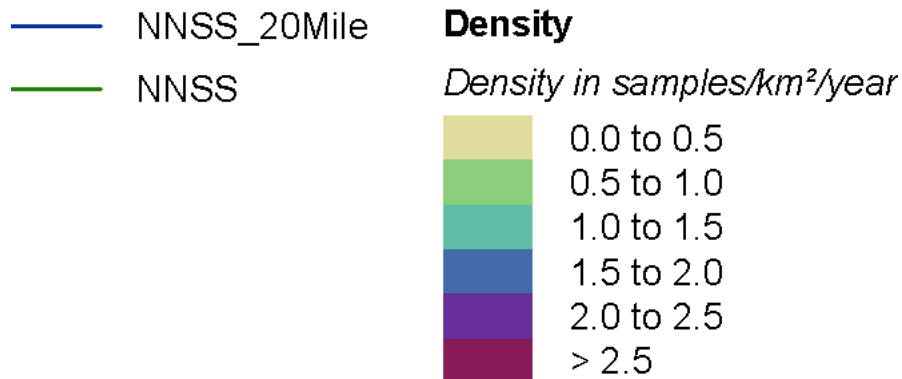
3.10.1	Area 23 - Mercury	Data Date Range
ARL\SORD	Within 10 Miles	2012/01/01 00:00:00 to
NNSS Lightning Summary		2022/12/31 23:59:59

For the 11-year period of record 9,295 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of Mercury, NV. The highest flash densities occur at the elevated terrain East of Mercury over the Ridges and over elevated terrain to the West.

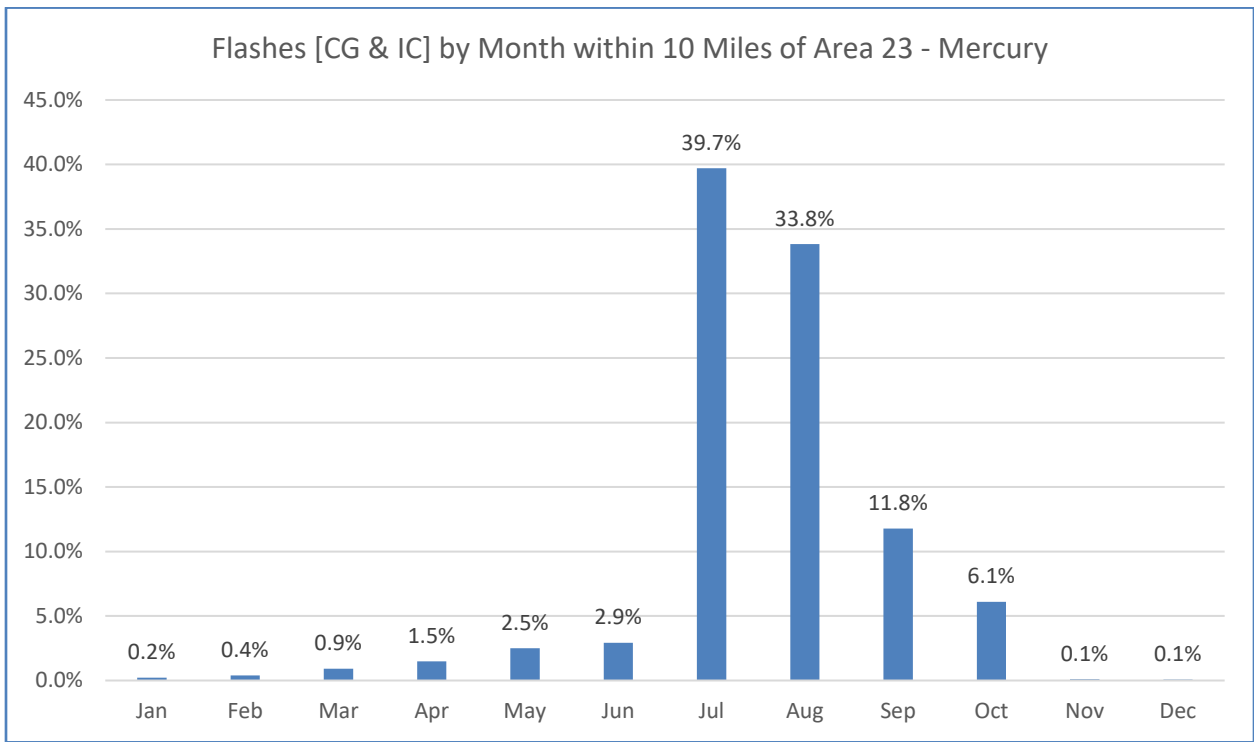
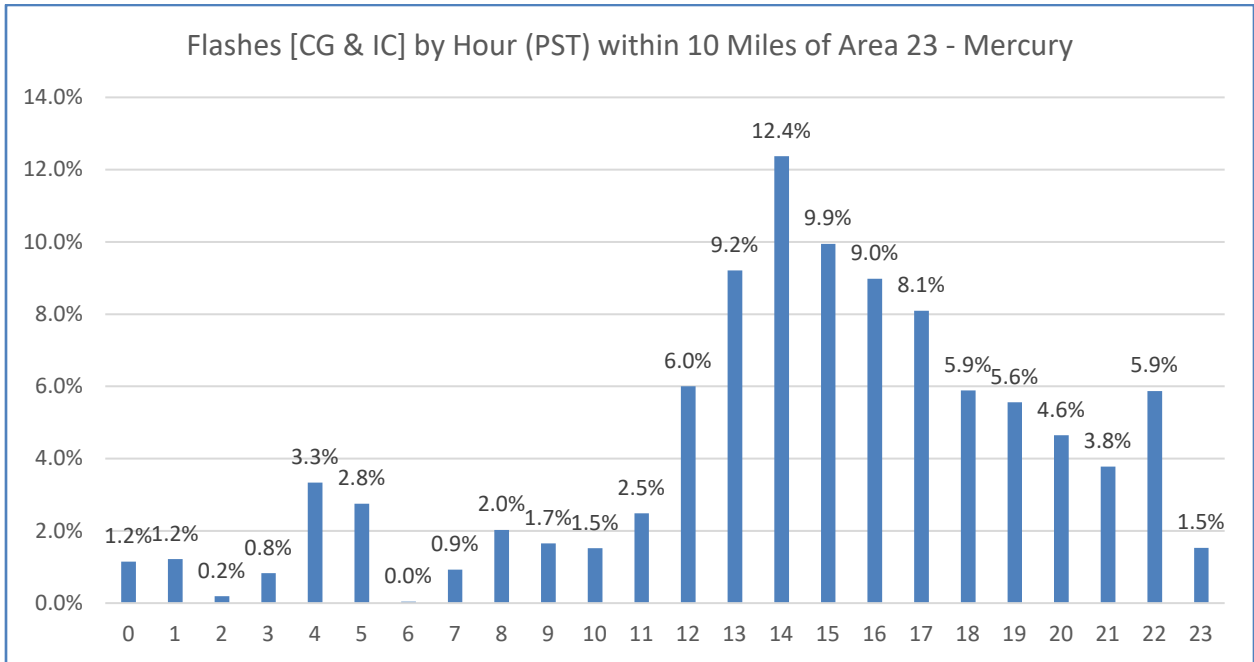
2,775 – CG Flashes / 6,520 – IC Flashes



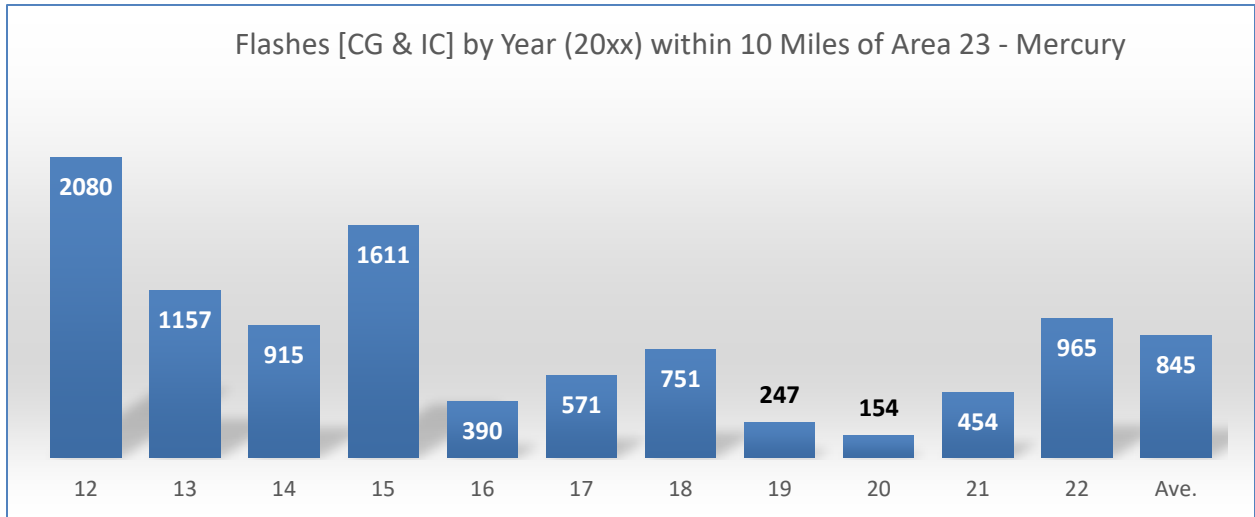
Legend



3.10.2	Area 23 - Mercury	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.10.3	Area 23 - Mercury	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

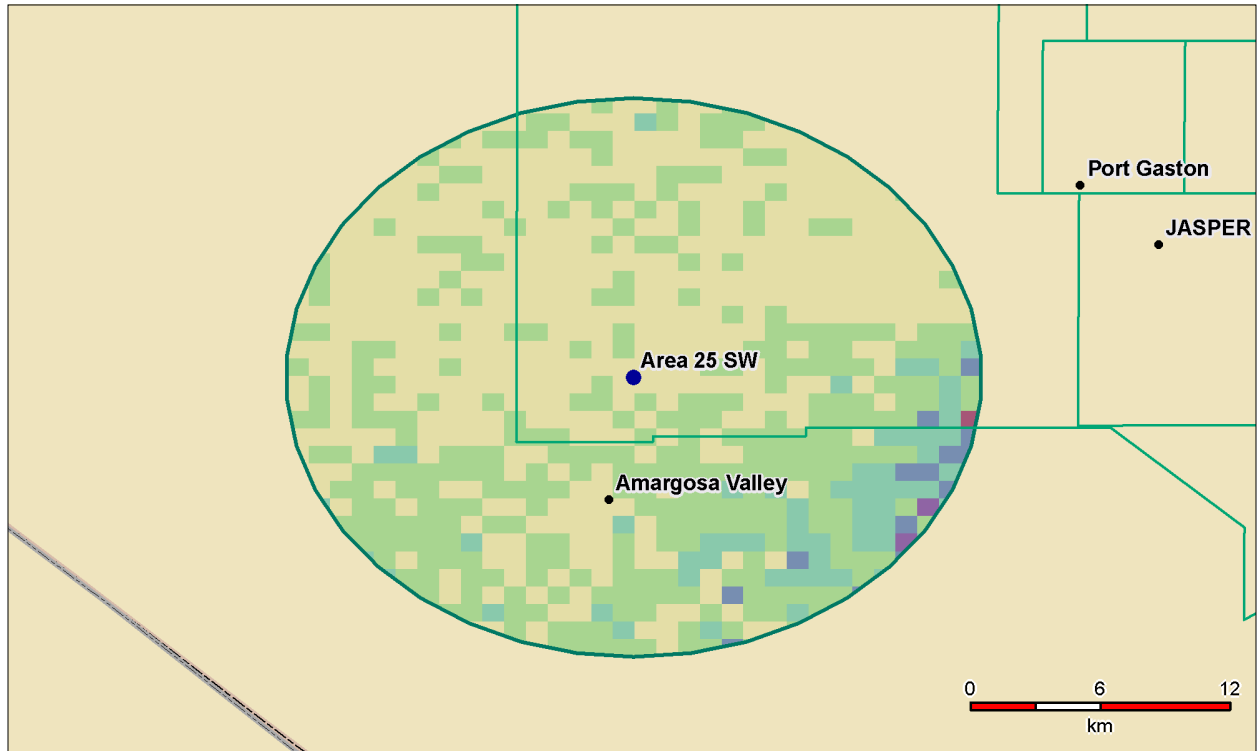


A23	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	18	0	0	0	0	3	0	21
Feb	10	0	20	0	0	0	0	0	0	7	0	37
Mar	0	0	15	58	0	2	8	0	1	0	0	84
Apr	1	3	0	0	10	2	0	90	32	0	0	138
May	0	8	0	143	11	2	2	65	0	2	0	233
Jun	0	0	0	3	153	0	0	37	5	65	8	271
Jul	930	364	322	585	151	142	572	10	0	271	345	3692
Aug	1059	476	297	369	30	298	19	36	116	84	360	3144
Sep	45	306	261	9	0	125	99	4	0	3	242	1094
Oct	35	0	0	443	17	0	51	0	0	19	2	567
Nov	0	0	0	0	0	0	0	0	0	0	8	8
Dec	0	0	0	1	0	0	0	5	0	0	0	6
Totals	2080	1157	915	1611	390	571	751	247	154	454	965	9295

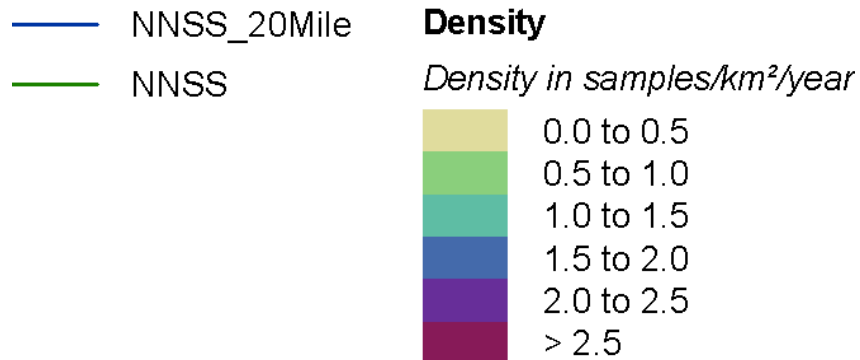
3.11.1	Area 25 SW	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 4,966 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of Area 25 SW. The highest flash densities occur at the elevated terrain East through Southeast of Area 25 SW.

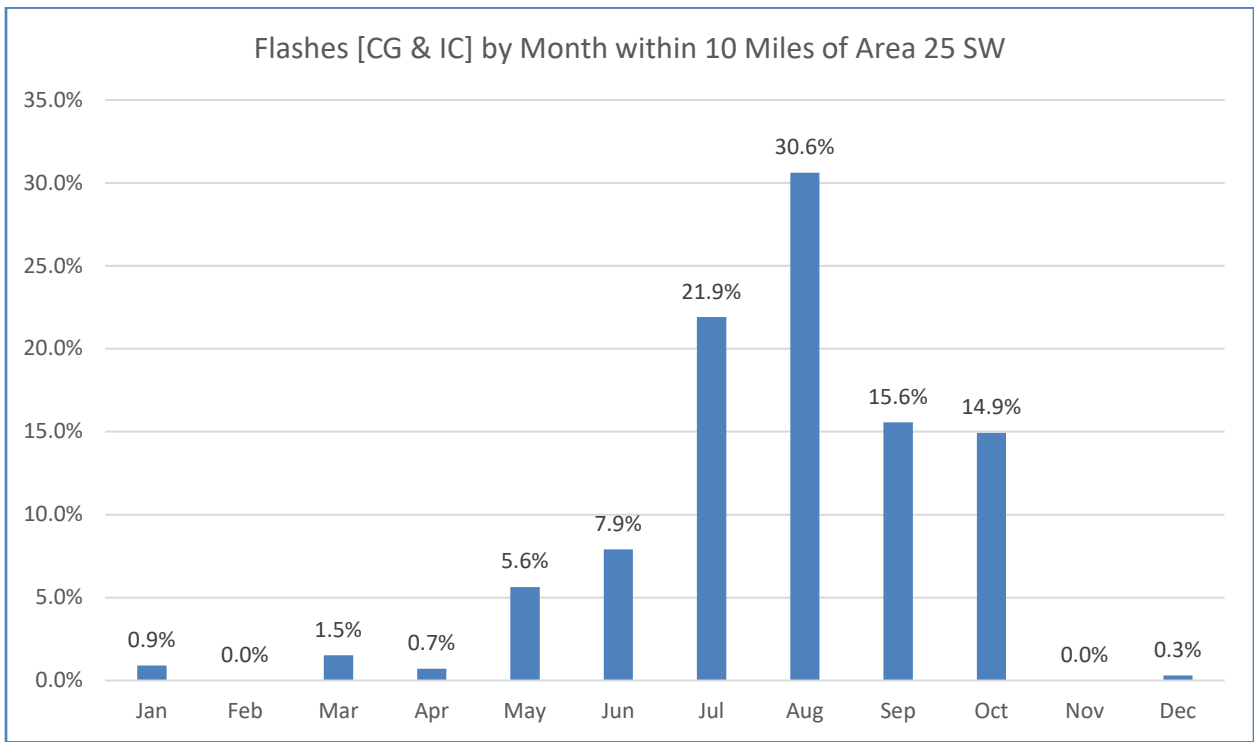
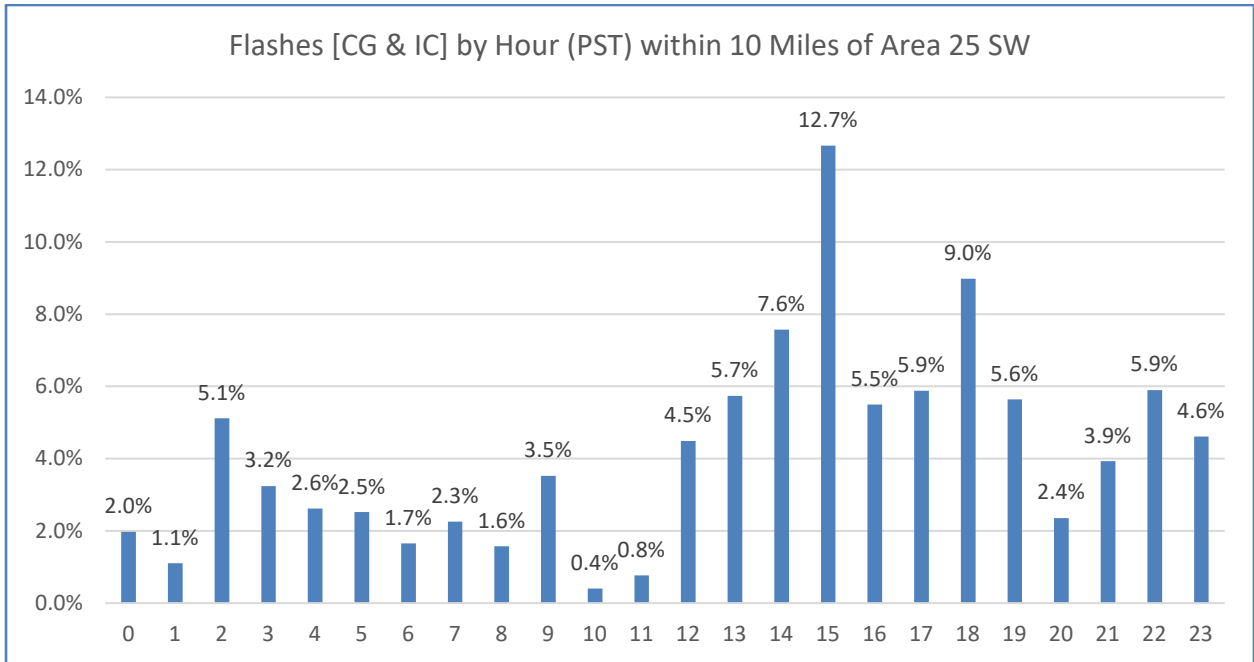
1,972 – CG Flashes / 2,994 – IC Flashes



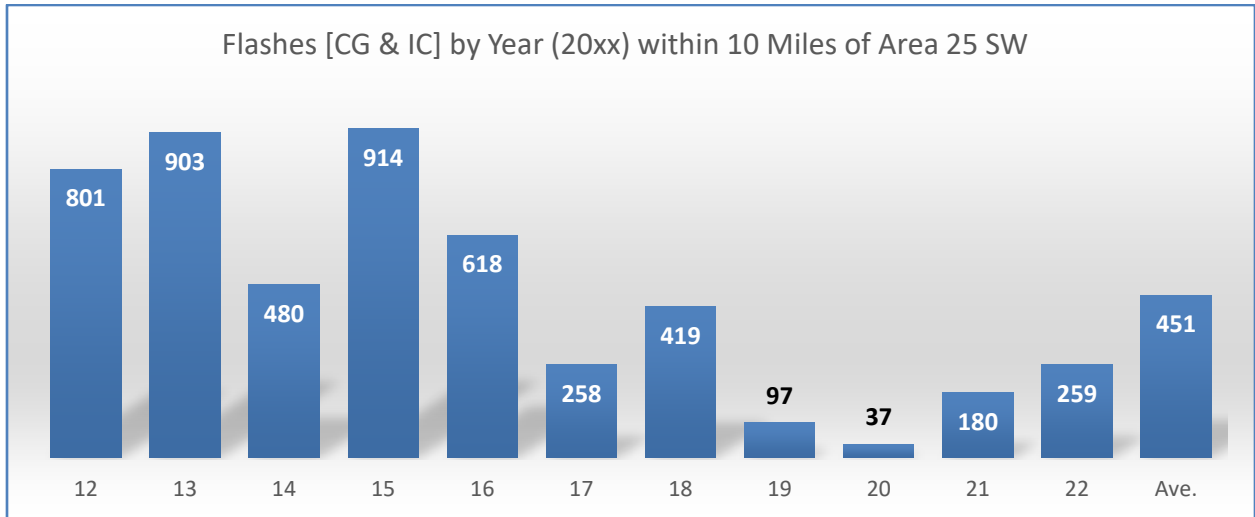
Legend



3.11.2	Area 25 SW	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.11.3	Area 25 SW	Data Date Range
ARL/SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

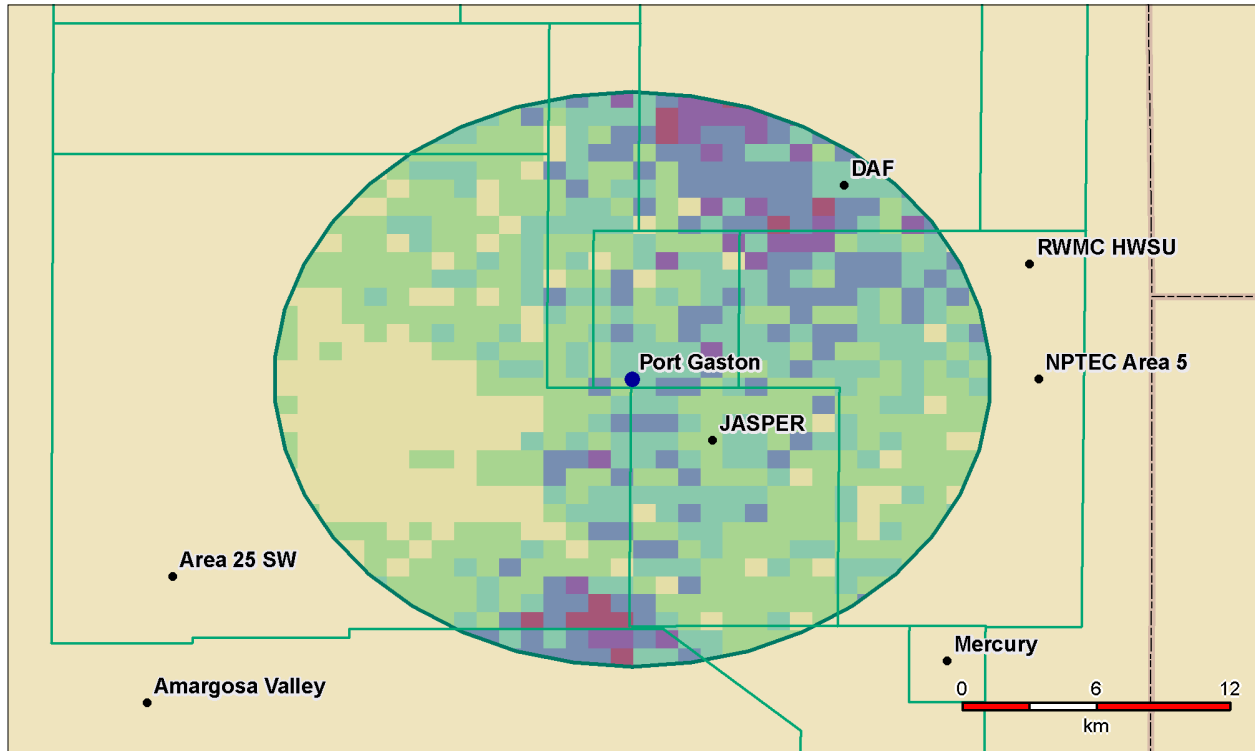


A25SW	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	43	2	0	0	0	0	0	45
Feb	0	0	0	0	0	0	0	0	0	0	0	0
Mar	0	0	3	68	3	0	0	1	1	0	0	76
Apr	0	0	0	6	14	0	0	10	0	3	2	35
May	0	27	11	192	16	0	1	17	2	14	0	280
Jun	0	1	0	1	295	0	0	23	7	60	6	393
Jul	72	182	58	100	234	31	216	14	0	92	89	1088
Aug	690	279	338	12	1	72	5	20	27	5	71	1520
Sep	0	414	70	1	0	153	53	0	0	0	82	773
Oct	39	0	0	533	12	0	143	0	0	6	8	741
Nov	0	0	0	0	0	0	0	0	0	0	0	0
Dec	0	0	0	1	0	0	1	12	0	0	1	15
Totals	801	903	480	914	618	258	419	97	37	180	259	4966

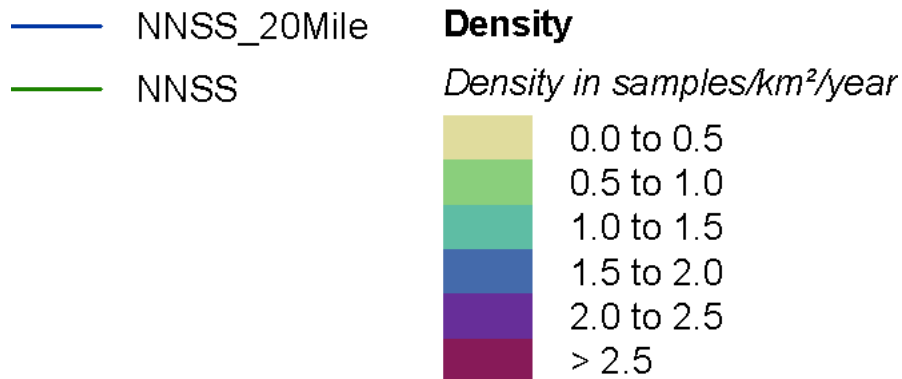
3.12.1	Area 26 - Port Gaston	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

For the 11-year period of record 9,071 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of Port Gaston. The highest flash densities occur at the elevated terrain North-northeast and South-southwest of Port Gaston.

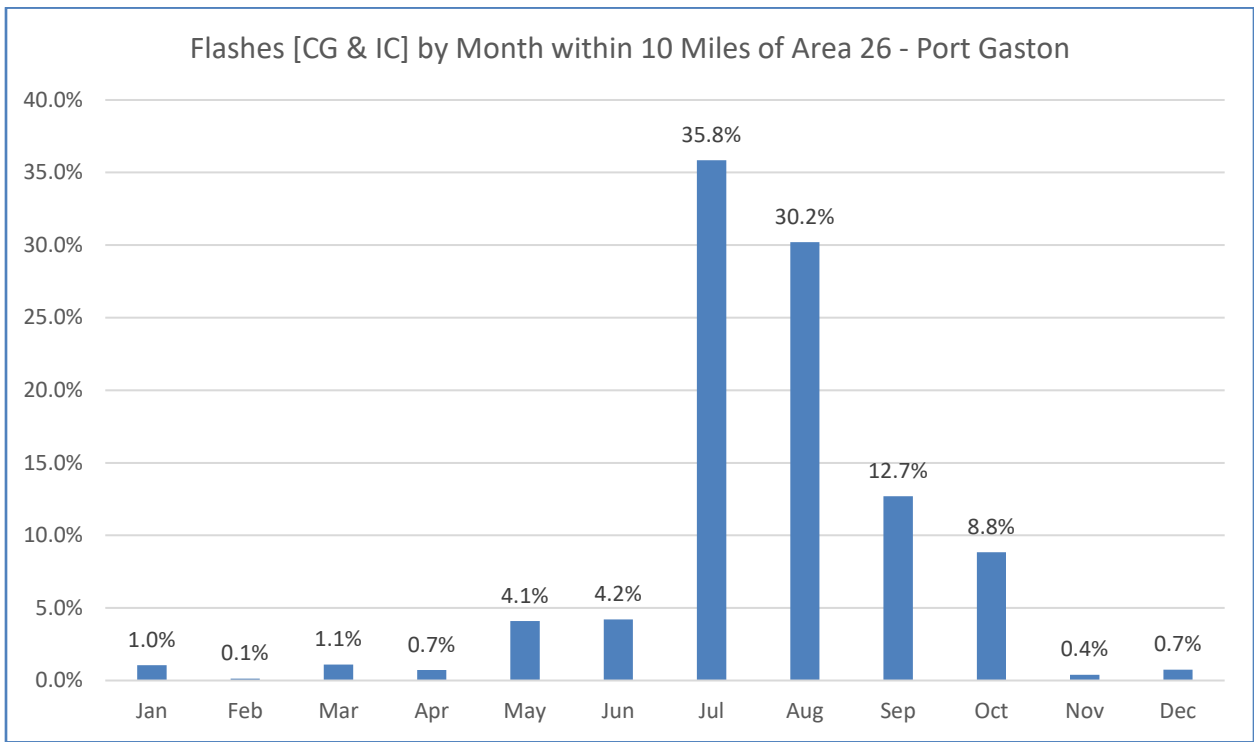
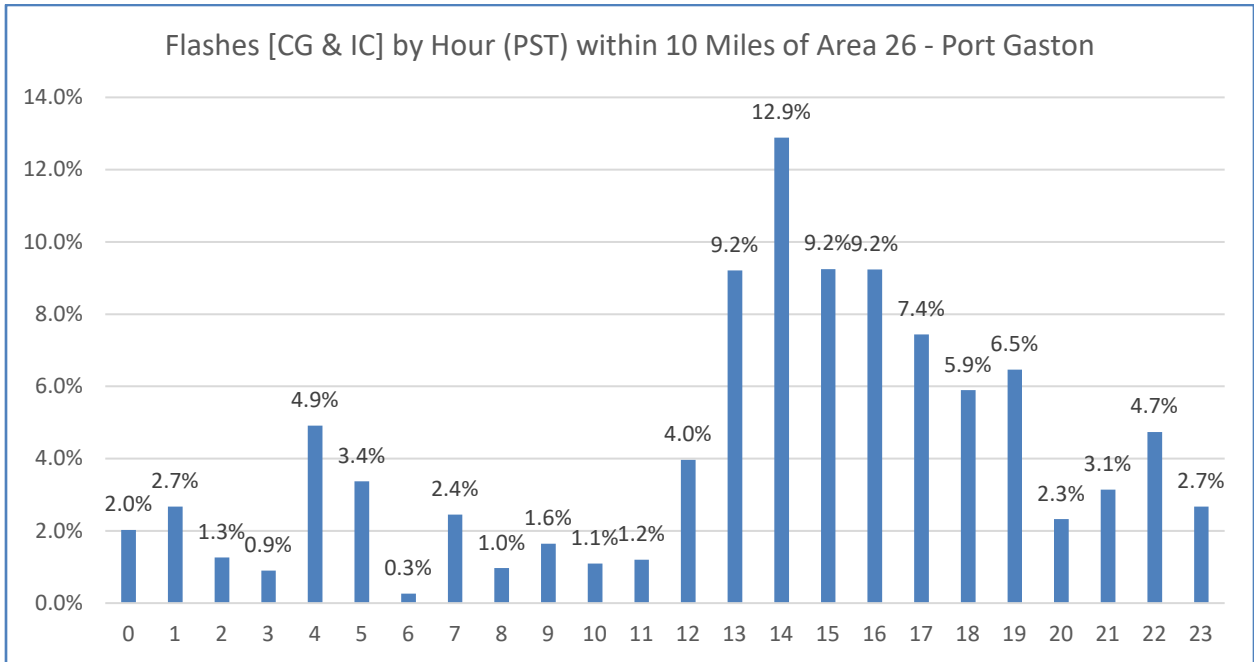
2,511 – CG Flashes / 6,560 – IC Flashes



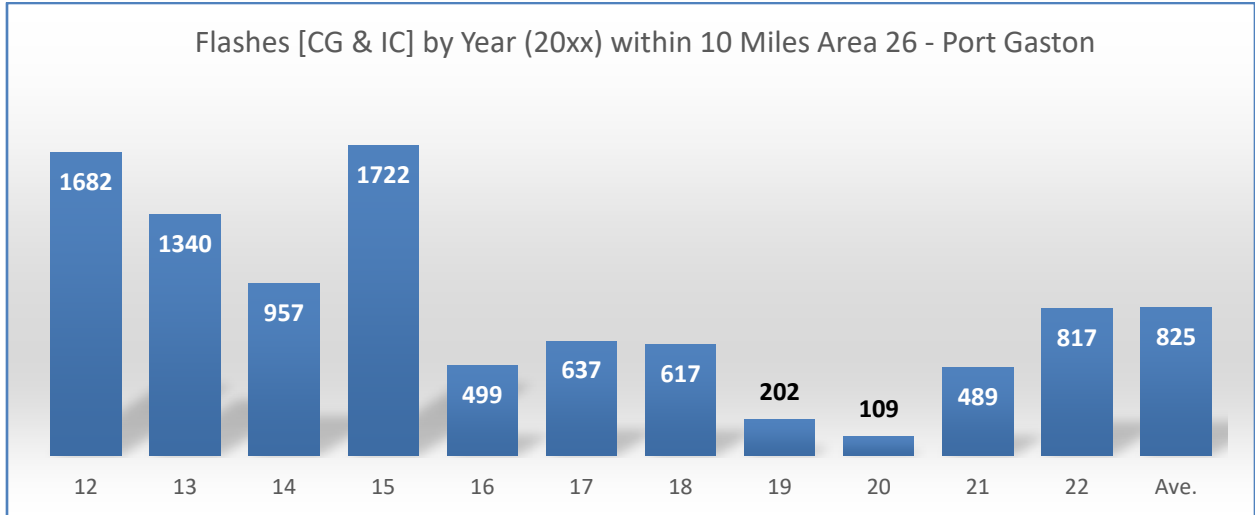
Legend



3.12.2	Area 26 - Port Gaston	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59



3.12.3	Area 26 - Port Gaston	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59:59

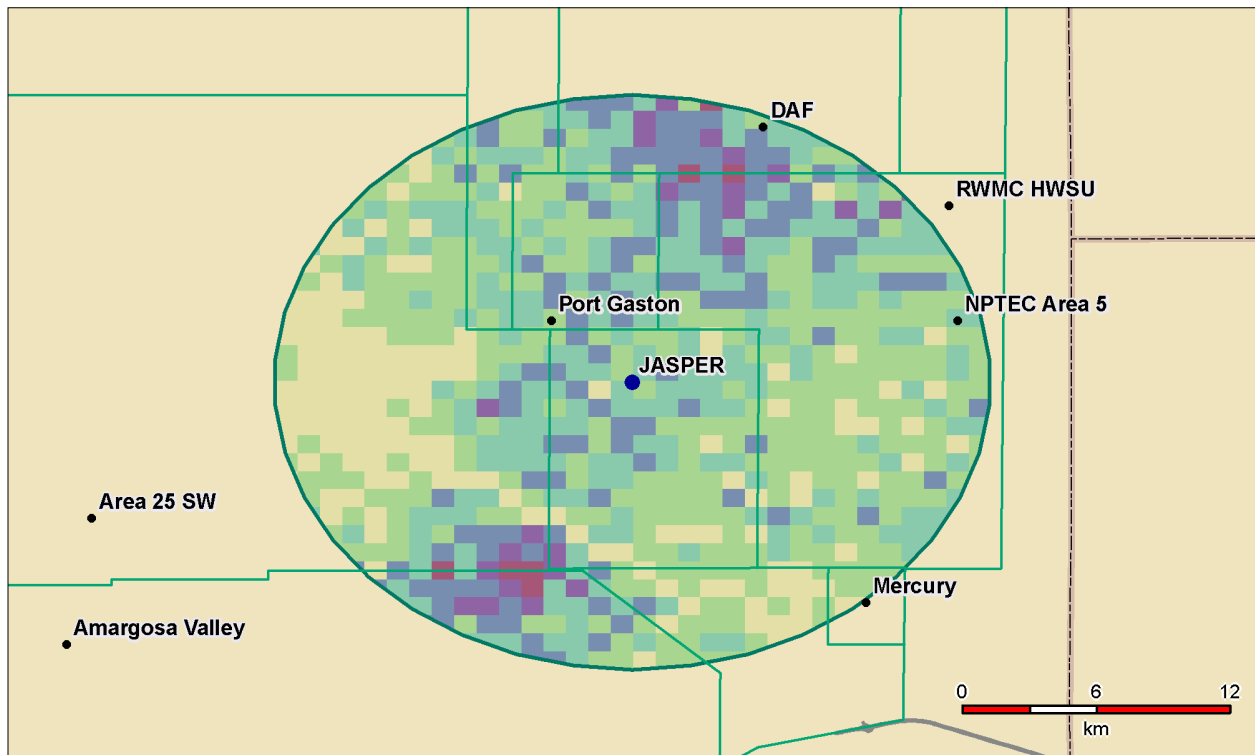


A26	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	95	0	0	0	0	0	0	95
Feb	8	0	4	0	0	0	0	0	0	0	0	12
Mar	0	0	17	66	2	11	1	1	2	0	0	100
Apr	1	1	0	5	1	0	0	29	22	6	0	65
May	0	71	0	243	4	16	14	20	1	2	0	371
Jun	0	0	0	0	174	0	0	53	1	132	21	381
Jul	705	332	293	570	153	191	406	18	0	213	370	3251
Aug	961	463	487	109	24	217	31	14	83	133	218	2740
Sep	2	453	156	28	0	202	152	3	0	0	156	1152
Oct	5	20	0	701	46	0	13	0	0	3	14	802
Nov	0	0	0	0	0	0	0	0	0	0	35	35
Dec	0	0	0	0	0	0	0	64	0	0	3	67
Totals	1682	1340	957	1722	499	637	617	202	109	489	817	9071

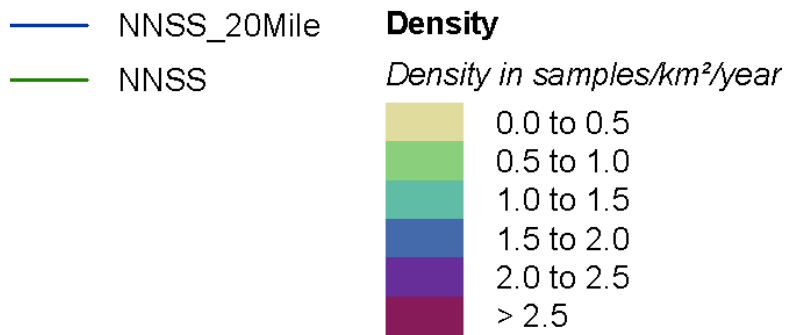
3.13.1	Area 27 – JASPER	Data Date Range
ARL\SORD NNSS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59059

Due their proximity JASPER and BAKER facilities have been included in this report. For the 11-year period of record 9,228 Cloud-to-Ground [CG] and Intra-Cloud [IC] flashes were detected within 10 miles of JASPER/BAKER. The highest flash densities occur at the elevated terrain South-southwest and North-northeast of JASPER and BAKER.

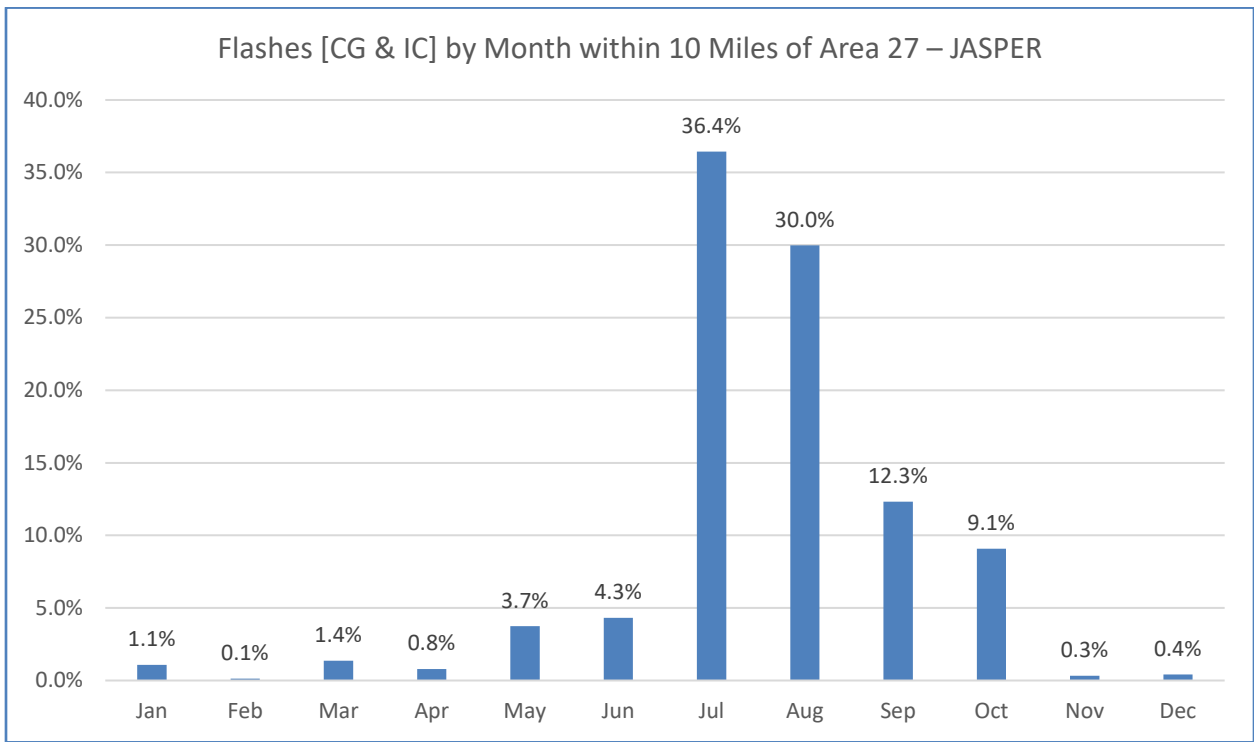
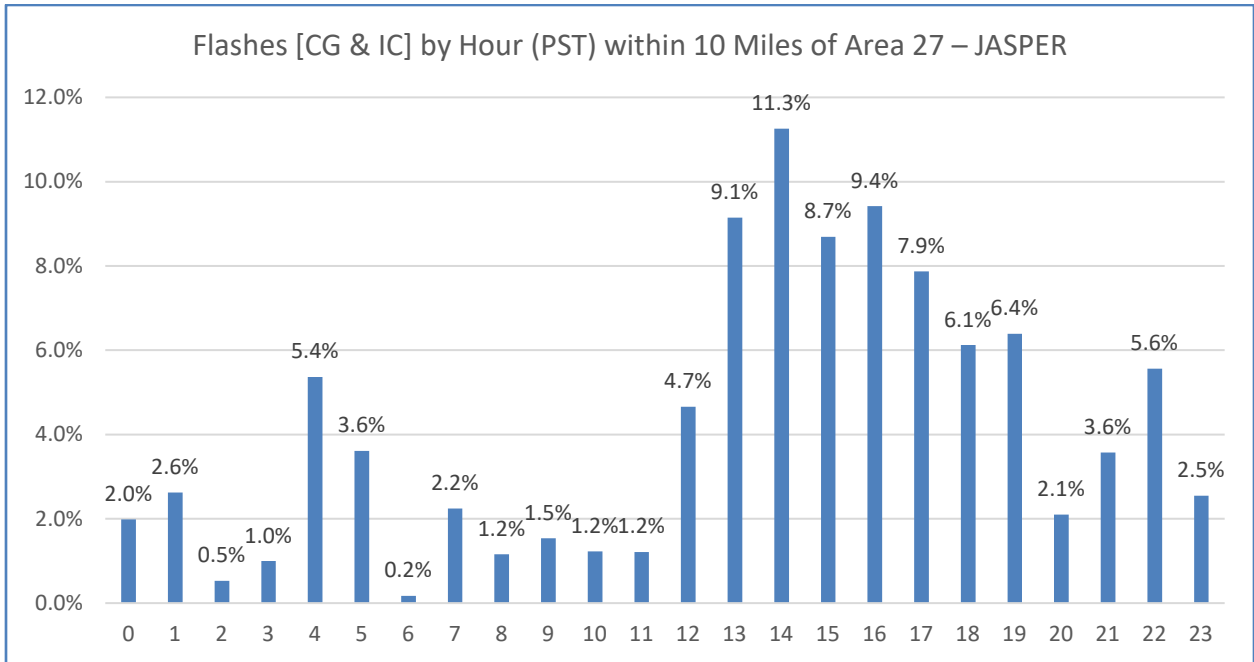
2,512 – CG Flashes / 6,716 – IC Flashes



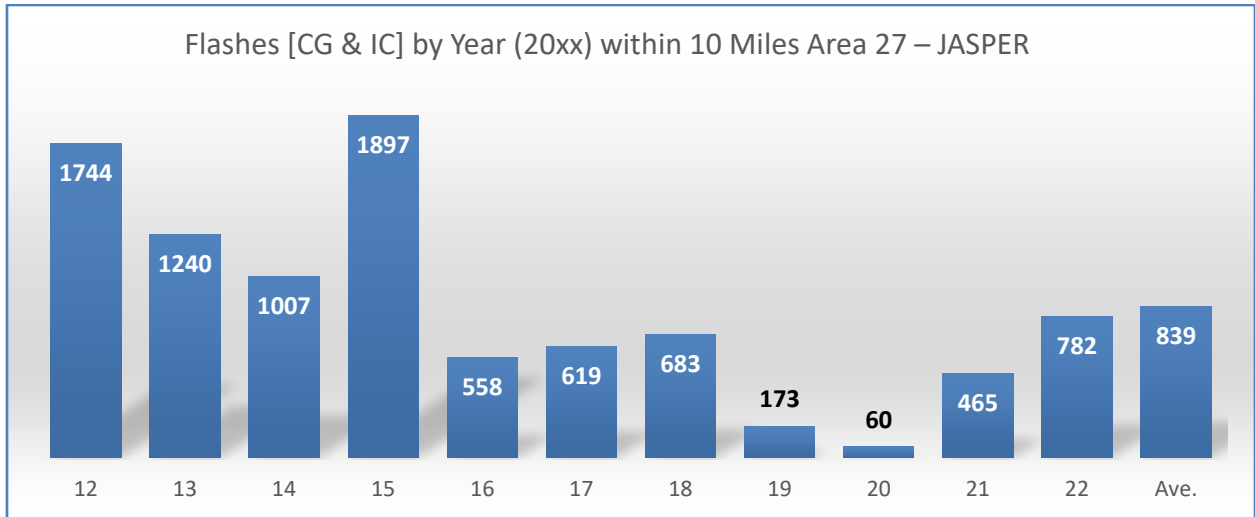
Legend



3.13.2	Area 27 – JASPER	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59059



3.13.3	Area 27 - JASPER	Data Date Range
ARL/SORD NNS Lightning Summary	Within 10 Miles	2012/01/01 00:00:00 to 2022/12/31 23:59059



A27	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Totals
Jan	0	0	0	0	94	0	0	0	0	5	0	99
Feb	8	0	4	0	0	0	0	0	0	0	0	12
Mar	0	0	19	91	2	7	5	0	1	0	0	125
Apr	1	2	0	4	3	0	0	27	31	5	0	73
May	0	57	0	234	10	10	11	24	0	0	0	346
Jun	0	0	0	1	199	0	0	49	4	126	20	399
Jul	636	370	318	653	181	176	469	14	0	203	342	3362
Aug	1089	390	501	135	26	199	30	22	23	123	228	2766
Sep	2	401	165	27	0	227	159	3	0	1	153	1138
Oct	8	20	0	747	43	0	9	0	0	2	9	838
Nov	0	0	0	0	0	0	0	0	1	0	30	31
Dec	0	0	0	5	0	0	0	34	0	0	0	39
Totals	1744	1240	1007	1897	558	619	683	173	60	465	782	9228

4.0 REFERENCE

Information in Section 2 of this document was obtained from the following source:

Jenselius, John S. Jr., Lightning Safety Specialist, National Weather Service (NWS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce (DOC). [Accessed August 1, 2023].

Understanding Lightning <https://www.weather.gov/safety/lightning-science-scienceintro>