



2020

# *MICHIGAN LIGHTNING REPORT*



## ABOUT THIS REPORT

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The 2020 Lightning Report was prepared by Earth Networks using the Earth Networks Total Lightning Network (ENTLN). The following report includes in-cloud, cloud-to-ground, and total lightning data for this state and the surrounding water bodies (if any) throughout 2020. Counts, densities, rankings, Dangerous Thunderstorm Alerts (DTAs), and Thunder Days in this report are from January 1, 2020 to December 31, 2020.

## THE EARTH NETWORKS TOTAL LIGHTNING NETWORK (ENTLN)

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The lightning data in this report is derived from the Earth Networks Total Lightning Network (ENTLN), which monitors the combination of in-cloud and cloud-to-ground lightning strikes over 100 countries. With over 1,800 sensors, the ENTLN is the most extensive and technologically advanced total lightning network in the world. ENTLN has been specifically deployed to detect real-time lightning and provide advanced warning for severe weather events that could threaten public safety and operational efficiency.



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# REPORT TERMINOLOGY

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To help you better understand the insights from this lightning report, we've included definitions of our frequently used report terminology below.

**Lightning Pulse:** This report measures lightning pulses. A pulse is a surge of electric current in lightning usually accompanied by a burst of light. Pulses are classified as In-cloud (IC) or Cloud-to-Ground (CG).

**Lightning Flash:** A lightning flash is a collection of pulses close in space and time that approximates the continuous ionized channels of a complete bolt of lightning.

**Cloud-to-Ground Lightning (CG):** Lightning that happens between opposite charges in a cloud and on the ground.

**In-Cloud Lightning (IC):** Lightning that occurs between opposite charges within a thunderstorm cloud.

**Total Lightning Detection:** The combination of all in-cloud and cloud-to-ground lightning activity.

**Pulse Density:** The number of lightning pulses per square mile per year.

**Dangerous Thunderstorm Alerts (DTAs):** Earth Networks patented advanced severe weather warnings that notify users of incoming storms up to 45 minutes before storm arrival.

**Thunder Days:** Any given day where lightning was detected in a certain area.

## TOTAL LIGHTNING

is the combination of cloud-to-ground (CG) and in-cloud (IC) lightning strikes



### Cloud-to-Ground lightning:

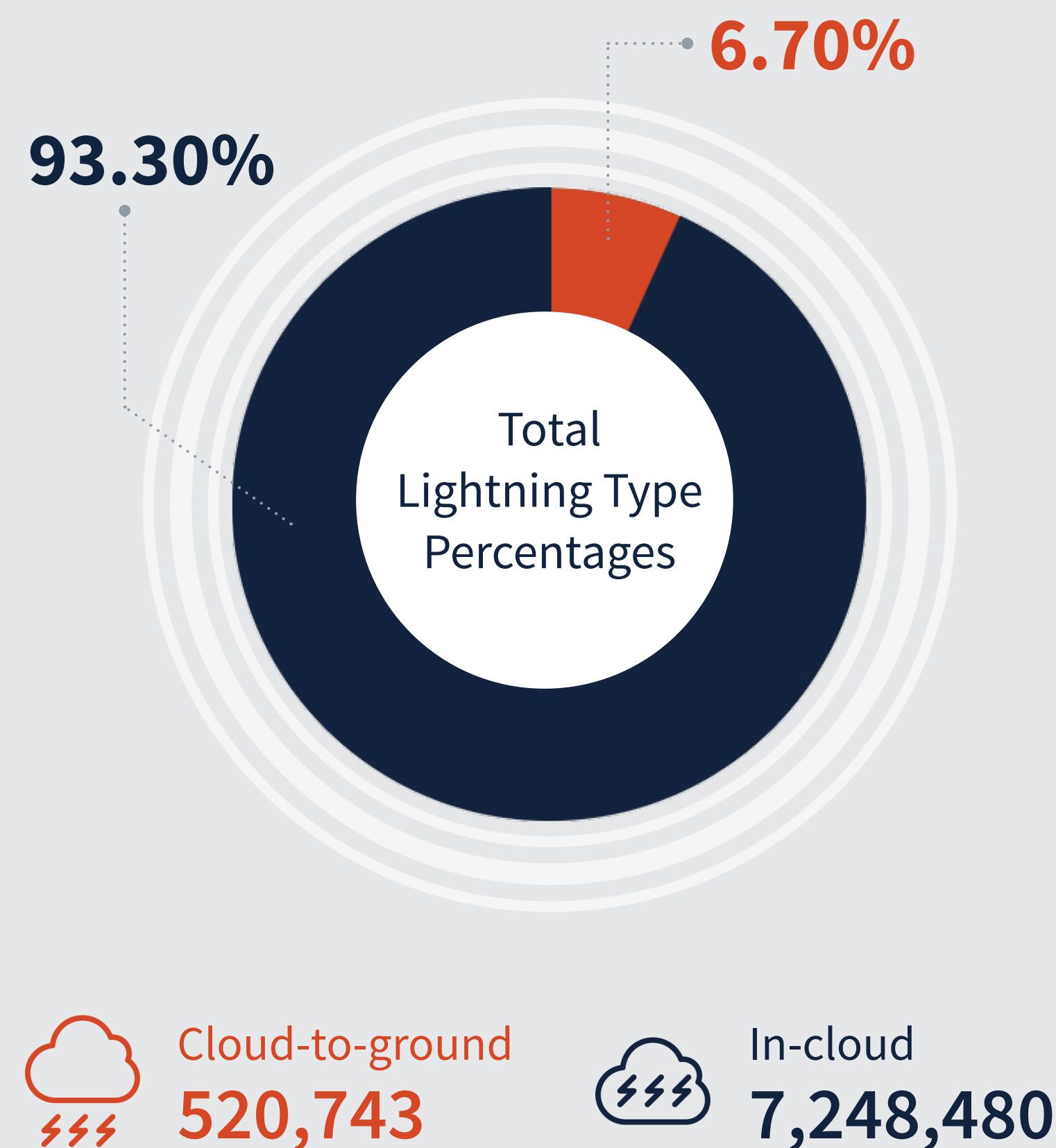
Lightning that happens between opposite charges in a cloud and on the ground

### In-Cloud lightning:

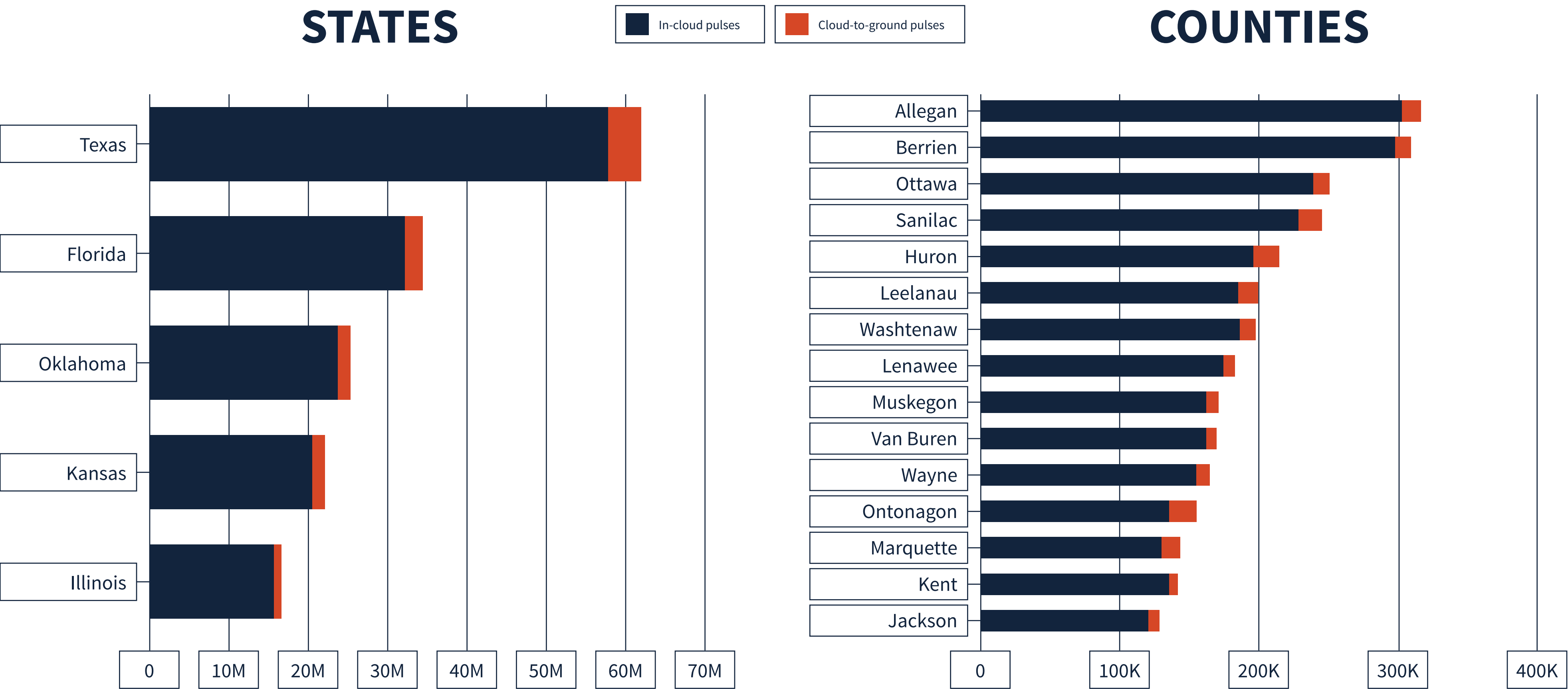
Lightning that occurs between opposite charges within a thunderstorm cloud

## MICHIGAN TOTAL LIGHTNING PULSES

# 7,769,382



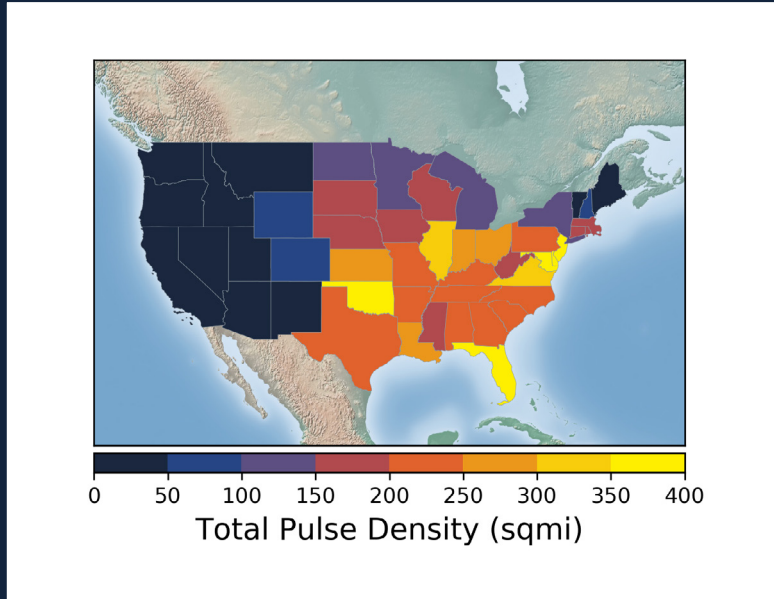
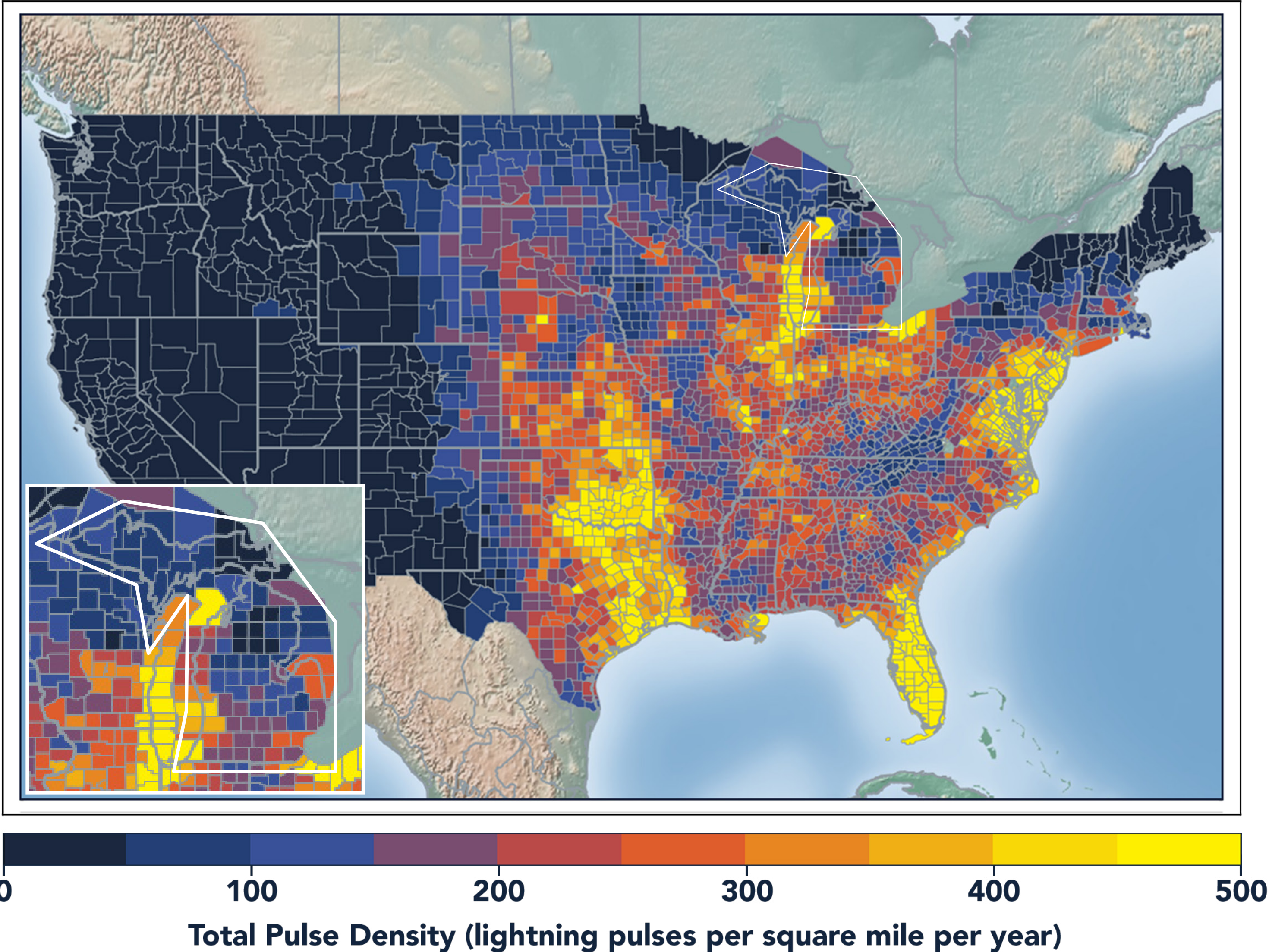
# LIGHTNING COUNT RANKINGS



Michigan ranked 24 in total lightning pulses for 2020.



# TOTAL (CG+IC) PULSE DENSITY MAP



Pulse density is a better indicator of lightning activity than total lightning counts because it enables us to compare different sized areas (like states and counties) fairly.

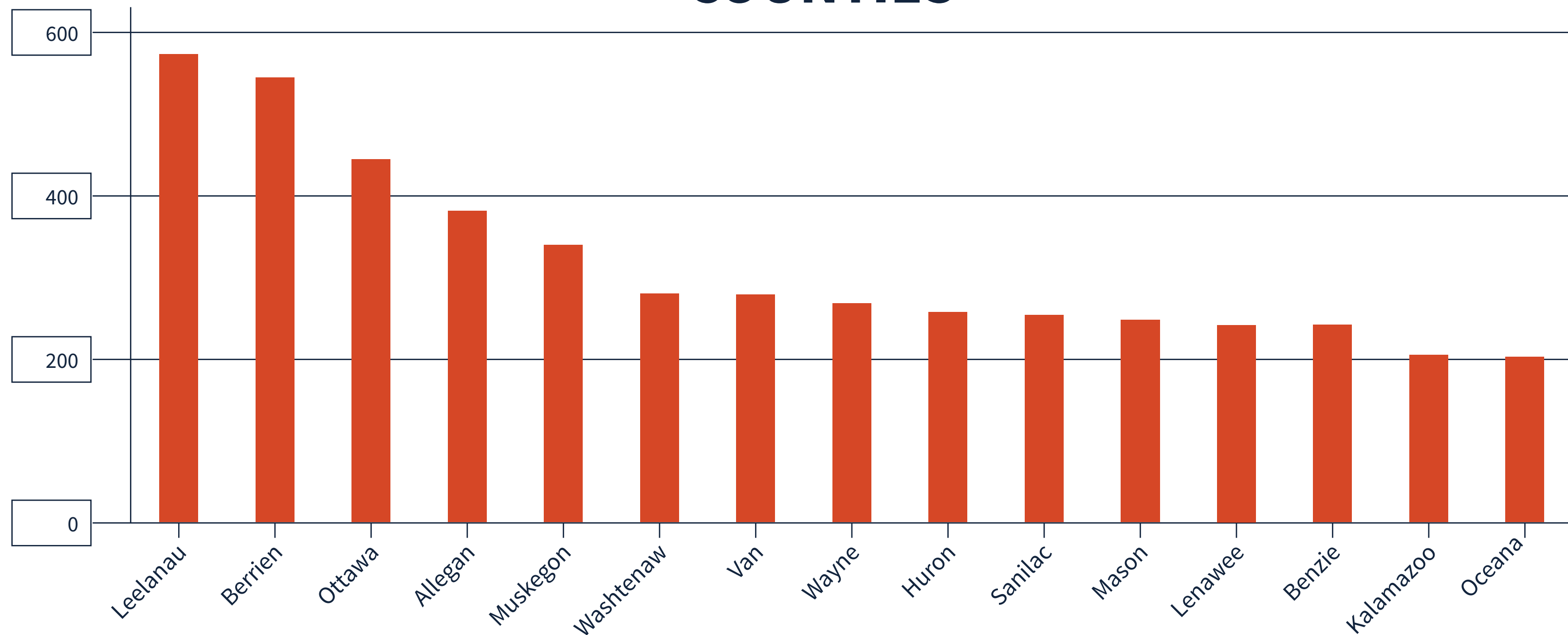
We cluster pulses together into a flash. With every pulse we detect, we receive a more precise measure of lightning activity. At left, areas in bright yellow experienced the highest lightning pulse density per square mile in 2020.



# TOTAL PULSE DENSITY RANKINGS

This chart shows the top 15 counties in the state ranked by total pulse density, which is the total lightning divided by the area of the county (in square miles).

## COUNTIES





# DANGEROUS THUNDERSTORM ALERTS IN THE U.S.



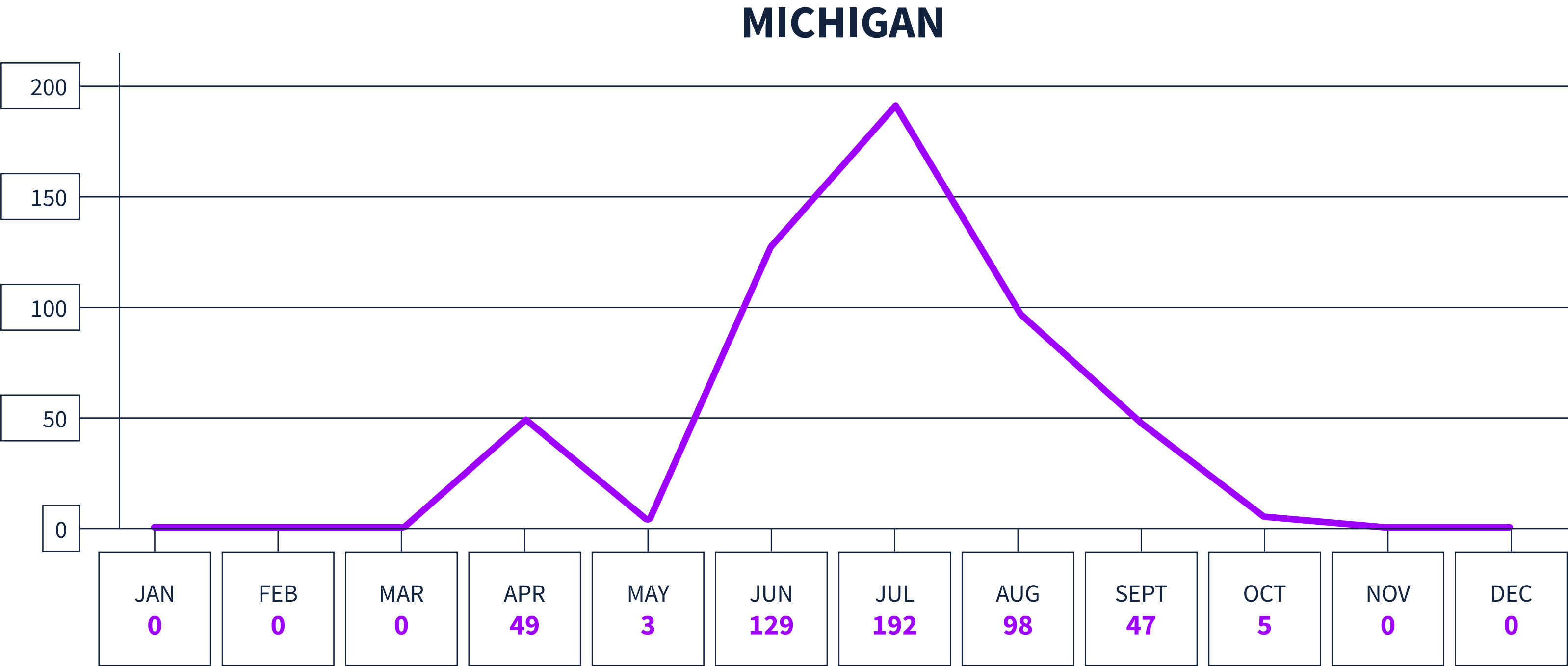
Earth Networks issued 29,401 Dangerous Thunderstorm Alerts (DTAs) in 2020. This year's map clearly shows the persistent drought conditions that have plagued the South and Southwest.

Dangerous Thunderstorm Alerts (DTAs), available exclusively to Earth Networks, provide **50% more lead time** to severe storms compared to publicly available alerts.



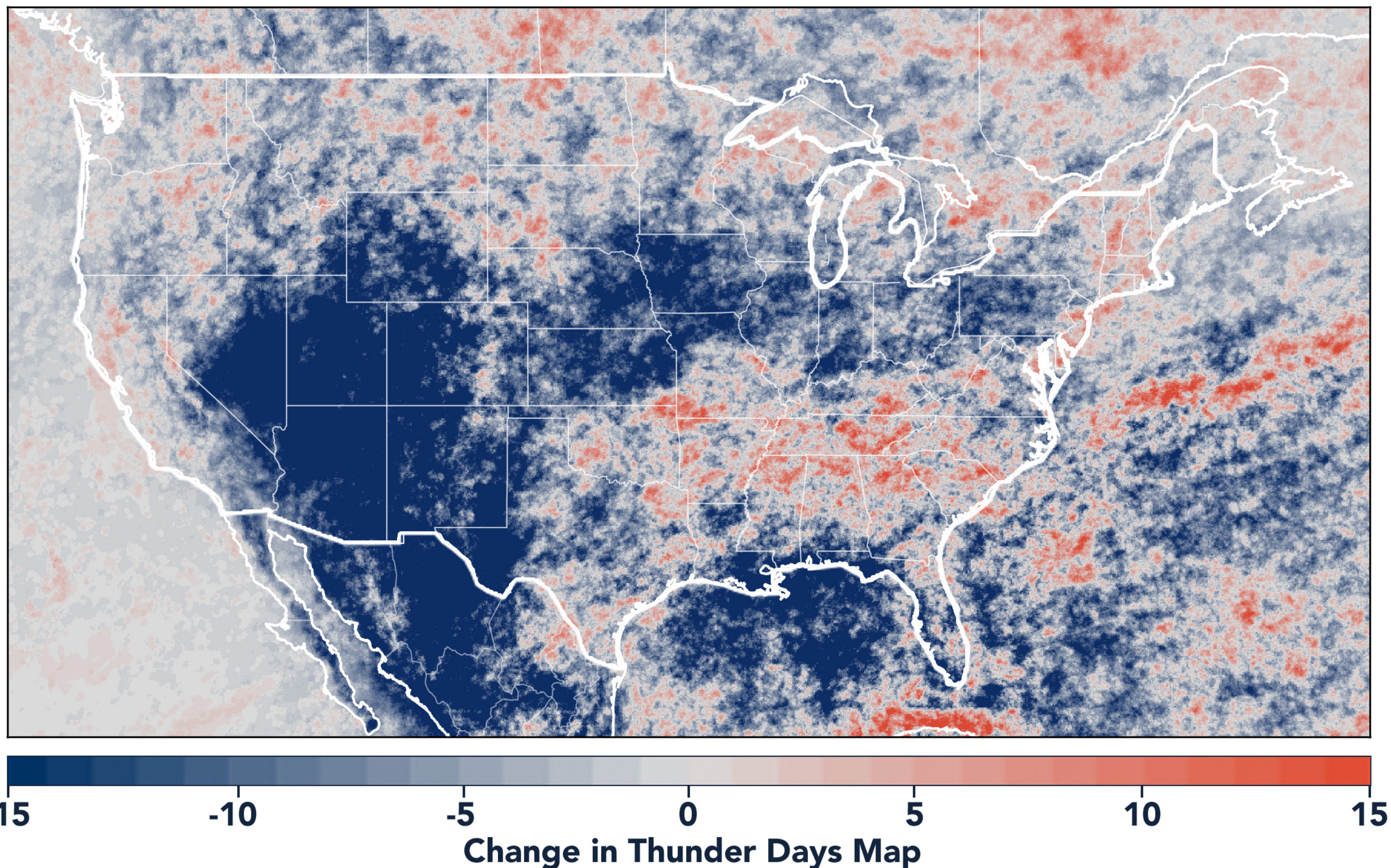
# DANGEROUS THUNDERSTORM ALERTS BY MONTH

Earth Networks issued 523 Dangerous Thunderstorm Alerts for the state in 2020.





## TOTAL STATE THUNDER DAYS: 159



Thunder Days are the days we detected lightning over a certain area. The map shows a deviation from our 7-year average and illustrates our overall finding that lightning decreased about 15% from 2019.

This year, the Southwest and Midwest experienced significantly less lightning than in previous years due to a persistent drought and weak monsoon. States in the Southeast experienced a substantial uptick in lightning activity this year, including Tennessee, North Carolina, South Carolina, Virginia, West Virginia, Georgia, Alabama, Mississippi, Florida, Louisiana, Arkansas, and Kentucky.





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# ***THANK YOU***

For additional insights or permission to use data or graphics from this report, please contact us at: [info@earthnetworks.com](mailto:info@earthnetworks.com) or call 1 301.250.4000





# APPENDIX

This table ranks all U.S. states by total lightning pulses, including in-cloud and cloud-to-ground from highest to lowest. Total number of thunder days in each state (the total number of days in the year when lightning was detected by ENTLN) are also included. The period covered is January 1, 2020 to December 31, 2020.

| STATE | TOTAL LIGHTNING PULSES | TOTAL THUNDER DAYS |
|-------|------------------------|--------------------|
| TX    | 63,683,799             | 278                |
| FL    | 35,430,198             | 246                |
| OK    | 26,159,420             | 205                |
| KS    | 23,125,675             | 179                |
| IL    | 16,785,149             | 166                |
| NE    | 14,433,875             | 178                |
| MO    | 14,081,658             | 184                |
| VA    | 13,234,163             | 176                |
| GA    | 13,016,803             | 217                |
| OH    | 12,009,955             | 143                |
| SD    | 11,940,870             | 156                |
| LA    | 11,787,379             | 230                |
| AL    | 11,448,621             | 202                |
| AR    | 11,417,155             | 211                |
| NC    | 10,666,834             | 203                |
| PA    | 10,024,978             | 151                |
| MS    | 9,236,279              | 210                |
| IN    | 9,175,986              | 149                |
| IA    | 9,121,097              | 140                |
| WI    | 8,812,327              | 145                |
| TN    | 8,458,373              | 186                |
| MN    | 8,009,792              | 148                |
| KY    | 7,974,926              | 166                |
| MI    | 7,769,382              | 159                |
| ND    | 7,634,287              | 131                |
| SC    | 7,454,219              | 197                |
| CO    | 7,360,769              | 185                |
| MD    | 6,666,766              | 124                |
| NM    | 5,819,550              | 196                |
| MT    | 5,107,593              | 154                |
| WY    | 4,951,397              | 166                |
| NY    | 4,943,122              | 152                |
| WV    | 4,684,226              | 150                |
| AZ    | 3,532,759              | 151                |
| NJ    | 3,465,297              | 96                 |
| UT    | 1,951,574              | 162                |
| ID    | 1,518,171              | 172                |
| MA    | 1,267,046              | 80                 |
| NV    | 1,237,862              | 146                |
| DE    | 1,168,918              | 89                 |
| CA    | 956,187                | 151                |
| OR    | 915,855                | 132                |
| CT    | 802,252                | 70                 |
| NH    | 618,242                | 70                 |
| WA    | 402,333                | 117                |
| ME    | 358,334                | 81                 |
| VT    | 354,695                | 75                 |
| RI    | 190,992                | 42                 |
| DC    | 44,204                 | 47                 |

# APPENDIX

This table ranks all counties in the state by total lightning pulses, including in-cloud and cloud to-ground from highest to lowest. Total number of thunder days in each county (the total number of days in the year when lightning was detected by ENTLN) are also included. The period covered is January 1, 2020 to December 31, 2020.

| COUNTY              | TOTAL LIGHTNING PULSES | TOTAL THUNDER DAYS |
|---------------------|------------------------|--------------------|
| Allegan County      | 316,485                | 58                 |
| Berrien County      | 308,941                | 56                 |
| Ottawa County       | 250,264                | 54                 |
| Sanilac County      | 244,881                | 41                 |
| Huron County        | 214,190                | 53                 |
| Leelanau County     | 198,905                | 50                 |
| Washtenaw County    | 196,931                | 49                 |
| Lenawee County      | 182,104                | 49                 |
| Muskegon County     | 170,374                | 53                 |
| Van Buren County    | 169,388                | 57                 |
| Wayne County        | 164,185                | 49                 |
| Ontonagon County    | 154,839                | 59                 |
| Marquette County    | 142,942                | 49                 |
| Kent County         | 141,638                | 47                 |
| Jackson County      | 127,809                | 44                 |
| Presque Isle County | 124,335                | 43                 |
| Mason County        | 122,900                | 49                 |
| Oakland County      | 122,793                | 48                 |
| Kalamazoo County    | 115,980                | 49                 |
| Calhoun County      | 114,942                | 44                 |
| St. Clair County    | 111,759                | 45                 |
| Oceana County       | 108,827                | 52                 |
| Eaton County        | 108,699                | 41                 |
| Hillsdale County    | 107,618                | 50                 |
| Alger County        | 103,333                | 45                 |
| Monroe County       | 101,086                | 48                 |
| Manistee County     | 100,118                | 47                 |
| Barry County        | 98,757                 | 44                 |
| Delta County        | 97,520                 | 47                 |
| Tuscola County      | 97,018                 | 47                 |
| Newaygo County      | 94,428                 | 46                 |
| Gratiot County      | 93,140                 | 42                 |
| Cass County         | 93,020                 | 47                 |
| Ingham County       | 92,716                 | 45                 |
| Saginaw County      | 91,338                 | 44                 |
| Ionia County        | 89,571                 | 42                 |
| Gogebic County      | 87,740                 | 53                 |
| Montcalm County     | 86,598                 | 42                 |
| St. Joseph County   | 86,392                 | 52                 |
| Livingston County   | 86,248                 | 43                 |
| Keweenaw County     | 83,735                 | 49                 |
| Menominee County    | 82,390                 | 43                 |
| Iron County         | 81,025                 | 42                 |
| Genesee County      | 80,042                 | 47                 |
| Macomb County       | 80,019                 | 38                 |
| Benzie County       | 77,469                 | 39                 |
| Branch County       | 77,358                 | 49                 |

| COUNTY                | TOTAL LIGHTNING PULSES | TOTAL THUNDER DAYS |
|-----------------------|------------------------|--------------------|
| Bay County            | 75,532                 | 37                 |
| Schoolcraft County    | 71,494                 | 44                 |
| Grand Traverse County | 71,374                 | 39                 |
| Shiawassee County     | 69,551                 | 43                 |
| Cheboygan County      | 69,479                 | 45                 |
| Clinton County        | 68,798                 | 43                 |
| Iosco County          | 66,533                 | 45                 |
| Isabella County       | 66,383                 | 42                 |
| Lapeer County         | 64,185                 | 41                 |
| Mecosta County        | 63,015                 | 42                 |
| Houghton County       | 62,789                 | 47                 |
| Alcona County         | 58,846                 | 48                 |
| Wexford County        | 57,050                 | 40                 |
| Dickinson County      | 56,362                 | 38                 |
| Clare County          | 53,773                 | 41                 |
| Midland County        | 53,141                 | 35                 |
| Emmet County          | 52,474                 | 33                 |
| Lake County           | 50,743                 | 42                 |
| Alpena County         | 49,726                 | 46                 |
| Charlevoix County     | 47,371                 | 41                 |
| Baraga County         | 46,558                 | 39                 |
| Osceola County        | 41,179                 | 43                 |
| Antrim County         | 38,076                 | 37                 |
| Mackinac County       | 37,557                 | 38                 |
| Gladwin County        | 37,542                 | 36                 |
| Oscoda County         | 37,394                 | 35                 |
| Chippewa County       | 29,616                 | 40                 |
| Arenac County         | 26,324                 | 35                 |
| Montmorency County    | 25,350                 | 32                 |
| Kalkaska County       | 24,902                 | 43                 |
| Otsego County         | 23,500                 | 41                 |
| Ogemaw County         | 22,099                 | 37                 |
| Luce County           | 19,962                 | 33                 |
| Missaukee County      | 18,400                 | 41                 |
| Crawford County       | 16,984                 | 41                 |
| Roscommon County      | 12,367                 | 38                 |