



# NCS<sup>4</sup> RESEARCH SEMINAR SERIES



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## Lightning Safety for Outdoor Venues

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NOAA's National Weather Service  
Shreveport, LA

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# Topics to be Covered

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- ✔ Shocking Statistics
- ✔ Motivation
- ✔ Recognition Programs
- ✔ Safety Plan
- ✔ Toolkit Recognition
- ✔ WRN Ambassador Program



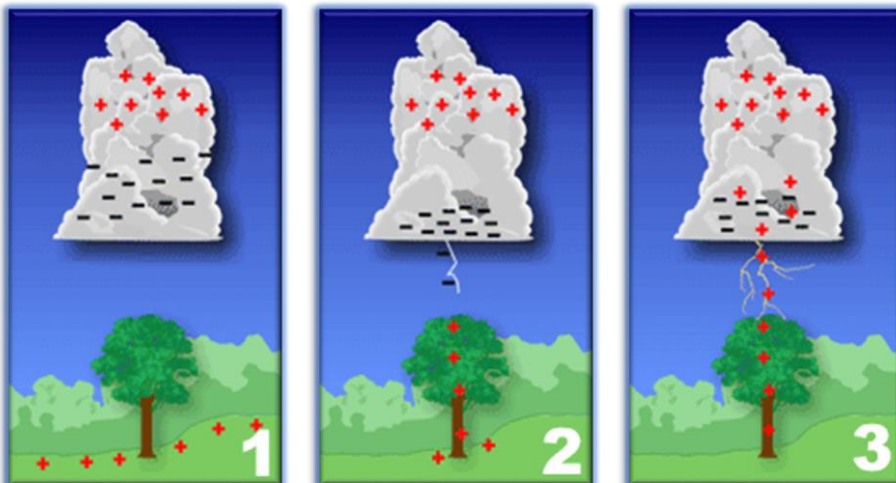
Lightning delay at Williams-Brice Stadium in Columbia, SC.  
(Photo courtesy- ESPN)

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# How Does Lightning Form?

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## Types of Lightning

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← **Cloud-to-ground**



**Cloud-to-cloud** →



← **Bolts from the blue**

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## Lightning Myths

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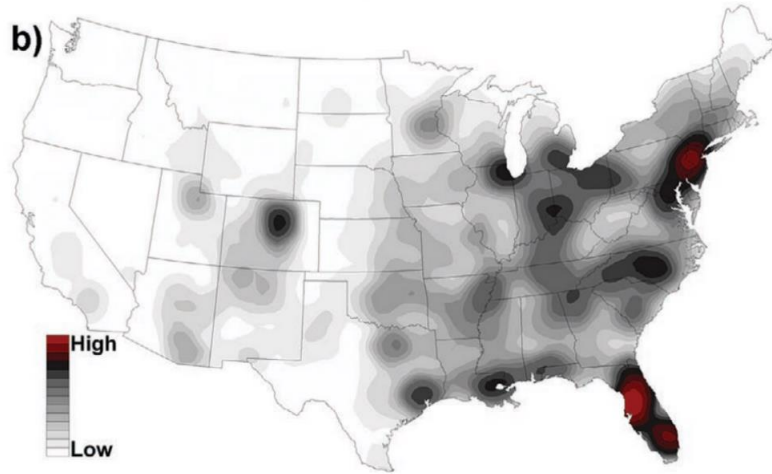
- ✔ **Lightning never strikes the same place twice.**
- ✔ **Rubber tires on a car protect you from lightning.**
- ✔ **Lightning is attracted to metal.**
- ✔ **Dugouts are completely safe.**

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# Lightning Fatalities Density

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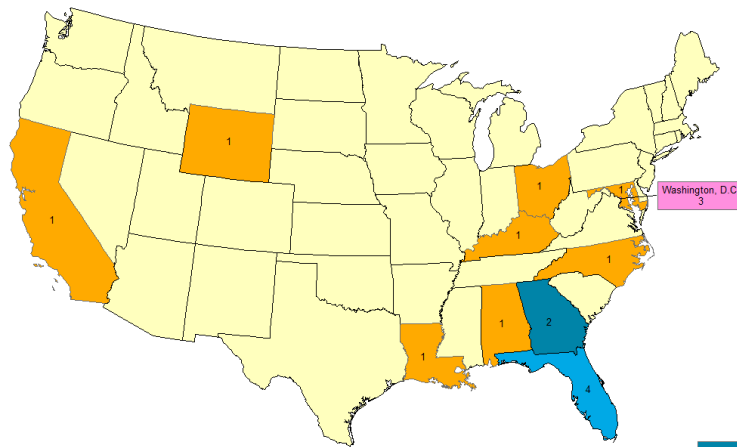
1959-2006 density of fatalities. (Graphic courtesy- Walker S. Ashley and Christopher W. Gilson)

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# Lightning Fatalities in 2022

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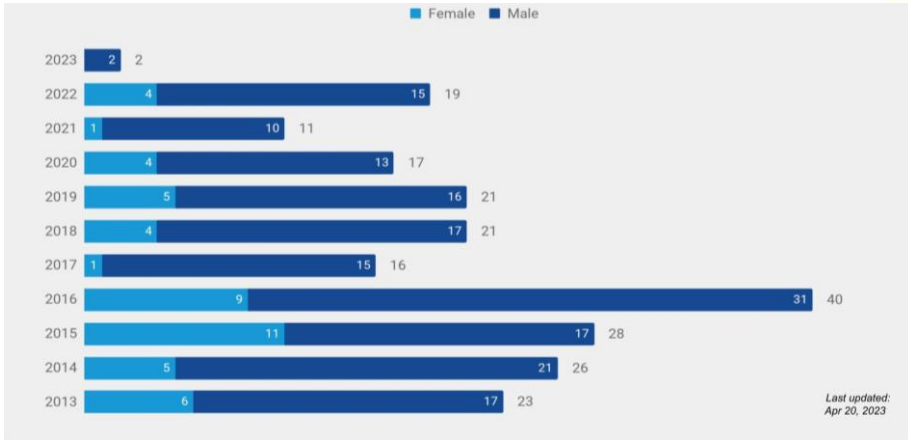


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# U.S. Lightning Fatalities (2013-2023)

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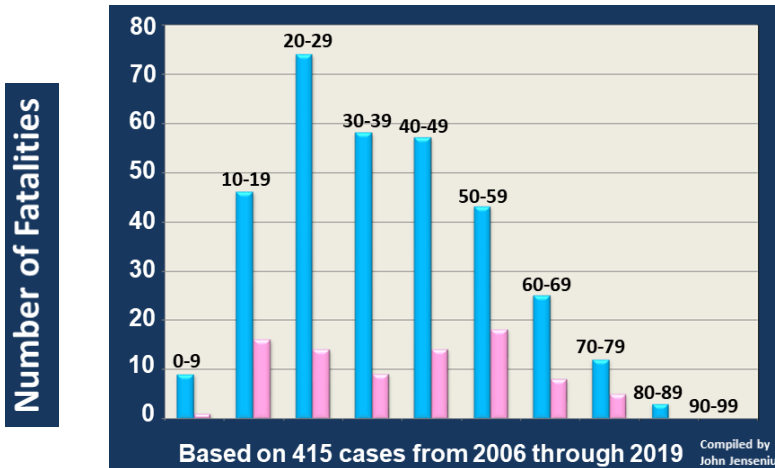


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# Lightning Fatalities by Age and Gender

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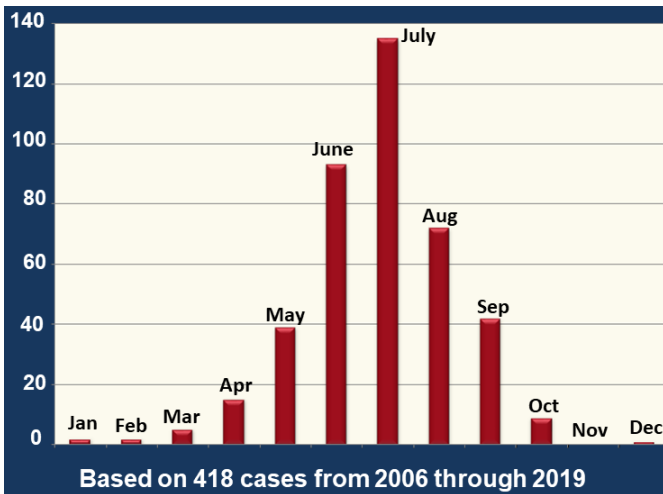


## Lightning Fatalities by Month

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Number of Fatalities



Based on 418 cases from 2006 through 2019

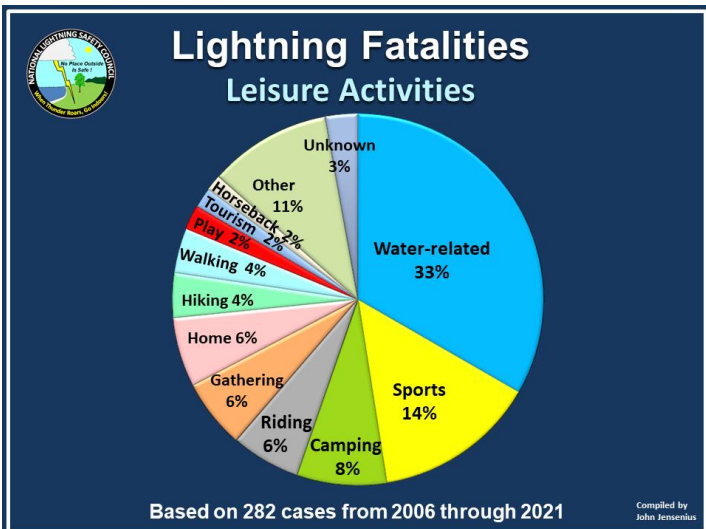
Compiled by John Jensenius

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## Lightning Fatalities by Leisure Activities

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Based on 282 cases from 2006 through 2021

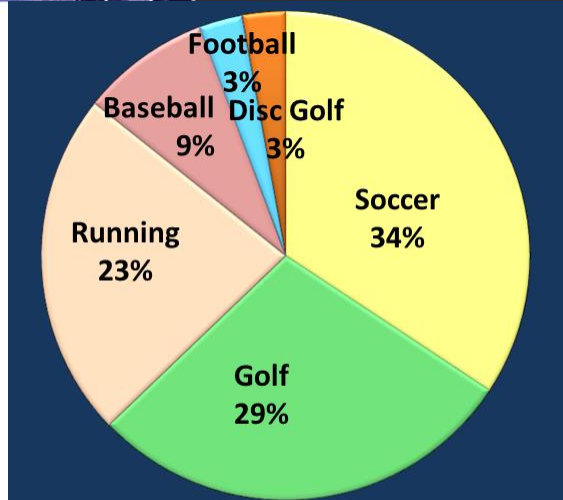
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## Lightning Fatalities by Sport

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Based on 35 cases from 2006 through 2019

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## NOAA's Guidelines *Outdoor Venues*

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- ✔ Designate a Weather Watcher
- ✔ Train Staff/Inform Fans/Shelters
- ✔ Evacuation occurs at a minimum **8 mile** radius
  - ✔ Recommendations for **15 and 12 miles** for more organized and fast-moving thunderstorms.
- ✔ Resumption of Event
  - ✔ No lightning within **6 miles** (storms moving away)
  - ✔ No lightning observed for the past **30 minutes** (day)
  - ✔ No thunder observed for the past **30 minutes** (night)



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# Eligible Venues

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**Outdoor Stadiums**

**Raceways**



**Amusement and Water Parks**

**Golf Courses**



**Concert Venues**

**Little League Facilities**



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# Safety Plan *Outdoor Venues*

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- ✔ **Motivates venues to pursue a lightning safety plan.**
  - ✔ BE PROACTIVE
  
- ✔ **Utilizing the Toolkit**
  
- ✔ **Safety Plan Submission**
  - ✔ Local National Weather Service



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## Keys to Preparing a Venue

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### Information Reception

### Decision Support Standards



### Public Notification Plan

### Protection Program



### Education

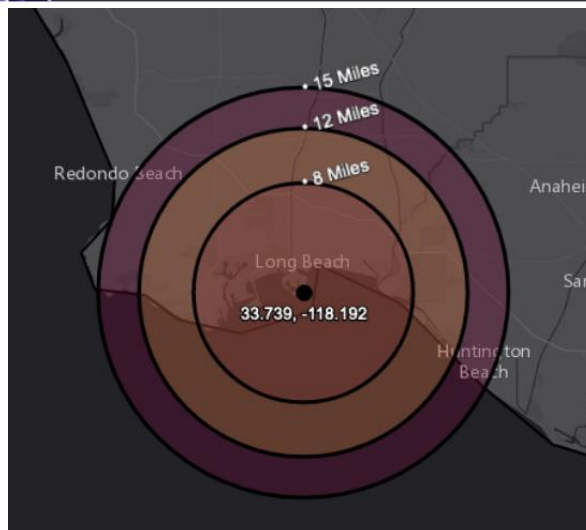
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## Lightning Radii Rings

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- Venues select their radii which lead to decision points
- Suggested radii
  - 15 miles
  - 12 miles
  - 8 miles



Recommended radii for lightning delay decisions  
Graphic courtesy- Charlie Woodrum (NWS)

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## Example Canned Message

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### Public Address System Evacuation Announcements

In a case where thunderstorms are in the forecast and an evacuation is possible during the event, radio, public address system announcements, and visual display boards will state:

*"Inclement weather, including lightning, is forecast today and may lead to the suspension of play. Those of you who wish to leave the venue for a safe structure or vehicle will be permitted to re-enter with your ticket stub."*

In the case of an evacuation, radio, public address system announcements, and visual display boards will state:

*"Inclement weather, including lightning, is in the area. The event has been suspended until the weather no longer poses a danger to this area. Please begin to evacuate in a calm and orderly fashion for everyone's safety. Once the storm clears, we will notify patrons of the resumption of the event. At that point, you will be permitted to re-enter with your ticket stub and return to your seats."*

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## Safe Structures

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- ✔ Large substantial building, fully enclosed.
- ✔ Have grounded wiring and plumbing with metal structural members.
- ✔ Surrounds people inside with a cage-like effect.

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## Sometimes Safe Structures

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- ☑ **Unsafe from Lightning** – has the world “shelter” attached – sun, beach, golf, picnic, or rain shelter



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## Completely Unsafe Structures

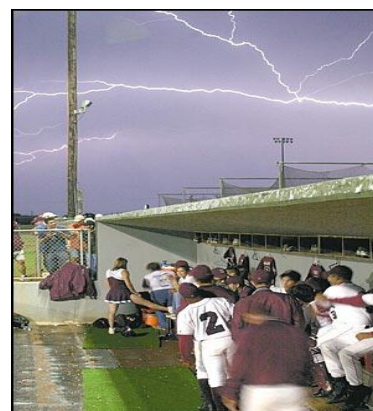
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### ☑ **Dugouts**

- ☑ Open side
- ☑ Small
- ☑ No conducting material around people inside
- ☑ Nearby tall utility pole
- ☑ Water on ground

### ☑ **Tents**

- ☑ Invisible to lightning



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## Safe/Unsafe Vehicles

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### Safe

- Fully enclosed metal-topped vehicle
- Buses



### Unsafe

- Convertibles
- Fiberglass body/cloth top
- Golf carts
- Bicycles/motorcycles



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## Resuming Activities

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- **Lightning has left a 6 mile radius**

**AND**

- **No thunder/lightning observed for 30 minutes**

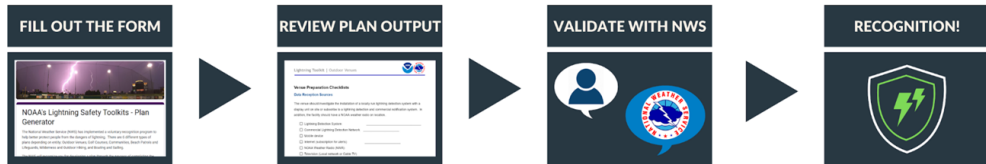
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## Process for Completing Lightning Safety with the Toolkits

- NWS office (WCM or Forecaster) advertises availability of new toolkits
- Organizations fill out toolkits on their own or NWS team members meets with them to go through the GoogleForm together (generate a PDF and link to editable Google Doc)
- Completed form is sent to user, local NWS contact, and [wrn.lightning@noaa.gov](mailto:wrn.lightning@noaa.gov)
- User submits to WCM or designated WFO team member for review
- WCM reviews, provides input/feedback if needed, and then submits validation to [wrn.lightning@noaa.gov](mailto:wrn.lightning@noaa.gov)
- Recognition Ceremony

Easy Steps!



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## Recognition Ceremonies *Outdoor Venues*



Bowling Green is recognized for completing lightning plans.



Lightning Safety Plan Recognition

**Lightning-Safe U.**

Date: Jan 4, 2023

Authorized By: \_\_\_\_\_

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## Lightning Plan Generator

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[www.weather.gov/safety/lightning-toolkits](http://www.weather.gov/safety/lightning-toolkits)

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## Questions?

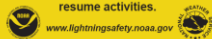
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**When  
Thunder  
Roars,  
Go Indoors!**

**STOP** all activities.

Seek shelter in a substantial building  
or hard-topped vehicle.

Wait 30 minutes after storm to  
resume activities.



Email: [Charles.Woodrum@noaa.gov](mailto:Charles.Woodrum@noaa.gov)

[www.weather.gov/safety/lightning-toolkits](http://www.weather.gov/safety/lightning-toolkits)

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