

# Teaching Lightning Safety

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Lightning is the second leading cause of storm deaths in the United States. It kills more than tornadoes or hurricanes! Lightning also inflicts life-long debilitating injuries on many more than it kills. In many states, lightning is the leading source of weather casualties (deaths + injuries). A recent study by the Center for Disease Control identified the military as especially at risk, based on medical reports. This increased risk is presumed to be from increased outdoor exposure during training, deployments, physical fitness training, and recreation. If you teach tornado and/or hurricane safety, shouldn't you devote even more effort to lightning? But how do you teach lightning safety?

The first step in teaching lightning safety is motivation through increased awareness of the threat. Lightning is a leading weather killer and injurer, as shown above. A second motivating factor is that the vast majority of lightning casualties can be easily, quickly, and cheaply avoided through a few simple guidelines. A quick review of the 5-level lightning safety plan is in Table-1. See the Jul/Aug 03 'OBSERVER' for more details.

**TABLE 1. QUICK REFERENCE FOR THE FIVE LEVELS OF LIGHTNING SAFETY.**

<b>LEVEL</b> (best to worst)	<b>BRIEF DESCRIPTION</b>
<u>Fundamental Principle:</u> No place outside is safe with thunderstorms within six miles	
1	Schedule outdoor activities to avoid lightning
2	'30-30 Rule' (If 30 sec between lightning and thunder, go inside. While inside, stay away from corded telephones, electrical appliances and wiring, and plumbing. Stay inside until 30 min after last thunder.)
3	Avoid dangerous locations/activities (elevated places, open areas, tall isolated objects, water activities). Do <b>NOT</b> go under trees to keep dry in thunderstorms!
4	Lightning Crouch (desperate last resort)
5	First Aid: Call 9-1-1. CPR or rescue breathing, as appropriate.

The second step in a lightning safety program is deciding when and where to conduct the program. The largest lightning threat in the U.S. is in the Southeast, Gulf States, Mississippi and Ohio River Valleys, and the Front Range of the Rocky Mountains (Figure-1). But no place in the U.S. is free of lightning threat. The best times to begin a program are just before the start of your local lightning season, just before major lightning outbreaks, during national Lightning Safety Awareness Week (always the last full week of June), and during state or regional severe weather awareness weeks. If these latter events don't include lightning, coordinate with the organizers to get it added. You can even declare your own local lightning week. Frequent reminders throughout the lightning season are also required, especially just before major local outdoor events. Even areas with relatively little lightning activity, such as the West Coast, need refresher training when lightning is forecast or occurring.

The third step is choosing how to communicate the lightning safety message. Use your base newspaper, Commander's Channel base television, global email, and personal briefings. Every format should remind people that you can provide training and give POC information. Lightning safety posters and brochures are useful as briefing handouts. Lightning safety refrigerator magnets have been extremely popular (Figure-2). Don't forget to add lightning safety to your unit website.

The fourth step takes the most work--choosing the content for your lightning safety program. In general, the more you include local interest, the better the training. One of most effective techniques is interviewing lightning survivors. The Lightning Strike Electric Shock Survivors International ([www.lightning-strike.org](http://www.lightning-strike.org)) is the largest support group for lightning survivors and can help you find a lightning survivor in your area that is willing to help. Another effective technique is myth-busting. This technique can be very entertaining, and thus tends to be remembered longer. The 45 WS has published a list of the 'Top-10 Lightning Safety Myths' (<https://www.patrick.af.mil/45og/45ws/lightningsafety>). A third useful approach is to emphasize the locations and activities associated with lightning casualties (Figure-3). You may need to adapt these to your local situation. For example, bases near the Front Range of the Rocky Mountains need to emphasize the danger of hiking and climbing in the mountains, especially after late morning. States with high lightning casualty rates can also use that fact as motivation (Table-2). Other useful techniques include coverage of recent local lightning casualties or major damage. Media reports of recent lightning events from around the world are available at [www.sirlinksalot.net/lightning.html](http://www.sirlinksalot.net/lightning.html). Catchy phrases also help people maintain awareness and remember the training, e.g. 'don't get fried, go inside'. One of the best resources for lightning safety information is the NOAA website at [www.lightningsafety.noaa.gov](http://www.lightningsafety.noaa.gov). Other useful websites are listed in Table-3. The 45 WS will submit a

scripted PowerPoint lightning safety briefing appropriate for the CONUS to AWSTL by Spring 2004 to help get you started on your lightning safety program.

Finally, we urge all meteorologists to proactively engage in lightning safety education for the general public. Lightning safety education is perhaps the best way to reduce weather casualties. Though be sure to coordinate with your local NWS office, since public weather education is their mission. Outreach to your local schools is vital. Ingraining lightning safety into our children could significantly reduce lightning casualties within a generation.

Needless to say, you should also ensure your base has an effective lightning warning program, from the technical meteorological procedures for issuing lightning advisories, through communicating the advisory to people outside. Your lightning safety education program can ensure people react correctly to the advisories, through increased awareness of the threat.

Fortunately, lightning safety has begun to get the attention it deserves. The American Meteorological Society and the National Weather Association published policy statements on lightning safety in 2002 and 2003, respectively. Both of these policy statements call for increased lightning safety education by meteorologists. The American Geophysical Union is currently implementing a lightning safety policy statement. The National Weather Service began an annual national Lightning Safety Awareness Week in 2001. The 'OBSERVER' covered lightning safety in Summer 2003.

Meteorologists can play a decisive and profound role in the battle against lightning casualties. We hope this article encourages more meteorologists to join this vital customer and public service to save lives and avoid crippling injuries. Please feel free to contact 45th Weather Squadron for advice on starting your lightning safety program (Mr. Roeder, [william.roeder@patrick.af.mil](mailto:william.roeder@patrick.af.mil), DSN467-8410).

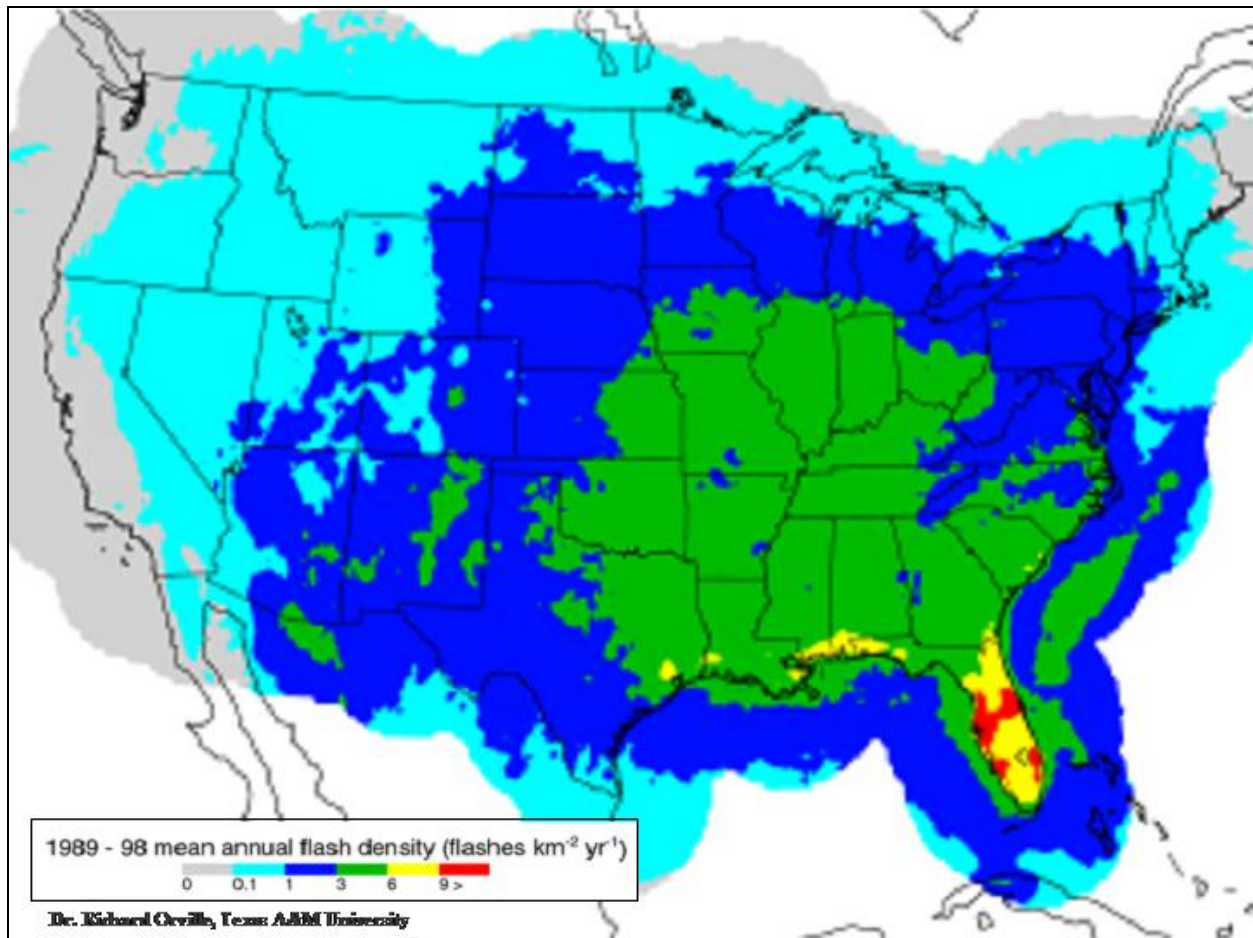



FIGURE 1. Average cloud-to-ground lightning flash density in the contiguous U.S. from the National Lightning Detection Network (1989-1998).




# LIGHTNING SAFETY

Lightning: Florida's #1 Weather Killer

Lightning Inflicts Life-Long Severe Injuries On Many More Than It Kills

NO Place Outside Is Safe When Thunderstorms Are In The Area!

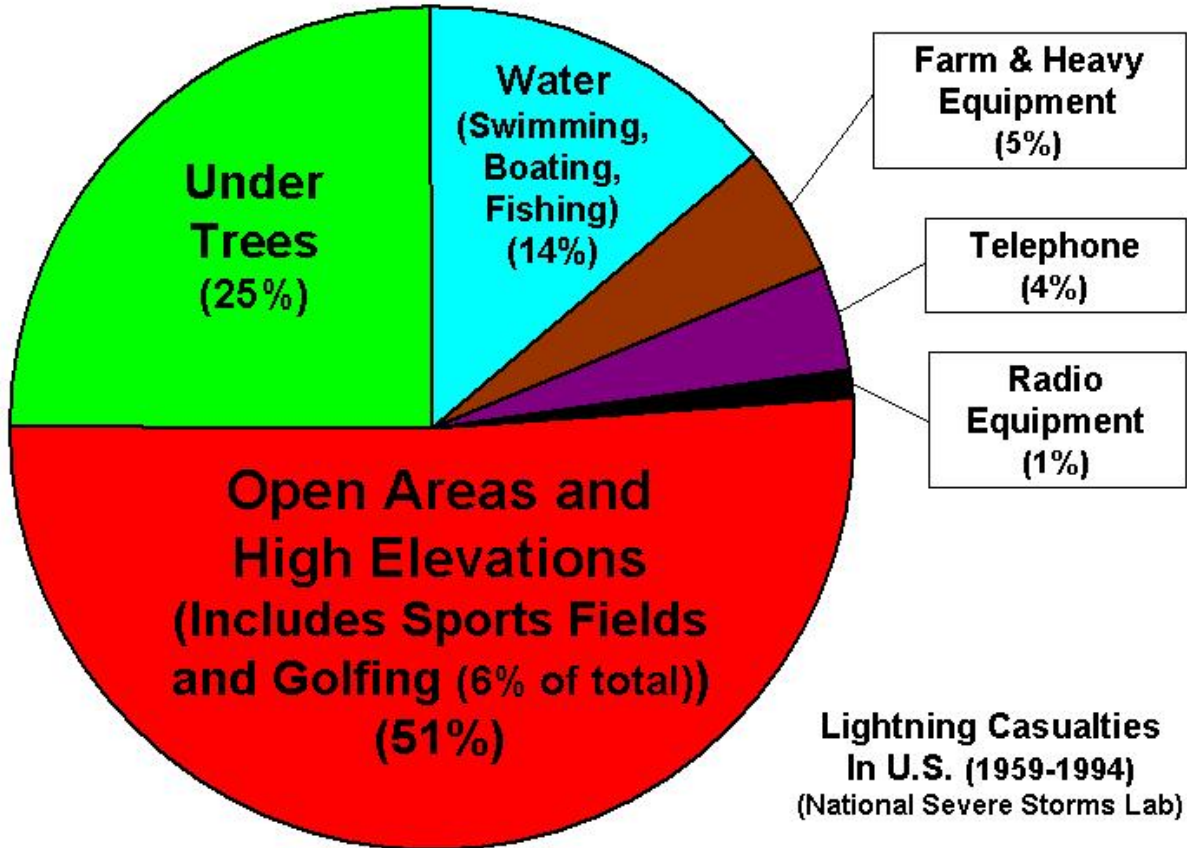


- **Plan:** Plan outdoor activities to avoid thunderstorms. Know the latest weather forecast and the local weather patterns.
- **30-30 Rule:** If 30 seconds or less between lightning and its thunder, go inside. Stay inside 30 minutes or more after the last thunder.
- **Safe Places:** Large fully enclosed buildings with wiring and plumbing provide good lightning protection. Vehicles with solid metal roofs and solid metal sides give some protection.
- **Indoors:** Don't use corded telephones. Keep away from electrical appliances and wiring. Stay away from plumbing.
- **Outdoors:** Avoid elevated places and open areas (golf courses, sports fields, beaches), water (swimming, boating, fishing), and tall isolated objects. Do **NOT** go under trees! Allow time to get to safety. Don't use open structures (picnic pavilions, rain shelters).
- **First Aid:** Call 911. All lightning deaths are from cardiac arrest or stopped breathing. Use CPR or rescue breathing, respectively.

More information: [www.lightningsafety.noaa.gov](http://www.lightningsafety.noaa.gov)

FIGURE 2. Lightning safety magnet (3 x 5 inches). This one is designed for Florida. A slightly modified version designed for the CONUS is available.

**When Thunderstorms Nearby, Avoid These Activities Like Your Life Depends On It  
– It Does!**



**FIGURE 3.** Distribution of U.S. lightning casualties by location and activity.

**TABLE-2 TOP-10 LIGHTNING CASUALTY STATES (1959-1994)** (National Severe Storms Laboratory). This shows the importance of behavior and availability of quick medical care. Even though New Mexico and Wyoming don't have high flash densities, they have high per capita lightning casualty rates, due to a large percentage of population with outdoor occupations and outdoor recreation in remote areas.

RANK	LIGHTNING DEATHS	LIGHTNING INJURIES	LIGHTNING DEATHS PER CAPITA	LIGHTNING INJURIES PER CAPITA
1	Florida	Florida	New Mexico	Wyoming
2	Texas	Michigan	Wyoming	New Mexico
3	North Carolina	Pennsylvania	Arkansas	Florida
4	New York	North Carolina	Florida	Arkansas
5	Ohio	Ohio	Mississippi	Colorado
6	Tennessee	New York	Colorado	Maine
7	Louisiana	Texas	Oklahoma	Mississippi
8	Maryland	Tennessee	North Carolina	Oklahoma
9	Pennsylvania	Maine	Louisiana	South Dakota
10	Arkansas	Georgia	South Dakota	North Carolina

**TABLE-3 LIGHTNING SAFETY WEBSITES**

<b>ORGANIZATION</b>	<b>URL</b>	<b>COMMENTS</b>
<b>GENERAL</b>		
National Weather Service	<a href="http://www.lightningsafety.noaa.gov">www.lightningsafety.noaa.gov</a>	Premier overall lightning safety website. Home of Lightning Safety Awareness Week.
45th Weather Squadron, US Air Force	<a href="https://www.patrick.af.mil/45ws/45og/lightningsafety">https://www.patrick.af.mil/45ws/45og/lightningsafety</a> (note the 's' in 'https')	None
National Severe Storms Laboratory	<a href="http://www.nssl.noaa.gov/researchitems/lightning.html">www.nssl.noaa.gov/researchitems/lightning.html</a>	None
National Lightning Safety Institute	<a href="http://www.lightningsafety.com">www.lightningsafety.com</a>	None
'USA Today' Newspaper	<a href="http://www.usatoday.com/weather/thunder/wlightning.htm">www.usatoday.com/weather/thunder/wlightning.htm</a>	None
<b>CHILDREN</b>		
Kids' Lightning Safety	<a href="http://www.kidslightning.info">www.kidslightning.info</a>	Aka "Sabrina's website"
Kidstorm	<a href="http://www.skydiary.com/kids/lightning.html">www.skydiary.com/kids/lightning.html</a>	None
National Severe Storms Laboratory	<a href="http://www.nssl.noaa.gov/edu/bm/bm_main.html">www.nssl.noaa.gov/edu/bm/bm_main.html</a>	Downloadable coloring books on thunder-storm safety and other weather safety topics
<b>SPORTS AND OTHER OUTDOOR ACTIVITIES</b>		
American Red Cross--Masters of Disaster	<a href="http://www.redcross.org/disaster/masters/">www.redcross.org/disaster/masters/</a>	Children's curriculum
National Collegiate Athletic Association	<a href="http://www.ncaa.org/sports_sciences/sports_med_handbook/1d.pdf">www.ncaa.org/sports_sciences/sports_med_handbook/1d.pdf</a>	None
National Athletic Trainers Assoc.	<a href="http://www.nata.org/publications/otherpub/lightning.pdf">www.nata.org/publications/otherpub/lightning.pdf</a>	None
National Outdoor Leadership School	<a href="http://research.nols.edu/wild_instructor_pdfs/lightningsafetyguideline.pdf">research.nols.edu/wild_instructor_pdfs/lightningsafetyguideline.pdf</a>	None
University Of Florida	<a href="http://www.thomson.ece.ufl.edu/lightning">www.thomson.ece.ufl.edu/lightning</a>	Boating--lightning safety
National Agricultural Safety Database	<a href="http://www.cdc.gov/nasd/docs/d000001-d000100/d000007/d000007.html">www.cdc.gov/nasd/docs/d000001-d000100/d000007/d000007.html</a>	Boating--lightning protection
<b>MISCELLANEOUS</b>		
Lightning Injury Research (Univ. Illinois at Chicago)	<a href="http://www.uic.edu/labs/lightninginjury">www.uic.edu/labs/lightninginjury</a>	None
Lightning Strike and Electric Shock Survivors, Intl.	<a href="http://www.lightning-strike.org">www.lightning-strike.org</a>	Support group
Sirlinksalot	<a href="http://www.sirlinksalot.net/lightning.html">www.sirlinksalot.net/lightning.html</a>	World-wide media reports of lightning events
Vaisala, Inc.	<a href="http://www.lightningstorm.com">www.lightningstorm.com</a>	National Lightning Detection Network

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