

# Reporting Severe Weather

**Spotter ID Number** \_\_\_\_\_

## CRITERIA:

- Tornado
- Funnel Cloud
- Storm Damage (deaths, injuries, broken tree limbs, shingles off roofs, etc.)
- Flooding (streets, running washes, etc.)
- Low Visibility
  - less than 1 mile due to dust, sand, fog, etc. (not rain though)
- Rotating Wall Cloud
- Heavy Rainfall
  - **measured** ½ inch or more **accumulation** in 30 minutes or less
- Hail (diameter of largest stone - any size)
- Snow (accumulating or not)

<b>Estimating Sustained Wind Speeds with Visual Clues (Gusts will be higher)</b>	
<b>Speed</b>	<b>Visual Clues and Damage Effects</b>
0	Calm wind. Smoke rises vertically with little if any drift.
1-3 mph	Direction of wind shown by smoke drift, not by wind vanes. Little if any movement with flags. Wind barely moves tree leaves.
4-7 mph	Wind felt on face. Leaves rustle and small twigs move. Ordinary wind vanes move.
8-12 mph	Leaves and small twigs in constant motion. Wind blows up dry leaves from the ground. Flags are extended out.
13-18 mph	Wind moves small branches. Wind raises dust and loose paper from the ground and drives them along.
19-24 mph	Large branches and small trees in leaf begin to sway. Crested wavelets form on inland lakes and large rivers.
25-31 mph	Large branches in constant motion. Whistling sounds heard in overhead or nearby power and phone lines. Umbrellas difficult to use.
32-38 mph	Whole trees in motion. Inconvenience felt when walking against the wind.
39-46 mph	Wind breaks twigs and small branches. Wind generally impedes walking.
47-54 mph	Structural damage occurs, such as chimney covers, roofing tiles blown off, and television antennas damaged. Ground is littered with many small twigs and broken branches.
55-63 mph	Considerable structural damage occurs, especially on roofs. Small trees may be blown over and uprooted.
64-75 mph	Widespread damage occurs. Larger trees blown over and uprooted.
Over 75 mph	Severe and extensive damage. Roofs can be peeled off. Windows broken. Trees uprooted. RVs and small mobile homes overturned. Moving automobiles can be pushed off the roadways.

<b>Hail Diameter</b>	<b>Description</b>
1/4"	Pea Size
1/2"	Marble Size
3/4"	Dime/Penny Size
7/8"	Nickel Size
<b>1" (Severe Threshold)</b>	Quarter Size
1 1/4"	Half Dollar Size
1 1/2"	Walnut/Ping Pong Ball Size
1 3/4"	Golf Ball Size
2"	Hen Egg Size
2 1/2"	Tennis Ball Size
2 3/4"	Baseball Size
3"	Teacup Size
4"	Grapefruit Size
4 1/2"	Softball Size

### **NWS Phoenix contact info**

#### **weather.gov/phoenix**

602-275-7418

- Public phone line for obtaining routine information

[austin.jamison@noaa.gov](mailto:austin.jamison@noaa.gov)

- Storm Spotter focal point

[marvin.percha@noaa.gov](mailto:marvin.percha@noaa.gov)

- HAM radio coordinator (KI7BLU)

### **Routine Skywarn NETs**

Sector 2 (Phoenix area) 442.550 MHz (PL 100.0)

The first Wednesday of the month at 8 pm

Sector 6 (Globe area) 147.200 MHz (PL 162.2)

Tuesdays 8 pm

Sector 7 (Yuma area) 146.780 MHz (PL 103.5)

Tuesdays 7 pm

# Skywarn Spotter Class Study Guide

- **Ground Truth**
  - Spotters provide ground truth information of hazardous weather conditions
    - Provide critical information that only people can provide (storm damage, size of hail, tornado touchdown, visual storm clues, etc.)
    - To fill in gaps in the observation networks
  - Warning Decision Process
    - Confirm or revise existing NWS forecasts
    - Prompt the issuance of new warnings and advisories
    - Alerting the general public of weather hazards
- **Hazardous Weather Services – “Ready, Go!”**
  - WATCH
    - Conditions are favorable for a severe weather event in the near future (2 hours up to 48 hours).
  - ADVISORY
    - Weather is occurring or imminent that will cause significant inconvenience and if caution is not exercised conditions could pose a threat to life or property.
  - WARNING
    - Life or property threatening weather is occurring or imminent (“Severe”).
- **Staying Informed**
  - Weather.gov/Phoenix
    - Clickable map
    - Radar and satellite imagery
    - Climate data
  - NOAA Weather Radio (NWR)
    - Routine and hazardous weather forecasts 24 hours a day.
    - Special radios needed to get the broadcast. Available at electronics stores, camping equipment stores, Walmart, others.
  - Social Media
    - Facebook: [www.facebook.com/NWSPhoenix](http://www.facebook.com/NWSPhoenix)
    - Twitter: @NWSPhoenix
    - Instagram: @nwsphoenix
    - YouTube: [www.youtube.com/NWSPhoenix](http://www.youtube.com/NWSPhoenix)
  - Wireless Emergency Alerts
    - Partnership between cell phone companies, FEMA, NWS
    - Targets cell phones within the warning “box”
    - Includes Tornado, Flash Flood\*, Dust Storm, Snow Squall, Hurricane, Tsunami; Amber Alerts. Doesn’t include Severe T-storm (58+ mph straight line winds and/or large hail).

- **Monsoon**
  - Key Factors
    - Heating, Complex Terrain, Moisture Fluxes
    - Not the “classic” frontal systems and jet streams
  - Definition
    - A seasonal reversal in the prevailing wind flow patterns.
    - NOT a thunderstorm that occurs in Summer.
    - Change from southwest-westerly flow aloft to east-southeasterly.
  
- **Thunderstorm Ingredients**
  - Moisture
    - Preferably in the lower to mid levels of the atmosphere.
  - Instability
    - Ability of air to accelerate upward = buoyancy.
  - Lift
    - Method of forcing air upward such as flow over mountains; fronts; thunderstorm gust fronts; surface heating, etc.
  
- **Thunderstorm Lifecycle**
  - Developing Stage
    - Start as cumulus; nearly all motion upward.
  - Mature Stage
    - Updrafts and downdrafts occurring at the same time.
    - Vertical tower, rain-free base mark the updraft.
  - Dissipating Stage
    - Updrafts weaken; downdrafts/precip more prevalent.
  
- **Strong Storm Characteristics**
  - Strong updraft
    - Rain-free base
    - “Hard” cauliflower updraft tower
    - Thick anvil
    - Overshooting top
    - Wall cloud (possibly)
      - Pronounced lowering attached to rain free base
      - Slow rotation may be present
      - Persistent feature
  - Strong downdraft and outflow
    - Small, heavy, rapidly-forming rain area
    - Toe/Foot/Curl formation of rain or dust
    - Shelf cloud (occasionally)
      - Wedge-shaped cloud with choppy base which marks leading edge of outflow.
      - Tends to be narrow and elongated; often in a curved manner.
  - POSSIBLE storm rotation
    - Rotating wall cloud (rare!)

- **Downbursts**
  - Terminology
    - Downburst Definition
      - A concentrated severe downdraft that induces an outward burst of damaging winds at the surface.
    - A microburst *is* a downburst
      - Limited areal extent up to 4 km (~2.5 mi) across.
    - A macroburst is greater than 4km in areal extent.
  - Key mechanism: Evaporative Cooling
    - evaporation of rain falling below cloud base
    - intrusion of dry air aloft
  - Straight Line Winds
    - Wind speeds may exceed 100 mph
    - Responsible for most thunderstorm wind damage on the deserts
  - Lifecycle
    - Formation, Impact, Dissipation
  - Dry Microburst
    - Occurs when most or all of the rain evaporates from the downdraft.
    - Can cause damaging wind without any rain falling.
- **Funnel Clouds**
  - Funnel shaped cloud extending from the base of a cumuliform cloud
  - Rotation
  - Circulation not on the ground
  - **Report funnel cloud**
- **Tornadoes**
  - Violently rotating column of air in contact with the ground
  - Always associated with a cumuliform cloud
  - **Report Tornado**
- **Tornado/Funnel Cloud Identification**
  - **Must have rotation!**
  - If condensation does not extend all the way to the ground, look for dust/debris near the ground.
  - Watch for persistence
    - What initially looks like a funnel may turn out to be scud
- **“Imposters”**
  - Scud clouds – ragged low level clouds
  - Rain shafts, virga
  - Smoke columns
  - Steam plumes
  - Gustnadoes
    - Looks like dust devil
    - Driven by strong outflow (usually along the leading edge)
    - Moves out from under cloud base
    - No connection to cloud base (unlike a real tornado)

- **Flooding**
  - Flash flooding is life threatening – even if water is within the banks of a waterway.
  - Unbridged crossings are especially dangerous.
  - Urban and Small Stream Flood Advisories are geared for less dangerous situations.
  - Report such situations as:
    - **Flowing water covering roadway**
    - **Running washes**
    - Submerged roadway (underpasses, curb lanes, intersections)
    - Hindered traffic due to water depth
    - Water to top of sidewalk
    - Ponding in backyard (good portion of yard submerged)
    - Deep ponding in detention basins
    - Very deep puddles in parking lots (reaching car doors)
    - Rainfall heavy enough to trigger local trouble spots
  - Take note of how long it took for the situation to develop
  
- **Low Visibilities (Dust, Fog, etc.)**
  - Less than 1 mile
  - Estimating visibility is best done from within the dust, fog, etc.
  - Use landmarks to estimate distance.
  - Look for objects that are only partially obscured but that you can still make out some details - not furthest object that you can barely detect.
  - Tell us how widespread the low visibilities are.
  - Exception: no need to report low visibility due to heavy rain.
  
- **Wind Damage**
  - From any natural cause (individual thunderstorms, cold fronts, etc.)
  - Examples: tree limbs snapped, whole trees down, roof materials damaged, patio furniture blown from yard.
  
- **Snow/Ice**
  - Even if it is not accumulating
  - Take multiple samples of snow depth if possible
  - Let us know about road conditions (accumulating snow, ice covered roadway)
  
- **Spotter Report Content - Describe the Scene**
  - **Who?** (spotter ID – or name if forgotten)
  - **What?** (damage, flooding, low visibility., etc.)
    - damage: trunk/limb diameter? roof material type?
    - flooding: streets? washes? depth? ponding vs. flowing?
    - Low vis: how low (distance)? how widespread?
  - **When?** (time reportable criteria first began – or when you first observed them)
  - **Where?** (at home? elsewhere? city, major cross-streets)
  - Only report information you can confirm
  - Make sure conditions meet criteria

- **Reporting Methods**
  - Spotter only options (webpage, email, voice hotline, amateur radio).
    - Specifics provided after successful quiz completion
  - Social media (Twitter, Facebook, Instagram only)
  
- **Amateur Radio Reports**
  - Monitor the frequency for your area
    - Maricopa/Pinal Co.: 442.550 MHz (PL tone 100.0)
    - Far East Valley/Southern Gila County: 147.200 MHz (PL tone 162.2)
    - Southwest Arizona/Yuma: 146.780 MHz (PL tone 103.5)
    - Southeast California/El Centro: 146.880 MHz (PL Tone 162.2)
  - Net Controller announces Skywarn Net activation
  - Use common radio etiquette to relay your report to the Net Controller – be prepared to provide your Spotter ID (in addition to your call sign).
  - Remember the reporting criteria
  - Be brief and to the point – no chit-chat!
  - Remember, don't wait for the Net if you already have something to report – use one of the other methods (phone, email, web form).
  
- **Spotter Safety**
  - Observing and reporting during severe weather is best done from within safe shelter.
  - If you go into the field (at your own risk), always have an escape route and shelter location available. Observe from a safe distance.
  
- **Flooding Safety**
  - **Never drive through areas covered by running water – especially if you cannot see the road surface!**
  - Two feet of running water can pick up and carry most vehicles (including trucks and SUVs).
  - Over half of all flash flood deaths are vehicle related.
  - **If your vehicle stalls in high water, Leave it!**
  
- **Lightning Safety**
  - **When thunder roars go indoors!**
  - Seek shelter immediately.
  - Stay away from trees or isolated tall objects.
  - Do not take a shower or bath due to pipes conducting electricity from lightning.
  - Avoid corded telephones and electric appliances.
  - Wait for 30 minutes after hearing the last thunder before leaving shelter.
  
- **Dust Storm Driving Safety**
  - **Stop and Survive!**
  - Pull off the road as far as possible and park.
  - Turn off the lights.
  - Keep foot off brake pedal.