

BASIC SKYWARN SPOTTER CLASS

KYLE MOZLEY
METEOROLOGISTS
NATIONAL WEATHER SERVICE
PUEBLO, CO

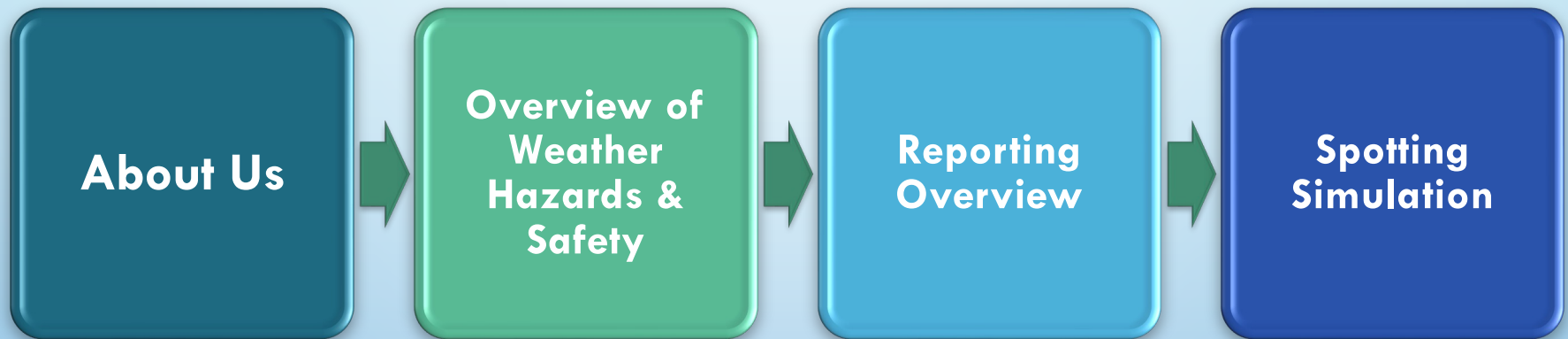
WHY WE NEED SPOTTERS

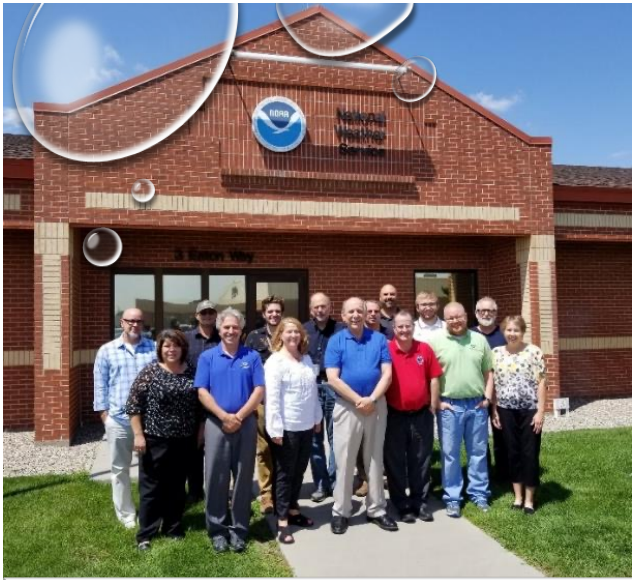
- ADD CREDIBILITY TO HAZARDS
- ENHANCE PUBLIC RESPONSE
- IMPROVE WARNING ACCURACY
- RADAR LIMITATIONS – SPOTTERS PROVIDE GROUND TRUTH
- WEAK TORNADOS ARE VERY DIFFICULT TO DETECT USING RADAR

A FEW HOUSEKEEPING ITEMS

- WE NO LONGER ISSUE SPOTTER ID'S
- USE NUMBER ON HAIL CARD TO CALL IN REPORTS, WHICH TELLS US YOU ARE A TRAINED SPOTTER
- GO TO WWW.WEATHER.GOV/PUB/SPOTTERS AND ENTER PASSWORD, GIVEN AT END OF CLASS, TO DOWNLOAD AND PRINT YOUR OFFICIAL TRAINING CERTIFICATE

OUTLINE





WHO WE ARE

- 1 Meteorologist in Charge
- 1 Warning Coordination Meteorologist
- 1 Science Operations Officer
- 1 Administrative Support Assistant
- 1 Information Technology Officer
- 1 Electronic Systems Analyst
- 1 Observation Program Leader
- 1 Service Hydrologist
- 5 Lead Forecasters
- 7 General Forecasters
- 2 Electronic Technicians

WHAT WE DO

Keep a continuous weather watch 24 hours a day, 7 days a week.

At least two meteorologists on each shift, 8AM-4PM, 4PM-12AM, and 12AM-8AM.

Issue warnings for Tornadoes, Severe Storms, Floods, Winter Storms & other hazards.



DOPPLER WEATHER RADAR

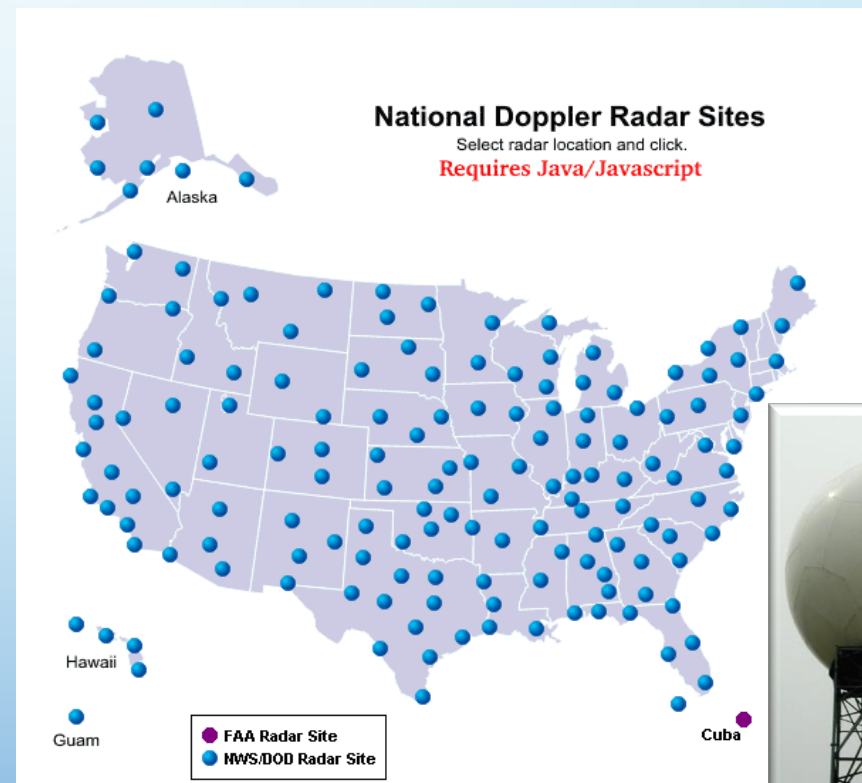
155 NEXRAD Radars Nationwide

Operate 24/7/365

Only detect rain/aerosol particles in the atmosphere, not the ground.

During severe weather, new scans update every 1-2 minutes.

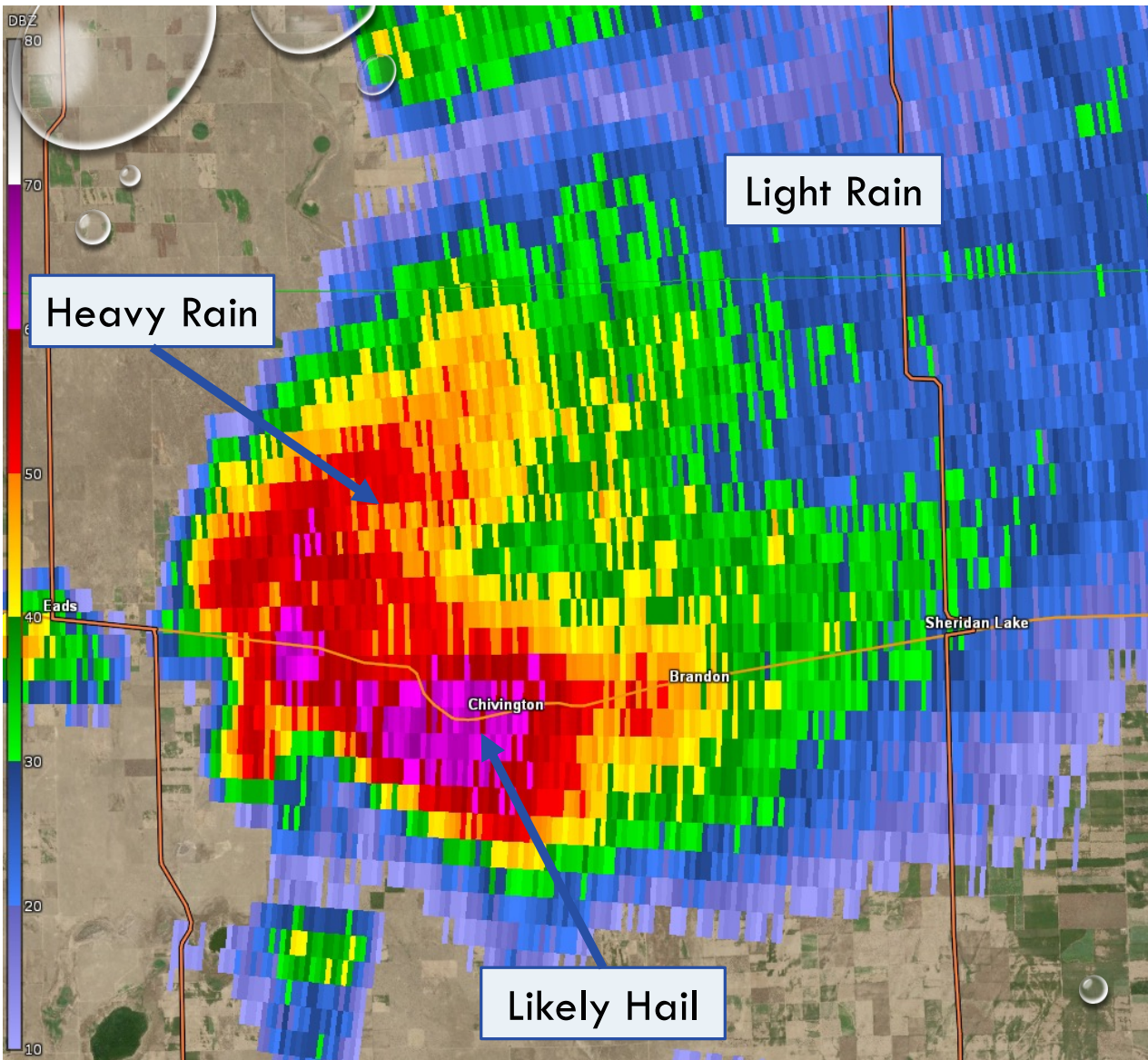
Amazing technology but still need ground truth.



BASE REFLECTIVITY

Shows energy
returned to
radar

Higher
reflectivity from
heavy rain/hail

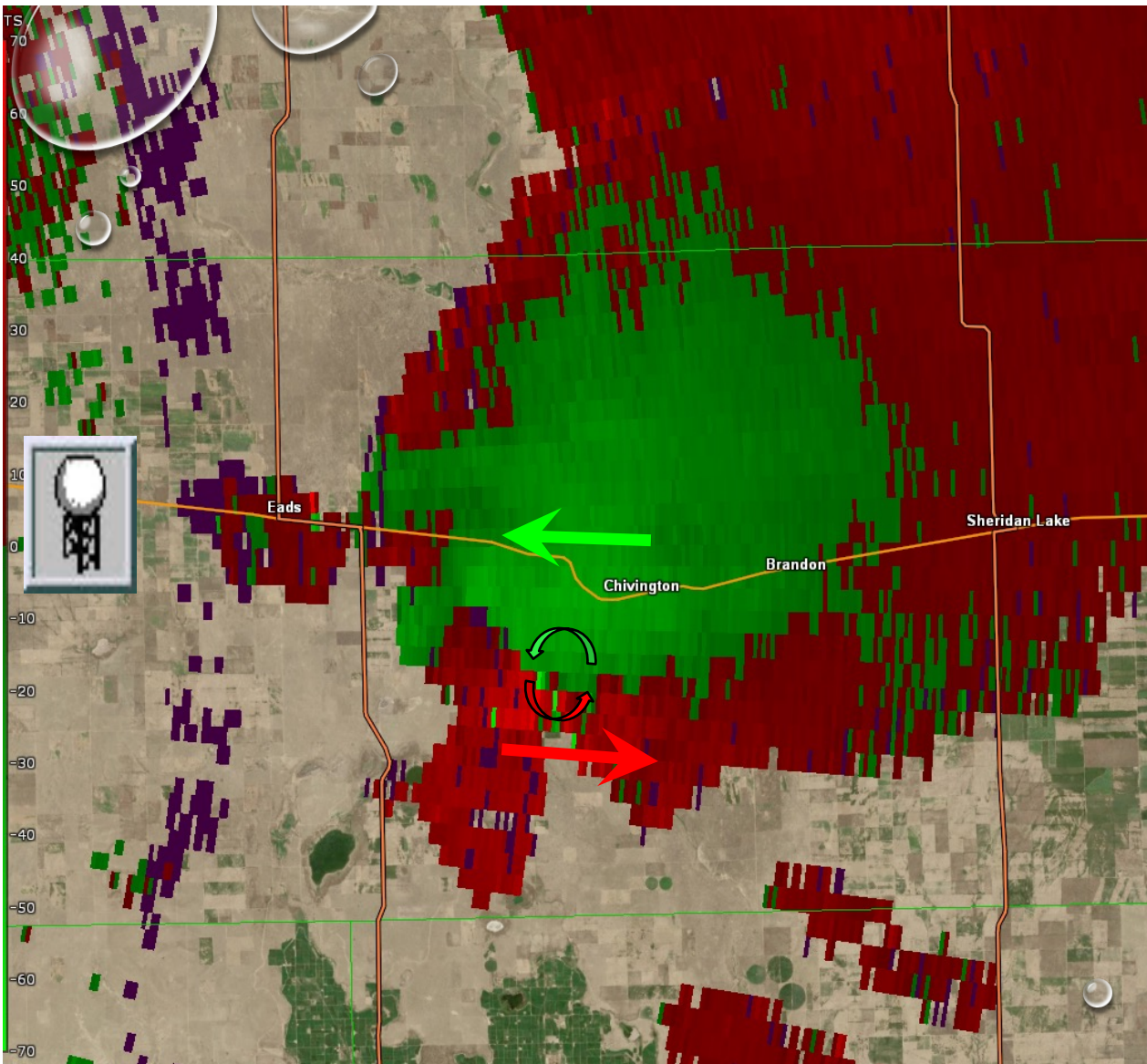


BASE VELOCITY

Product that puts the “Doppler” in Doppler Radar

One dimensional velocity:
Motion toward or away
from radar

Motion away from the
radar in **RED** and motion
toward the radar in **GREEN**

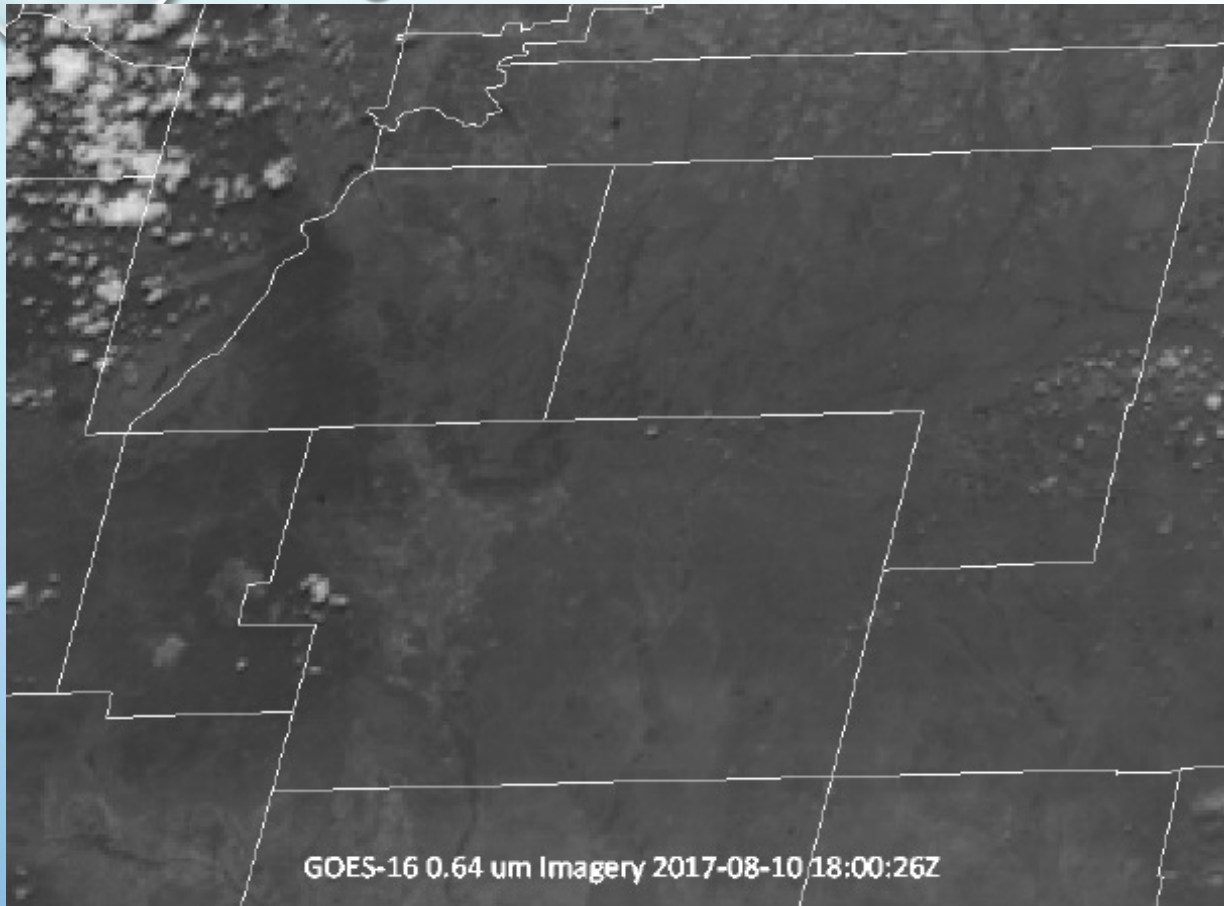


SATELLITE IMAGERY

Use to monitor for
thunderstorms, wildfires,
smoke, fog, snow

Several products to aid
in determining different
hazards

Updated every 5
minutes, but can be as
rapidly as 1-2 minutes



GOES-16 0.64 um Imagery 2017-08-10 18:00:26Z

The background features a light blue to medium blue gradient. Scattered throughout are several realistic water droplets of various sizes, some with highlights and shadows, giving them a three-dimensional appearance. The droplets are primarily located in the top-left and bottom-right corners, with a few smaller ones in the middle.

WEATHER HAZARDS OVERVIEW

SOUTHERN CO WEATHER HAZARDS

Severe Thunderstorms & Tornadoes

Wildfires

Flash Floods & River Floods

Winter Storms

HAIL

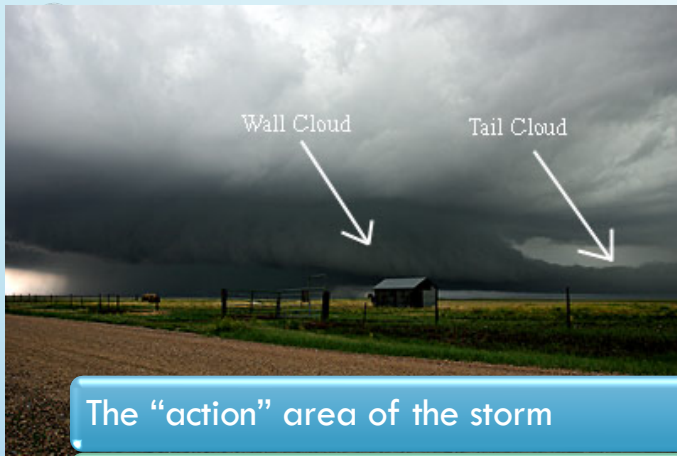
Most common severe storm threat in CO

Typically falls away from updraft, but not always

Can range in size from $<1/4$ " to several inches in diameter



WALL CLOUDS



The “action” area of the storm

Area of strongest updraft or lift

Rain-free base

Where tornadoes normally develop

May be accompanied by a tail cloud in very moist environments

May not be visible in HP storms

Not ALL wall clouds rotate



© Steve Hodanish



(C) Andrew Fritchard
prairiestormmedia.com

TORNADOES

Rapidly rotating column of air extending from a cloud that **IN CONTACT** with the ground.

The air is the tornado, not the condensation funnel.



© Stefan Klein



© Copyright 2004 Eric Nguyen



© Steve Hodanish



DAMAGING WINDS

Sometimes referred to as
“straight-line winds”

Winds not associated with a
tornado

Can exceed 100 mph

Can cause extensive damage

Shelf cloud usually a good
indicator of strong winds



Courtesy of NWS Social
Media



FLASH FLOODING

Rapid rise in water in a manner of a few hours or less

Burn scars are especially susceptible

Can cause extensive damage

Just 12" of water can cause vehicles to float



Photo Credit:
NPS Photo/Cullen Kirk



The background is a light blue gradient with several realistic water droplets of various sizes scattered across the top and bottom edges. The droplets have highlights and shadows, giving them a three-dimensional appearance.

SAFETY OVERVIEW

LIGHTNING SAFETY

One bolt measures
50,000° F

Usually strikes the
tallest object

Can strike the same
place over and over

Can strike several
miles away from
storm



When Thunder Roars, Go Indoors!

STOP all activities.

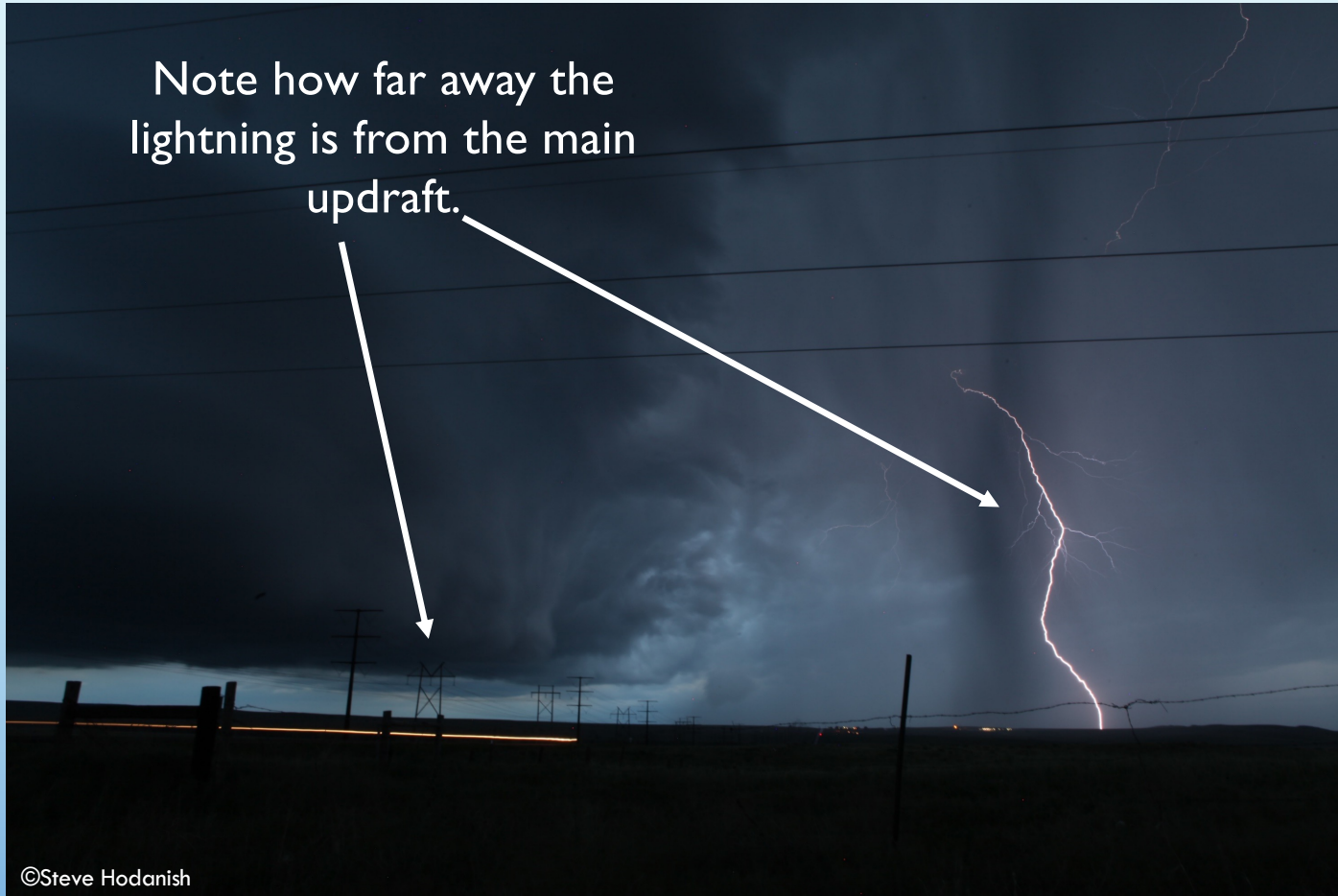
Seek shelter in a substantial building or hard-topped vehicle.

Wait 30 minutes after the storm to resume activities.

 www.lightningsafety.noaa.gov 

LIGHTNING SAFETY

Note how far away the lightning is from the main updraft.



©Steve Hodanish

TORNADO & SEVERE STORM SAFETY



TORNADO & SEVERE STORM SAFETY

Tornado Sheltering Guidelines

Seek the best available refuge area **immediately** when a Tornado Warning is issued.
Your chance of surviving a tornado is excellent if you follow these guidelines.

WORST OPTIONS

Mobile homes
Vehicles
Underneath a
highway overpass

BAD OPTIONS

Large open rooms
like gymnasiums
Manufactured housing

GOOD OPTIONS

Interior room
of a well-constructed
home or building
Basement

BEST OPTIONS

Above or below ground
Tornado Storm Shelter
(NSSA/ICC 500 compliant)*
Specifically-designed
FEMA Safe Room*

Find another option



Stay in place until all clear

PHOTO: U.S. Air Force - Tech. Sgt. Bradley C. Church

*Recommended by FEMA



TORNADO & SEVERE STORM SAFETY

Know Where to Go

When Sheltering from a Tornado



If you have no basement, move to an interior room with no windows.

Top floor rooms DO NOT protect you.

Exterior rooms and rooms with windows DO NOT protect you.

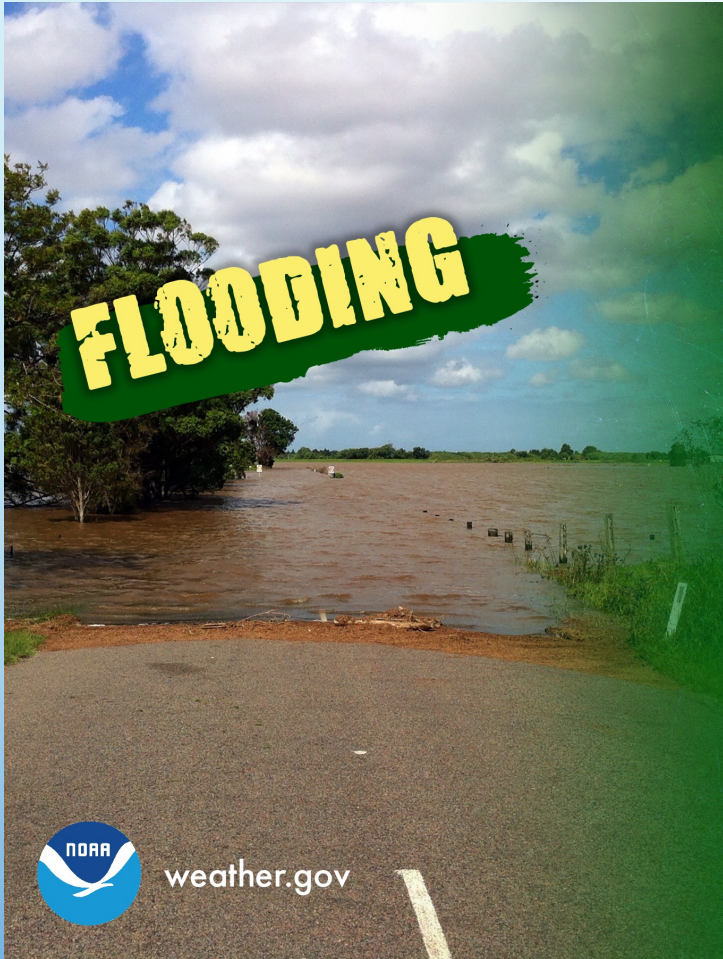
NO PLACE OUTSIDE is safe from a tornado.

Quickly move to your basement and bring your emergency supply kit.



[weather.gov/safety/tornado](https://www.weather.gov/safety/tornado)

FLOOD SAFETY



weather.gov

Small Decisions can have a
BIG IMPACT.

- Turn around and don't drive through a flooded roadway
- Don't drive around barricades
- Delay travel until conditions improve

Don't let a bad decision be your last.

FLOOD SAFETY

Never cross
flooded
roadways...



FLOOD SAFETY

...because it
could be like
this
underneath.



© Tom Magnuson



NEW EMERGENCY ALERTS

WIRELESS EMERGENCY ALERTS

Changes to Severe Thunderstorm Warnings

Impact-based warning tags

Damage Threat Tag	Wind	Hail	WEA?
Base (No tag)	58 mph (60 mph in warning)	1.00 inch (quarter)	NO
Considerable	70 mph	1.75 inch (golfball)	NO
Destructive	80 mph	2.75 inch (baseball)	YES

HAIL THREAT...RADAR INDICATED
MAX HAIL SIZE...1.00 IN
WIND THREAT...RADAR INDICATED
MAX WIND GUST...60 MPH

THUNDERSTORM DAMAGE THREAT...CONSIDERABLE
HAIL THREAT...OBSERVED
MAX HAIL SIZE...1.75 IN
WIND THREAT...RADAR INDICATED
MAX WIND GUST...70 MPH

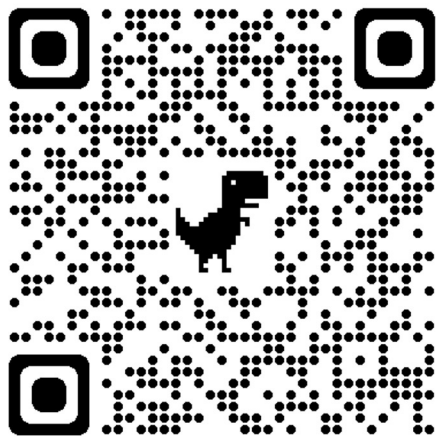
TORNADO...POSSIBLE
THUNDERSTORM DAMAGE THREAT...DESTRUCTIVE
HAIL THREAT...OBSERVED
MAX HAIL SIZE...2.75 IN
WIND THREAT...OBSERVED
MAX WIND GUST...80 MPH

IPAWS - WEA, NWR & EAS

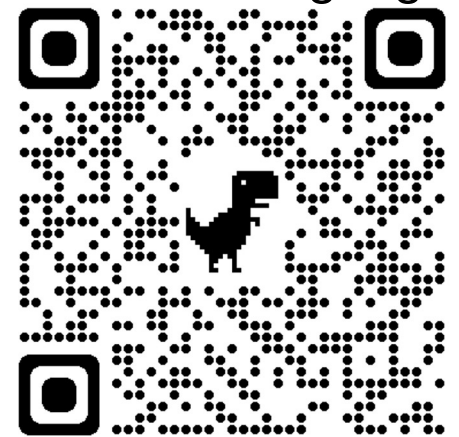
WEA PROCESS IS FULLY AUTOMATED

STANDARD MESSAGES FOR EACH WARNING TYPE

NWS WEA



WEA 360 language



The background is a light blue gradient with several realistic water bubbles of various sizes scattered across the top and bottom edges. The bubbles have highlights and shadows, giving them a three-dimensional appearance.

REPORTING OVERVIEW

WHEN TO REPORT?

AS SOON AS YOU FEEL
COMFORTABLE, USUALLY
AFTER THE REPORTABLE
WEATHER OCCURS.



3 C'S OF EMERGENCY COMMUNICATION

Clear

Concise

Calm



GOOD EXAMPLE

Who Are
You?

- Name

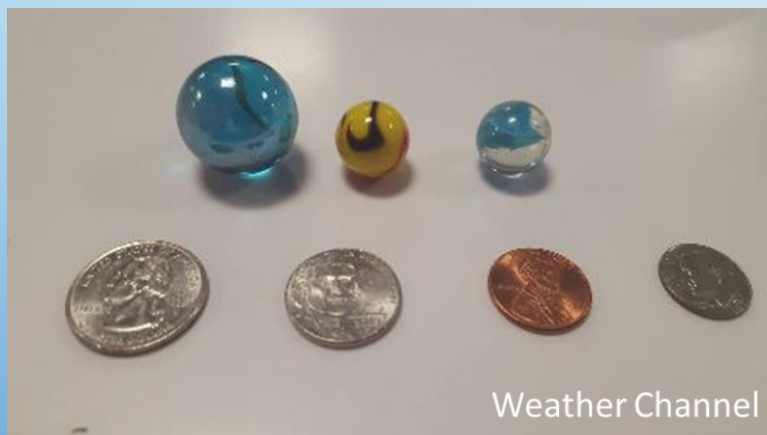
WHAT TO REPORT...HAIL

Report widest diameter of hailstone

Report hail Penny size or larger

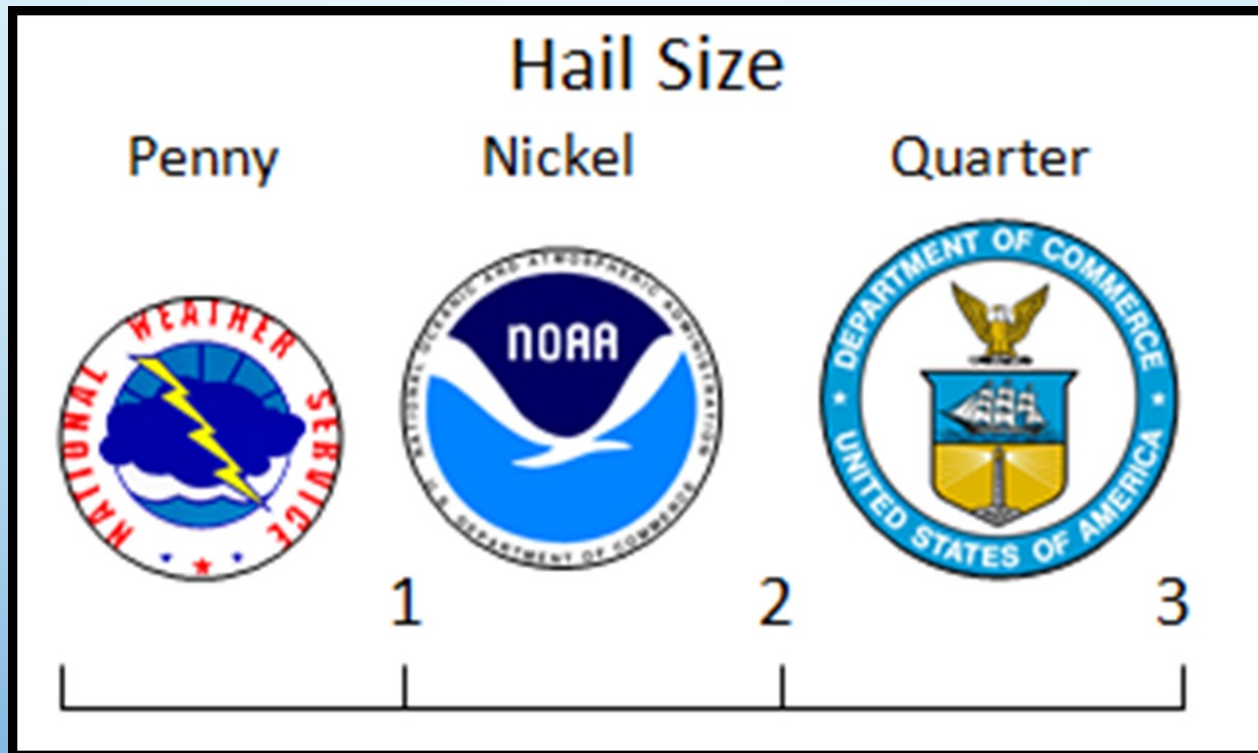
Severe Thunderstorms require hail of 1 inch in diameter (Quarter sized hail)

Do NOT report Marble size hail (they come in all different sizes!)



Common Object	Size
BB	<.25"
Pea	.25"
Dime	.7"
Penny	.75"
Quarter	1"
Half Dollar	1.25"
Ping Pong Ball	1.5"
Golf Ball	1.75"
Hen Egg	2"
Tennis Ball	2.5"
Baseball	2.75"
Grapefruit	4.00"

WHAT TO REPORT...HAIL HAIL CARD



WHAT TO REPORT...HAIL

HAIL CARD

Severe Weather Spotter Card - WFO Pueblo, CO

To report by phone to WFO Pueblo - **1-800-884-1540**

WHO, WHERE, DIRECTION LOOKING, **Local (948-3838)**

WHAT, WHEN

EVENT

TORNADO -	Location and size
FUNNEL CLOUD -	Location and size
RAPIDLY ROTATING WALL CLOUD -	Location and size
WIND -	Direction and estimated speed (if possible)
HAIL -	Size of largest stone related to coins, or in inches
FLOODING -	of creeks, rivers and roadways, etc.

WHAT TO REPORT...DAMAGING WINDS

Winds of 58 mph (50 knots) or greater

- Only if it is measured

Physical damage caused by the winds

- Include measured or best estimate of large branches or trees



© Tom Magnuson

WHAT TO REPORT...**ROTATING** WALL AND/OR FUNNEL CLOUDS

ROTATING WALL CLOUD



FUNNEL CLOUD



Lowering of rain-free base

Look for persistent rotation

Rapidly rotating wall cloud
often precedes tornado
development

WHAT TO REPORT...TORNADO



Again, the air is the tornado, not the condensation funnel.

WHAT TO REPORT...FLASH FLOODING

Best estimate of water depth



SUBMITTING A REPORT

YES

**Is it life-
threatening?**

**PROBABLY
NOT**

Direct/Voice

*Tornado
Damaging Hail
Destructive Wind
Dangerous Flooding
Also call 911?*

**SpotterNetwork
Amateur Radio
Online Form
Twitter
Facebook
Email**

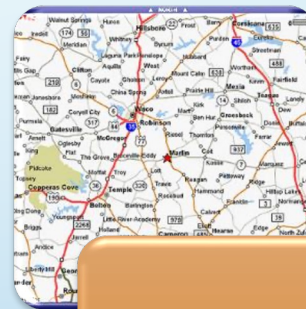
CALLING US FOR A REPORT



Dial
1-800-
884-1540



What
Weather
You
Witnessed



Where It
Was
Witnessed



What
Time It
Was
Witnessed

SOCIAL MEDIA

TWITTER*

@NWSPueblo

Use #pubspotter

Send reports and pictures

Constantly monitored

FACEBOOK

@NWSPueblo

Send reports and pictures

Constantly monitored

AMATEUR RADIO

Pikes Peak
SKYWARN:
146.970 – 100Hz

Pueblo SKYWARN:
146.790 – 88.5Hz



EMAIL

nws.pueblo@noaa.gov

- Good way to send us pictures or videos, especially after the storm is over.



The background is a light blue gradient with several realistic water droplets of various sizes scattered across the top and bottom edges. The droplets have highlights and shadows, giving them a three-dimensional appearance.

SPOTTING SIMULATION

BRIEF INTRODUCTION

- CONSIDER THIS A LEARNING EXPERIENCE FOR ALL OF US
- A SCENARIO WILL BE PRESENTED
- A VIDEO WILL FOLLOW, AND WE'LL ASK WHAT YOU WOULD REPORT
 - WE'LL DISCUSS THE ANSWER AND WHY IT IS THAT WAY

BUT FIRST...

- LET'S DO A QUICK WARM-UP
- WHAT WOULD YOU REPORT FROM THE FOLLOWING IMAGES?



©Steve Hodanish



Courtesy of NWS Social Media



HOW DO YOU MEASURE THESE HAIL STONES?

The background is a light blue gradient that transitions from a pale blue at the top to a slightly darker blue at the bottom. Scattered throughout the background are several realistic-looking water droplets of various sizes. Some are in the top-left corner, some in the top-right, and a cluster of larger droplets is in the bottom-right corner. The droplets have highlights and shadows, giving them a three-dimensional appearance.

NOW TO THE SIMULATIONS...

SIMULATION #1

SIMULATION #1 – SCENARIO

- YOU'RE DRIVING NORTH ON I-25
- YOU SEE A STORM AHEAD OF YOU
- YOU WANT TO BE SAFE, SO YOU DON'T LOOK AT RADAR
- THEN, YOU SEE THIS...

SIMULATION #1 – WHAT YOU SEE



©Scott Curry

SIMULATION #1 – DECISION TIME

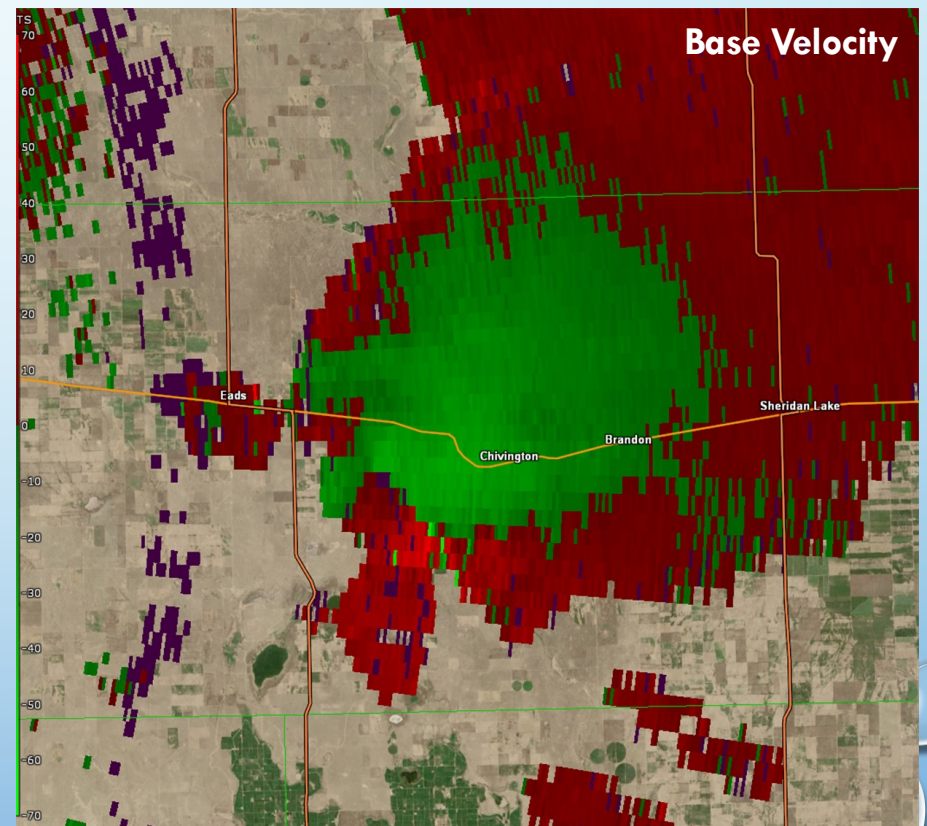
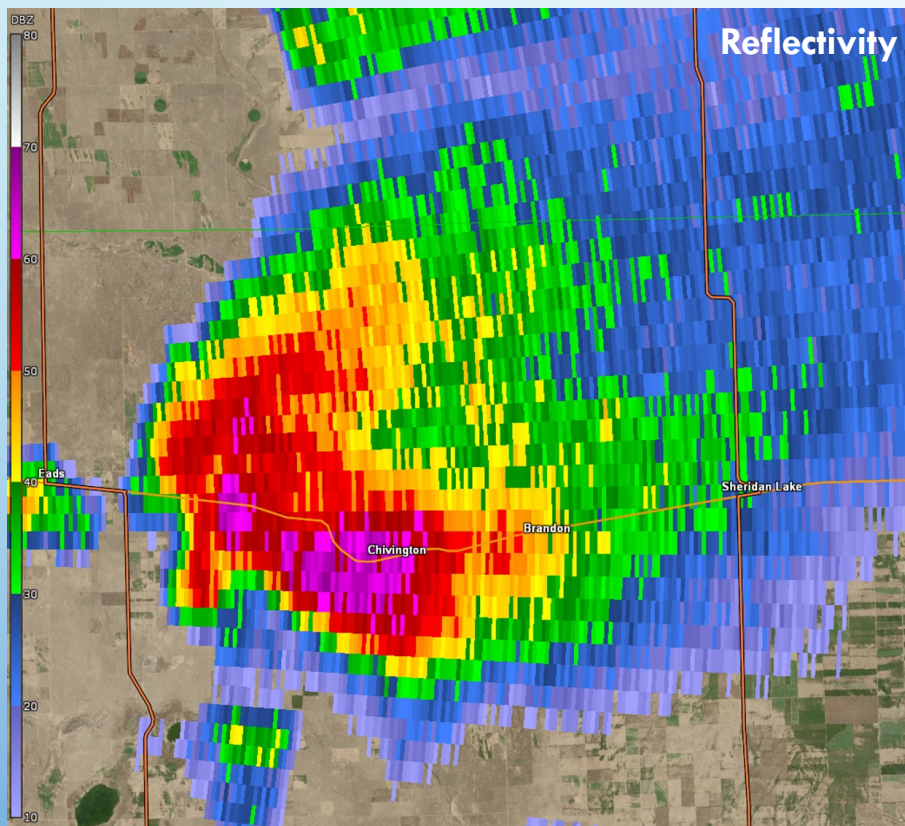
- IS THIS REPORTABLE?
- IF YES, WHAT WOULD YOU REPORT?
- HOW WOULD YOU REPORT IT?
 - I.E. PHONE CALL, SOCIAL MEDIA, EMAIL

SIMULATION #2

SIMULATION #2 – SCENARIO

- YOU SEE SOME STRONG STORMS POPPING UP NEAR YOUR LOCATION
- YOU CHECK YOUR FAVORITE RADAR SOFTWARE/APP AND SEE THE FOLLOWING IMAGES...

SIMULATION #2 - RADAR IMAGES



SIMULATION #2 – SCENARIO

- YOU NOTICE THE STORM IS A SUPERCCELL AND YOU CAN GET TO A LOCATION TO SAFELY MONITOR THE STORM
- ASSUME THE ROAD IS ORIENTED NORTH-SOUTH, LET'S CALL IT HIGHWAY 1, WITH THE CARS CLOSEST TO YOU HEADING SOUTH
- YOU THEN SEE THIS...

SIMULATION #2 – WHAT YOU SEE

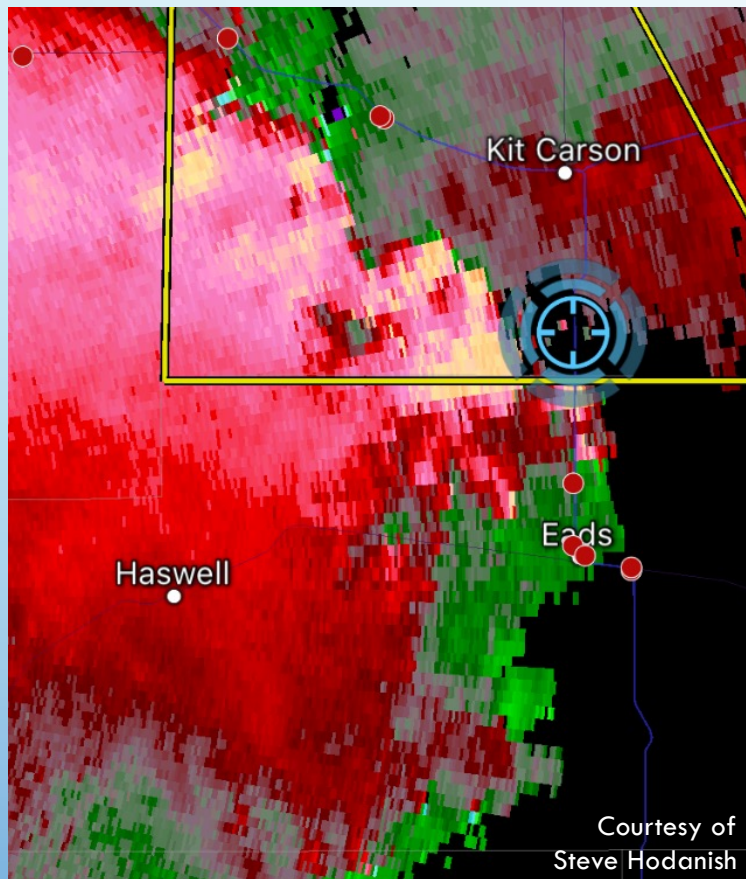


©Scott Curry

SIMULATION #2 – DECISION TIME

- IS THIS REPORTABLE?
- IF YES, WHAT WOULD YOU REPORT?
- HOW WOULD YOU REPORT IT?
 - I.E. PHONE CALL, SOCIAL MEDIA, EMAIL

SIMULATION #3 - RADAR IMAGE



- YOU'RE LOCATED AT THE BLUE CIRCLE, ABOUT 5 MILES SOUTH OF KIT CARSON ON HWY 287 WITHIN A SEVERE THUNDERSTORM WARNING (YELLOW POLYGON)
- YOU PULL OVER AND PULL UP A RADAR APP AND SEE THIS BASE VELOCITY IMAGE
- THINK ABOUT WHAT YOU MIGHT EXPECT TO SEE

SIMULATION #3 - CONTINUED

- YOU NOW SEE SOMETHING INTERESTING
- SINCE YOU'RE PULLED OVER ALREADY, YOU GET YOUR CELL PHONE OUT TO TAKE SOME VIDEO
- YOU CAPTURE THIS...

**SIMULATION #3
– VIDEO
CAPTURE**



©Steve Hodanish

SIMULATION #3 – DECISION TIME

- IS THIS REPORTABLE?
- IF YES, WHAT WOULD YOU REPORT?
- HOW WOULD YOU REPORT IT?
 - I.E. PHONE CALL, SOCIAL MEDIA, EMAIL

**THANK YOU TO ALL OF THOSE WHO
SUBMITTED PHOTOS AND VIDEOS!**

Certificate Password: SKYwarn2023!!

The background is a light blue gradient with several realistic water bubbles of various sizes scattered across it, particularly concentrated in the corners.

THANK YOU!!!!

NWS.PUEBLO@NOAA.GOV

800-884-1540