The *illusion* of Storm Based Warnings

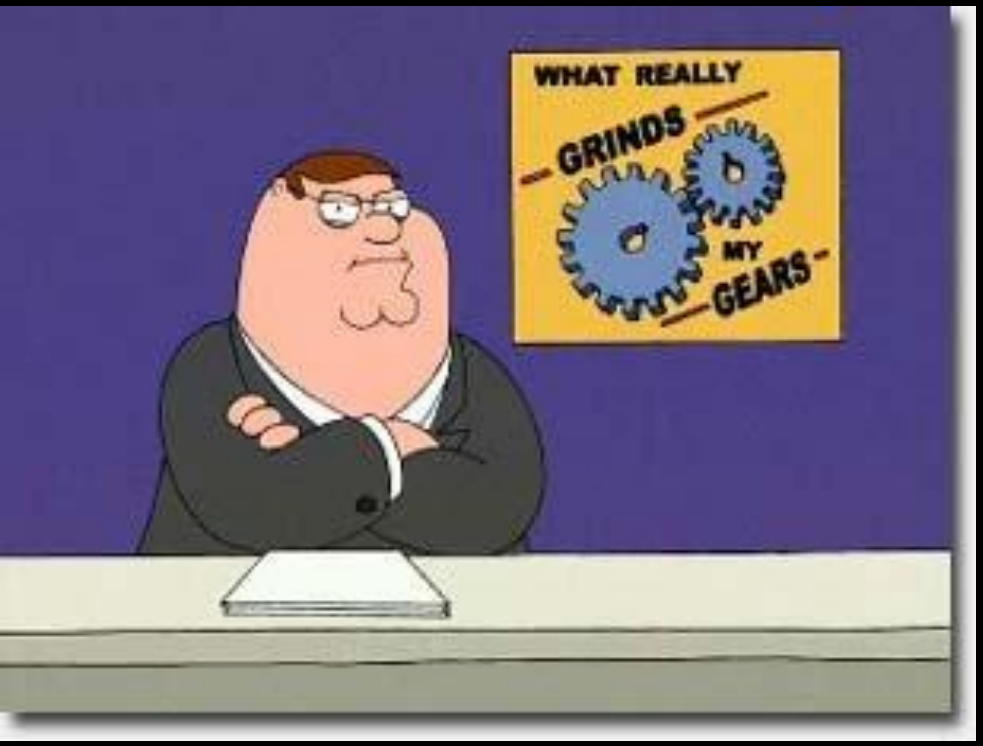
Daryl Herzmann

Iowa State University

Don’t agree with something you see?
Do what this guy did!

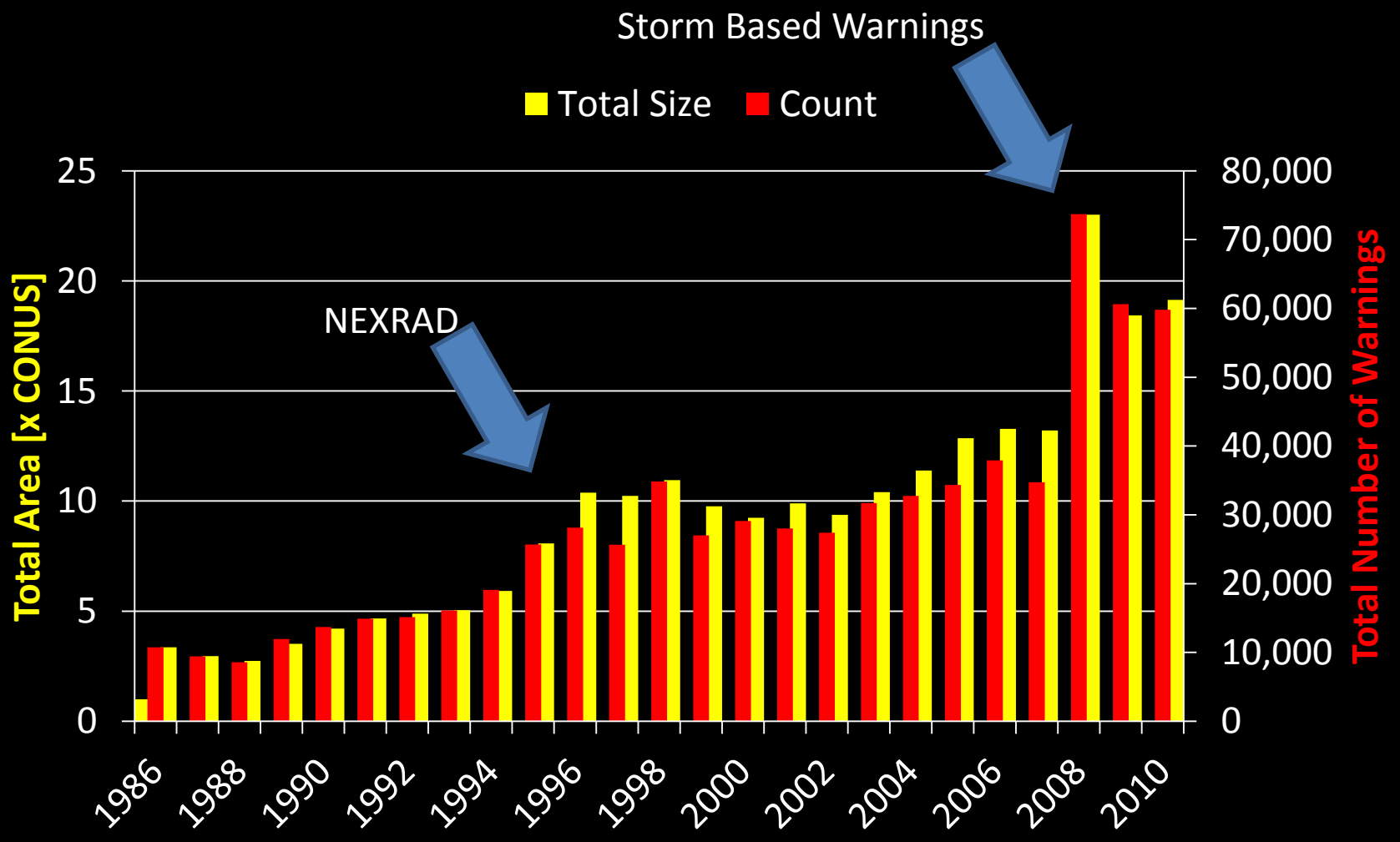
I’ll act indignant and ignore you.

Why am I so bitter?



1. Old Age
2. The calendar says 2011, our NWS is stuck in 1970s technology (ASCII Text)
3. Too many warnings are issued. Do you know how many?

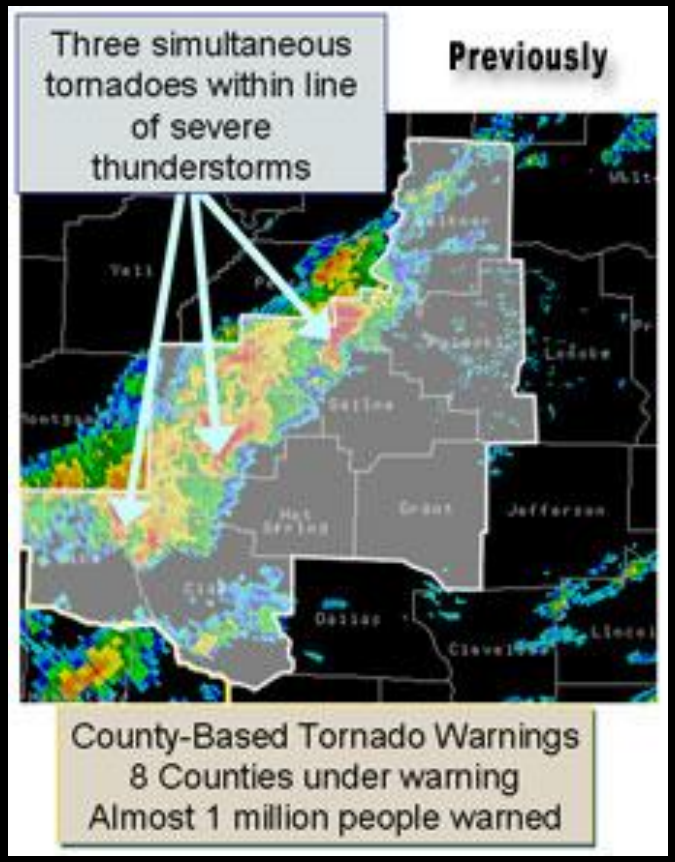
NWS County SVR/TOR Warnings

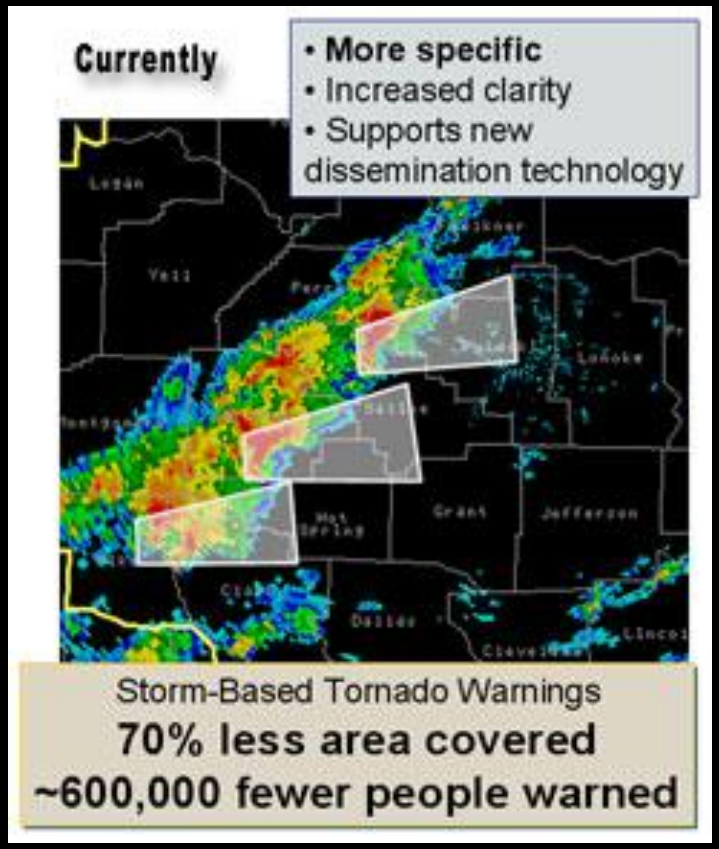


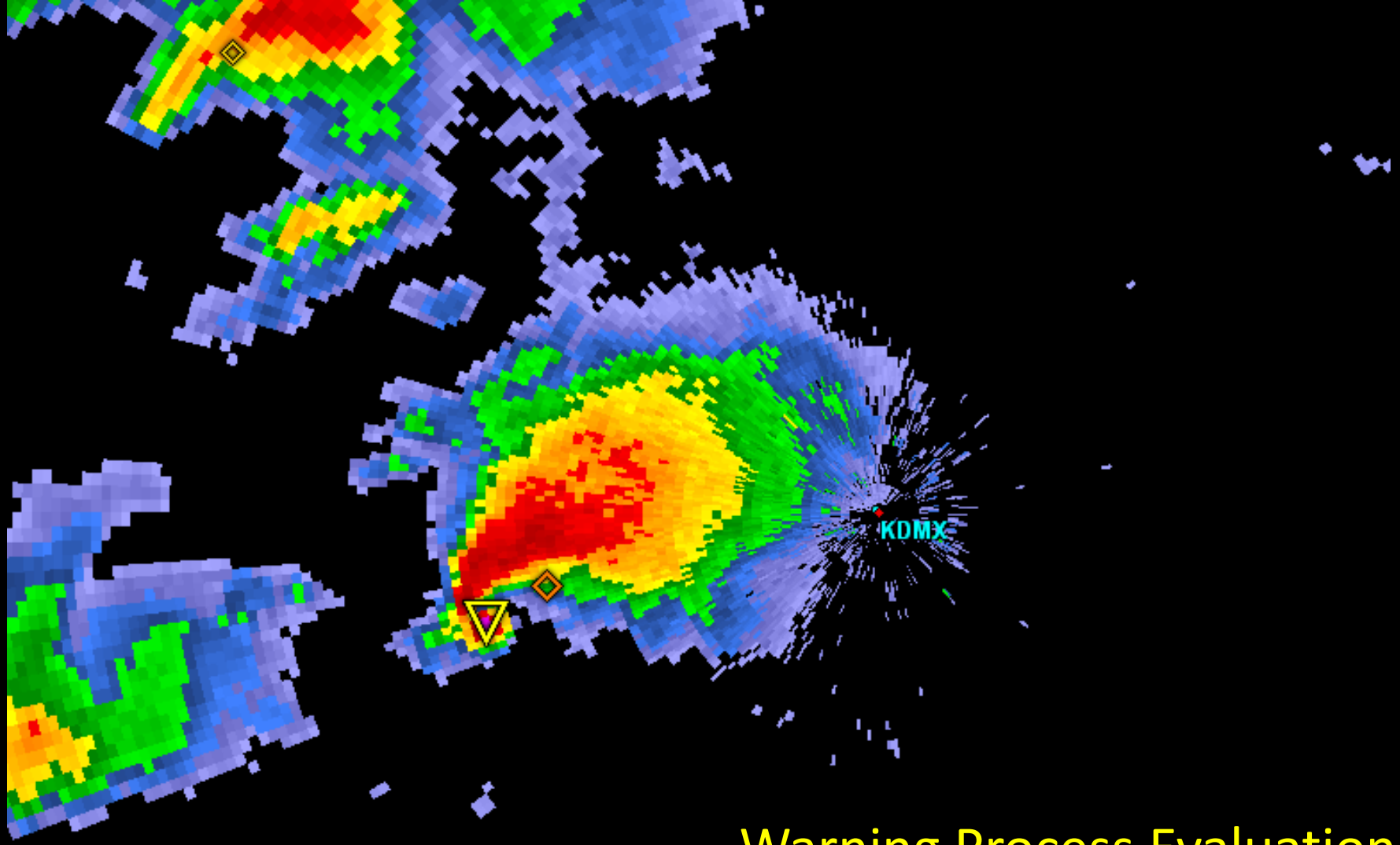
1 Oct 2007, warnings changed

http://www.weather.gov/sbwarnings/

"Storm-Based Warnings show the specific meteorological or hydrological threat area and are not restricted to geopolitical boundaries."



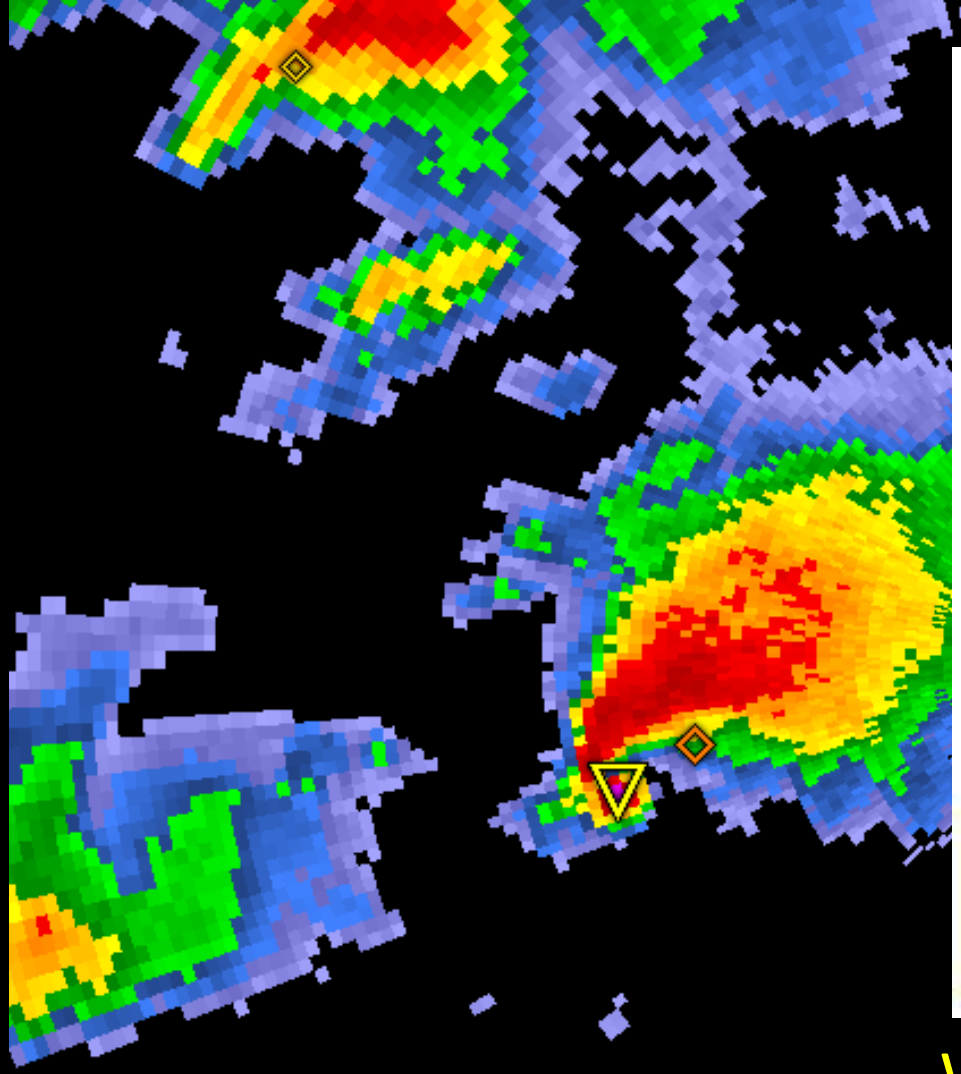


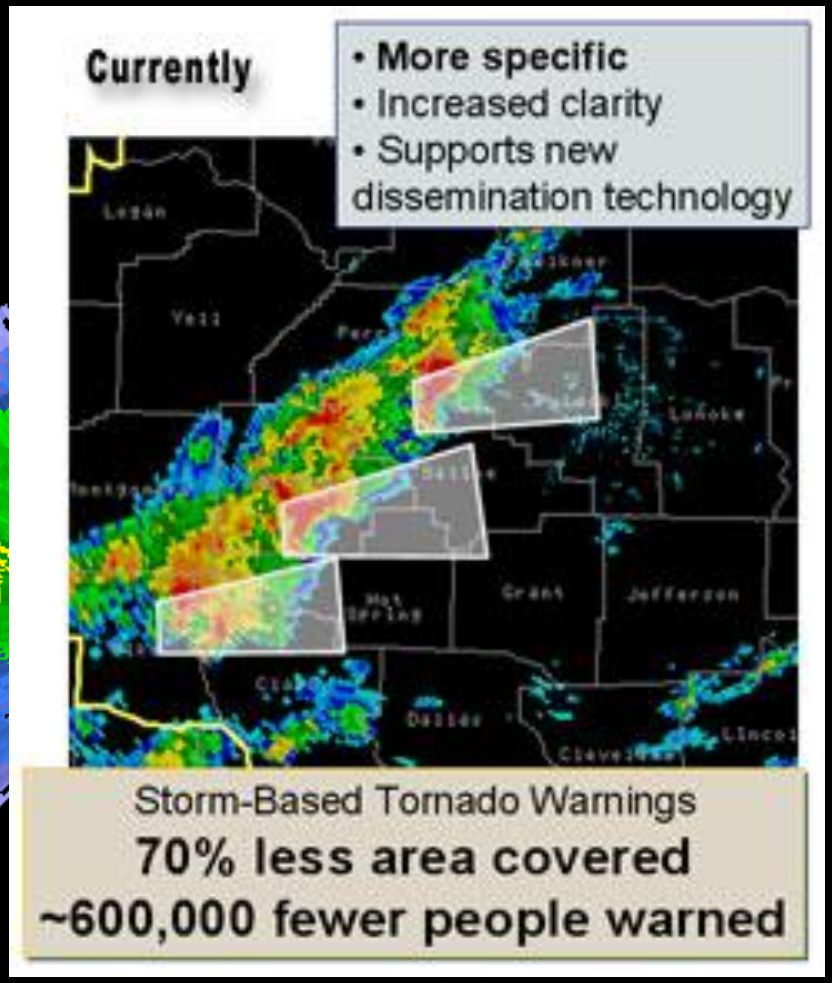


Warning Process Evaluation

Garden Variety Tornado

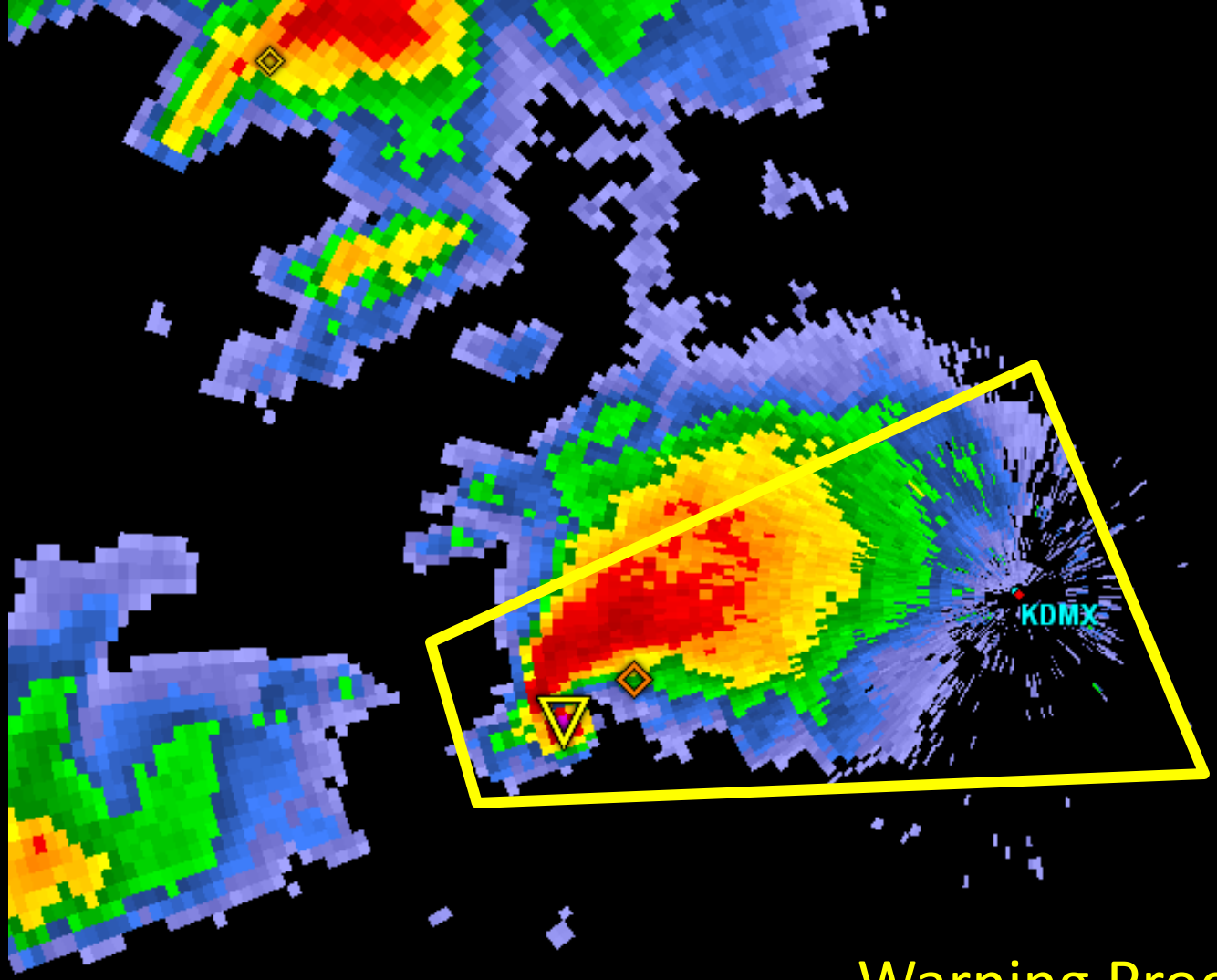
We had better warn.





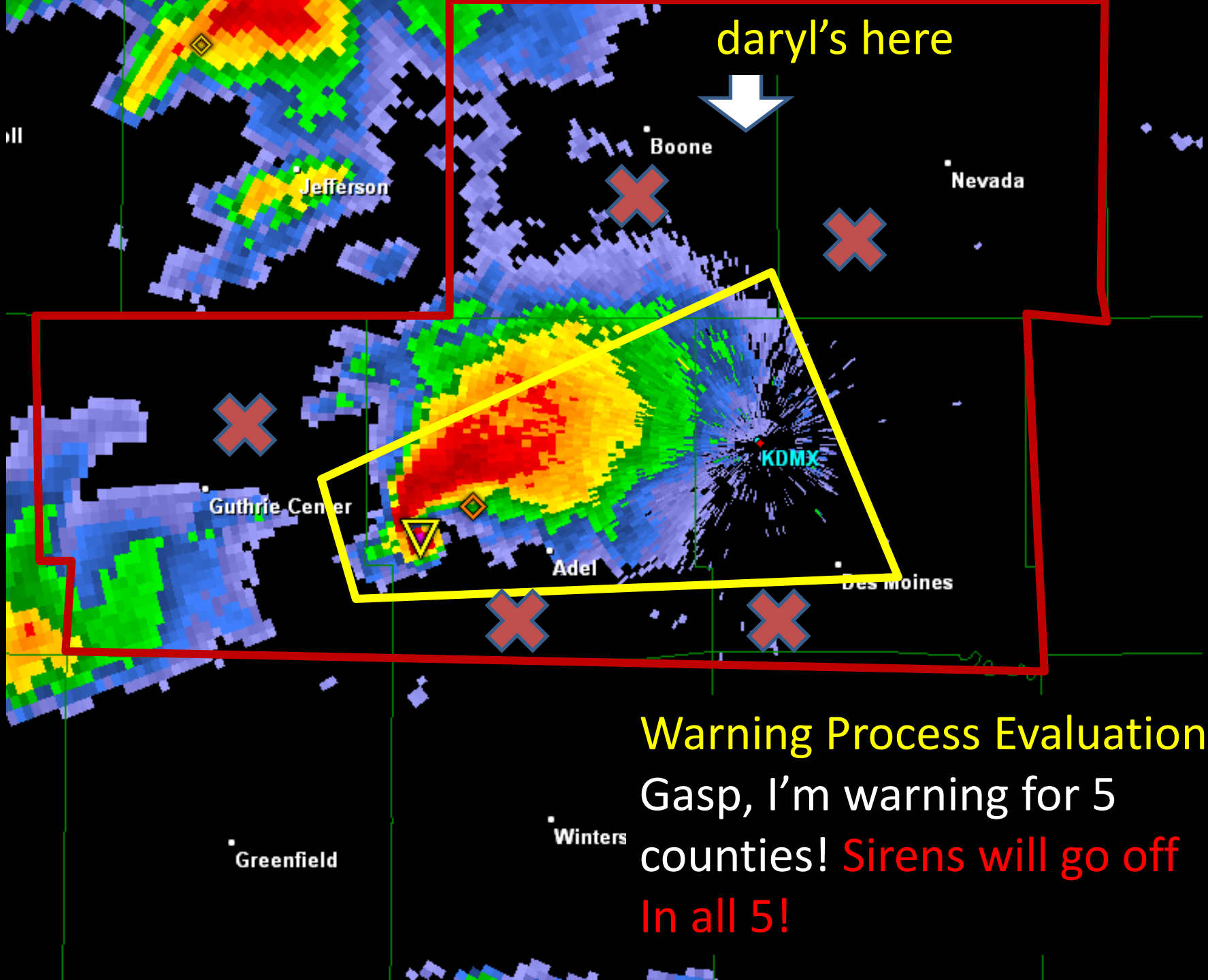
Warning Process Evaluation

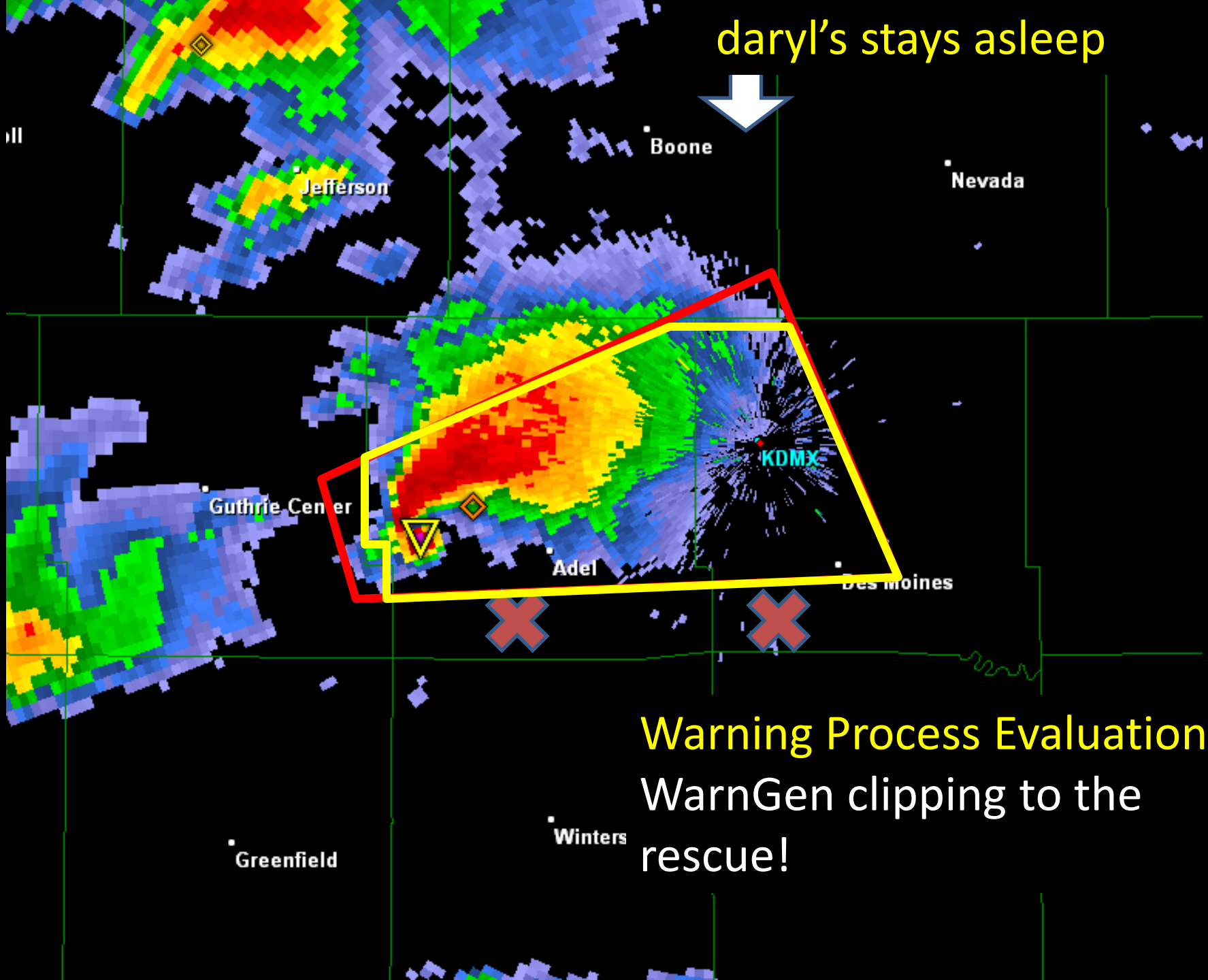
Yippee, we can use our fine education and draw a polygon!

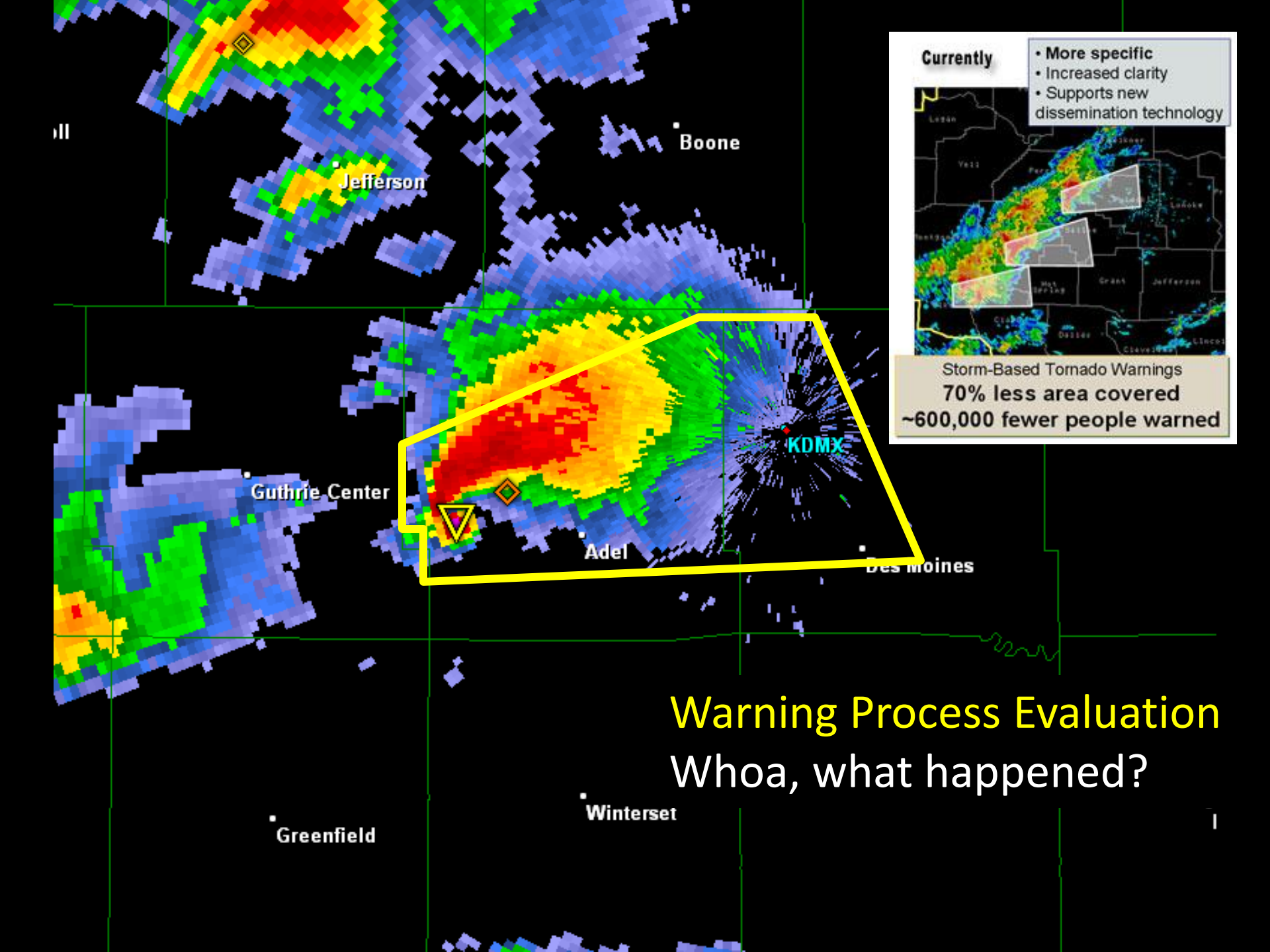


Warning Process Evaluation

I draw my fancy pants polygon out for 30 minutes. I'm done, right?


daryl's here
Boone
Nevada
Jefferson
Guthrie Center
Adel
KDMX
Des Moines
Winters
Greenfield
Warning Process Evaluation
Gasp, I'm warning for 5 counties! Sirens will go off
In all 5!


daryl's stays asleep
Boone
Nevada
Jefferson
KDMX
Guthrie Center
Adel
Des Moines
Winters
Greenfield
Warning Process Evaluation
WarnGen clipping to the rescue!

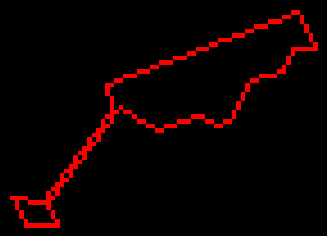


Warning Process Evaluation

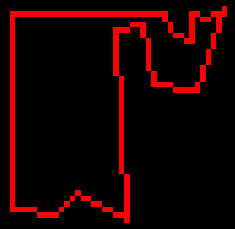
Whoa, what happened?

These aren’t the polygons you’re looking for

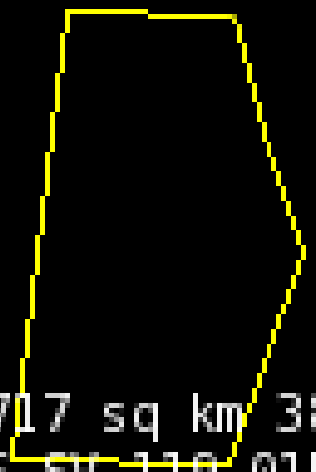
(Maryland == 26,000 sq km)



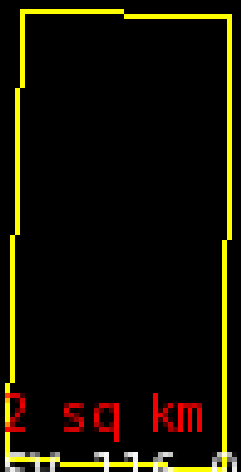
744 sq km 93%
LOX.TO.1.2036



2246 km^2 40%
OUN.TO.45.0229



39717 sq km 38%
BIS.SV.119.0158



37902 sq km 25%
BIS.SV.116.0056

Ye ole text product
You can’t read this, nor can the public!

```
291
WUUS53 KDMX 182302
SVRDMX
IAC007-117-125-135-181-182345-
/O.NEW.KDMX.SV.W.0171.100618T2302Z-100618T2345Z/

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE DES MOINES IA
602 PM CDT FRI JUN 18 2010

THE NATIONAL WEATHER SERVICE IN DES MOINES HAS ISSUED A

* SEVERE THUNDERSTORM WARNING FOR...
  NORTHWESTERN APPANOOSE COUNTY IN SOUTH CENTRAL IOWA...
  NORTHEASTERN LUCAS COUNTY IN SOUTH CENTRAL IOWA...
  SOUTHWESTERN MARION COUNTY IN SOUTH CENTRAL IOWA...
  MONROE COUNTY IN SOUTH CENTRAL IOWA...
  SOUTHEASTERN WARREN COUNTY IN SOUTH CENTRAL IOWA...

* UNTIL 645 PM CDT

* AT 600 PM CDT...NATIONAL WEATHER SERVICE DOPPLER RADAR
INDICATED A
  SEVERE THUNDERSTORM CAPABLE OF PRODUCING GOLF BALL
SIZE HAIL...AND
  DAMAGING WINDS IN EXCESS OF 60 MPH.  THIS STORM WAS
LOCATED 10
  MILES NORTHEAST OF CHARITON...OR 36 MILES SOUTHEAST OF
DES
  MOINES...AND MOVING SOUTHEAST AT 30 MPH.

* LOCATIONS IMPACTED INCLUDE...
  ALBIA...RUSSELL...MELROSE AND LOVILIA.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

MOVE TO AN INTERIOR ROOM AND STAY AWAY FROM WINDOWS. IF
YOU ARE IN A
MOBILE HOME...GET OUT NOW...AND SEEK SHELTER IN A
REINFORCED
BUILDING.

A TORNADO WATCH REMAINS IN EFFECT FOR THE WARNED AREA.
SEVERE
THUNDERSTORMS CAN PRODUCE TORNADOES WITH LITTLE OR NO
WARNING. IF A
TORNADO IS SPOTTED...IMMEDIATELY MOVE TO THE BASEMENT OR
SMALL
INTERIOR ROOM OF A REINFORCED BUILDING.

TORRENTIAL RAINFALL IS ALSO OCCURRING WITH THIS
STORM...AND MAY LEAD
TO FLASH FLOODING. DO NOT DRIVE YOUR VEHICLE THROUGH
FLOODED
ROADWAYS. TURN AROND DON’T DROWN.

&&
LAT...LON 4089 9310 4090 9310 4090 9313 4112 9357
      4116 9357 4116 9358 4135 9335 4105 9272
      4084 9301
TIME...MOT...LOC 2302Z 300DEG 28KT 4114 9321
WIND...HAIL 60MPH 1.75IN

$$

SMALL
```

Confusion

UGC Code says we have **5** full counties

```
IAC007-117-125-135-181-182345-
/O.NEW.KDMX.SV.W.0171.100618T2302Z-100618T2345Z/
```

The product text gives **4** partial counties, **1** full one:

```
* SEVERE THUNDERSTORM WARNING FOR...
  NORTHWESTERN APPANOOSE COUNTY IN SOUTH CENTRAL IOWA...
  NORTHEASTERN LUCAS COUNTY IN SOUTH CENTRAL IOWA...
  SOUTHWESTERN MARION COUNTY IN SOUTH CENTRAL IOWA...
  MONROE COUNTY IN SOUTH CENTRAL IOWA...
  SOUTHEASTERN WARREN COUNTY IN SOUTH CENTRAL IOWA..
```

Yet the official warning is actually for:

```
LAT...LON 4089 9310 4090 9310 4090 9313 4112 9357
      4116 9357 4116 9358 4135 9335 4105 9272
      4084 9301
```

Quiz Question #1
How do you cancel a portion of the warning?

Answer: Cancel one of the counties in the warning!

IAC181-182341-
/O.CAN.KDMX.SV.W.0171.000000T0000Z-100618T2345Z/

...THE SEVERE THUNDERSTORM WARNING FOR SOUTHEASTERN WARREN COUNTY IS CANCELLED...

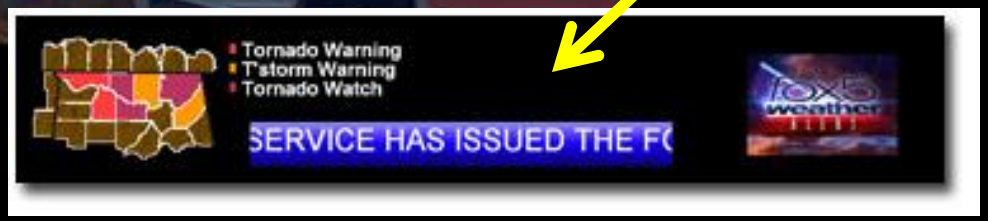
IAC007-117-125-135-182345-
/O.CON.KDMX.SV.W.0171.000000T0000Z-100618T2345Z/

...A SEVERE THUNDERSTORM WARNING REMAINS IN EFFECT FOR SOUTHWESTERN MARION...MONROE...EASTERN LUCAS AND NORTHWESTERN APPANOOSE COUNTIES UNTIL 645 PM CDT...

Thankfully, we have TV Weather

Comic Relief

Lifted from Barons and WXC website. Those are county warnings!



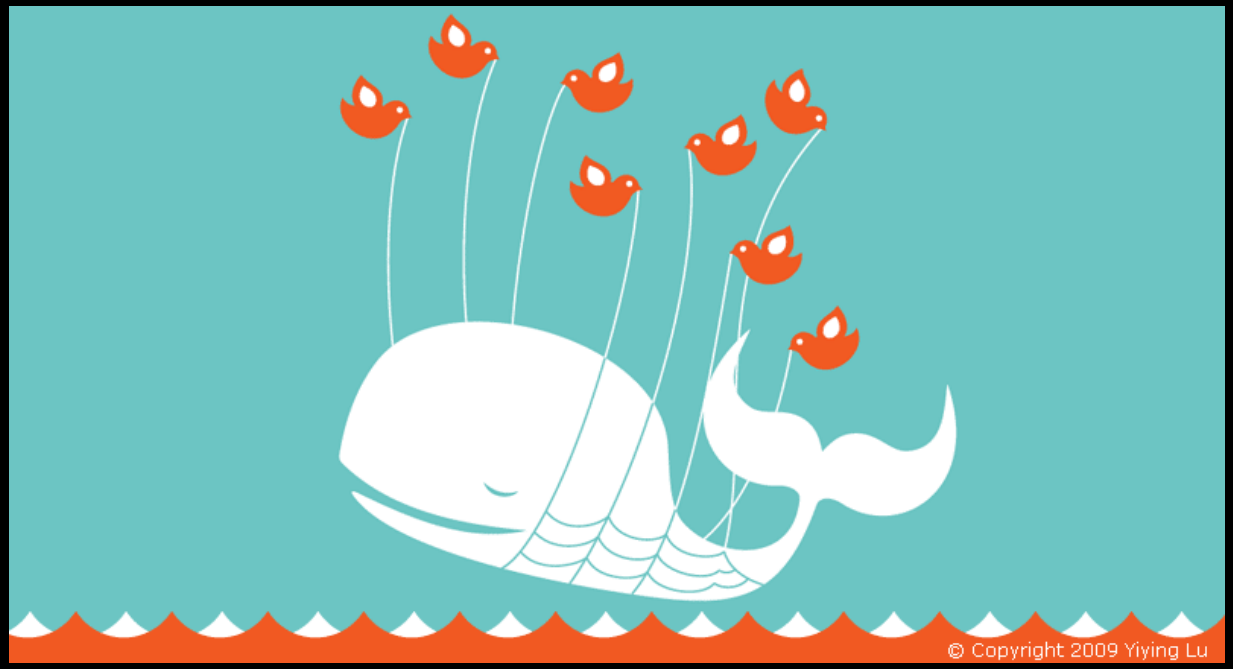
Thankfully, we have social media

#JAN issues Severe Thunderstorm Warning for Covington, Simpson, Smith [MS] till 4:00 PM CDT http://bit.ly/i7B5Sh

about 20 hours ago via iembot

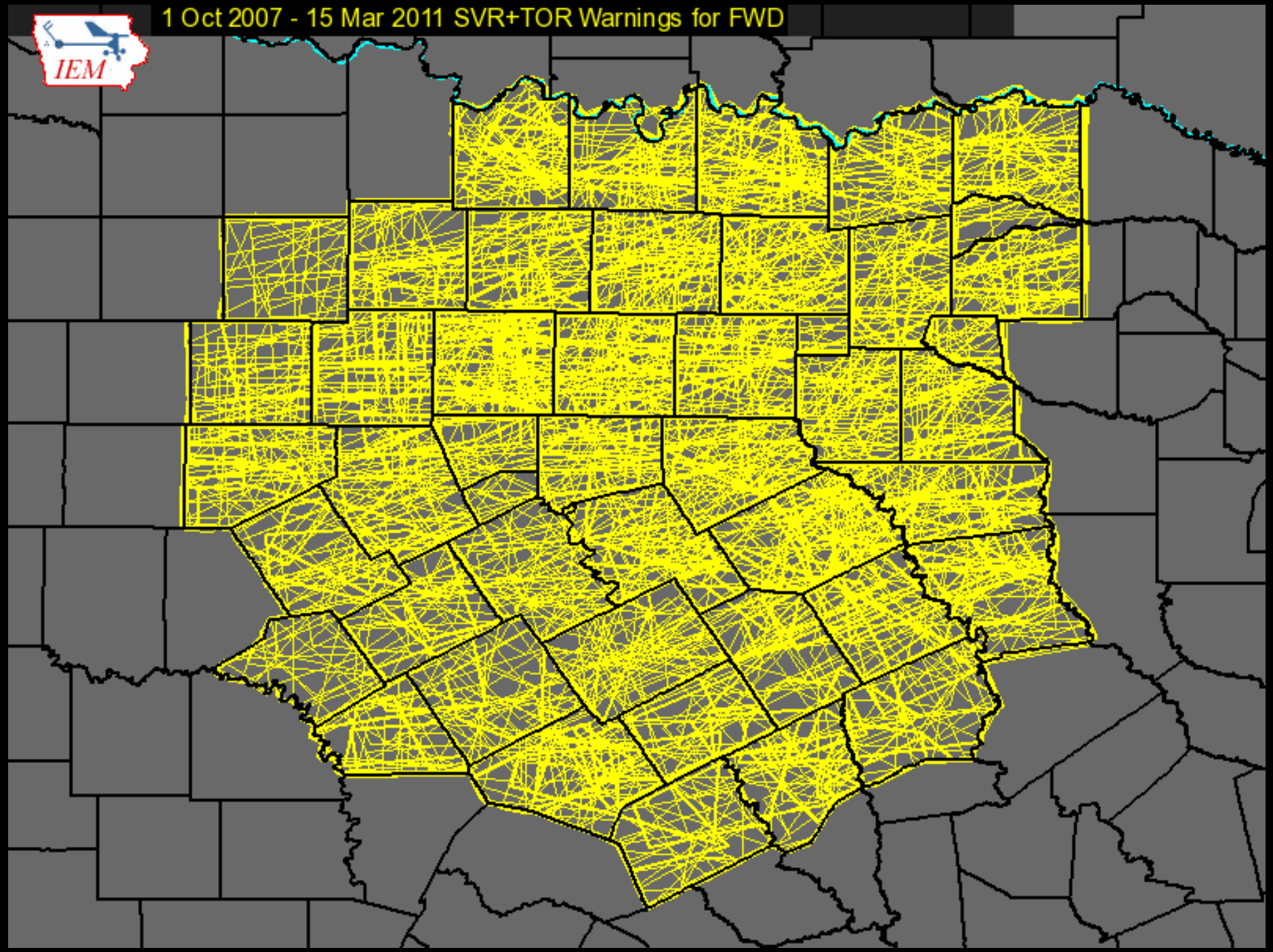
Great job daryl on iembot !

….. FAIL ….

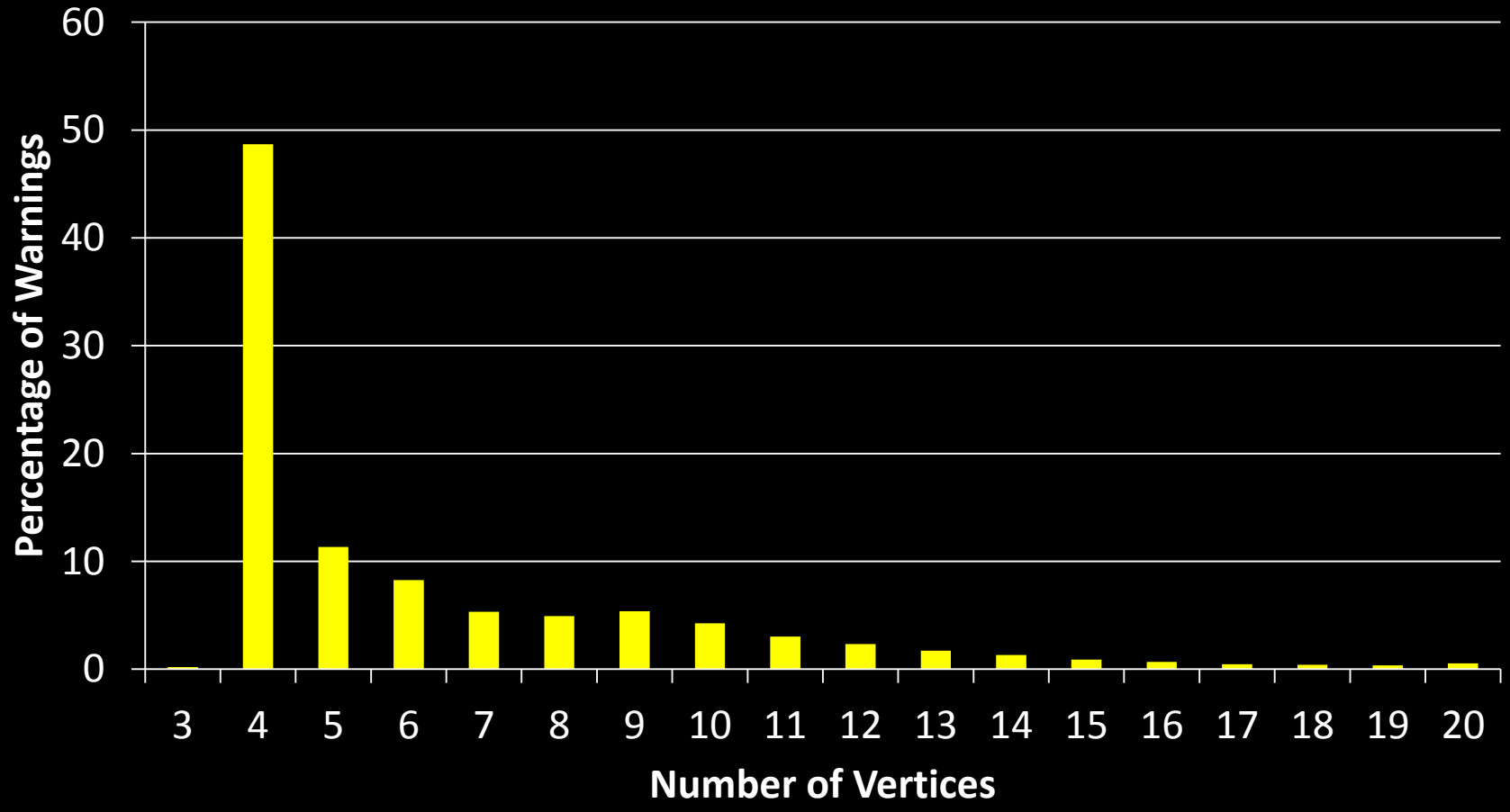


Quiz Question #2
What's wrong with this picture?

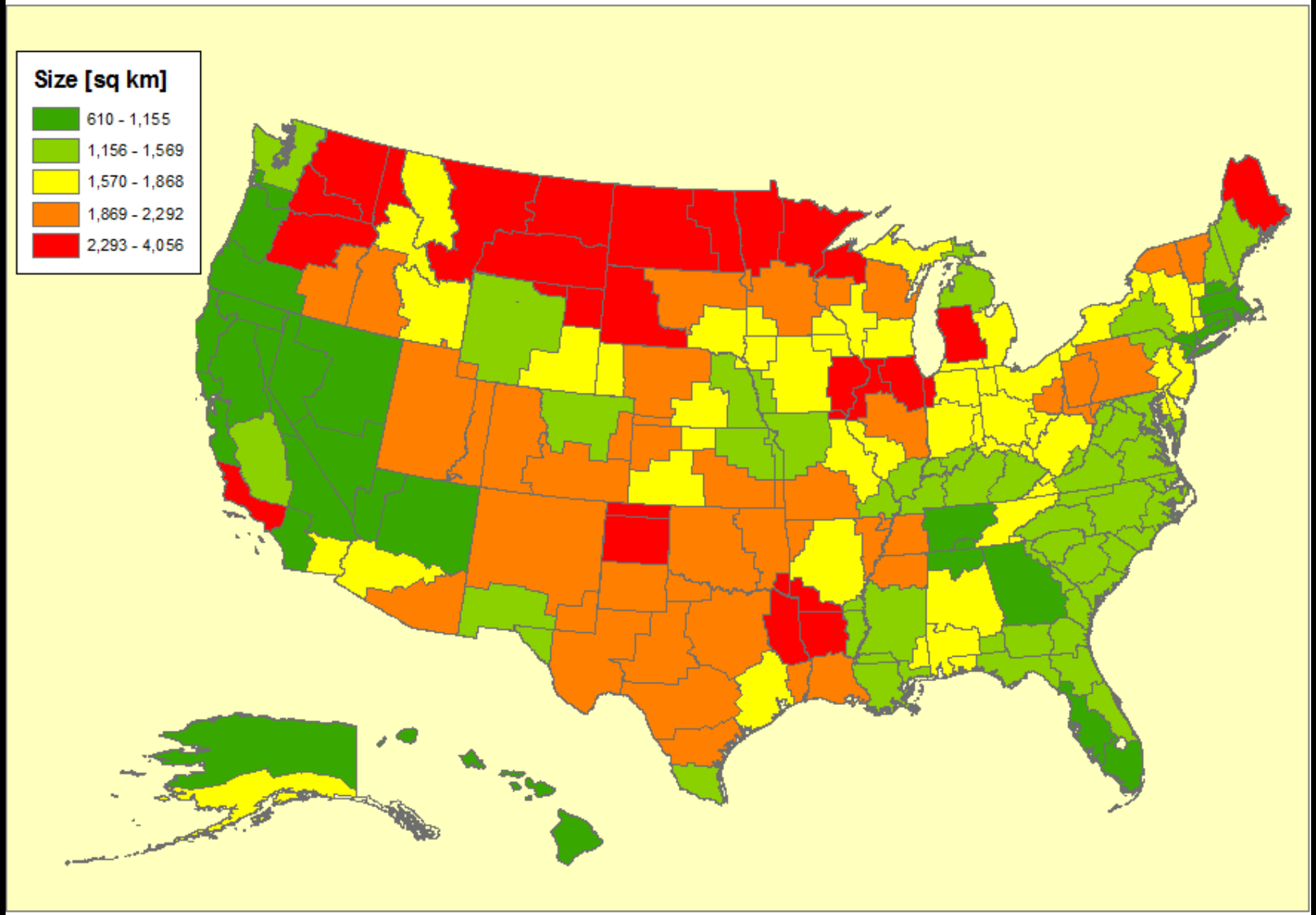
1 Oct 2007 - 15 Mar 2011 SVR+TOR Warnings for FWD
IEM


1 Oct 2007 - 15 Mar 2011 SVR+TOR Warnings for FWD
IEM

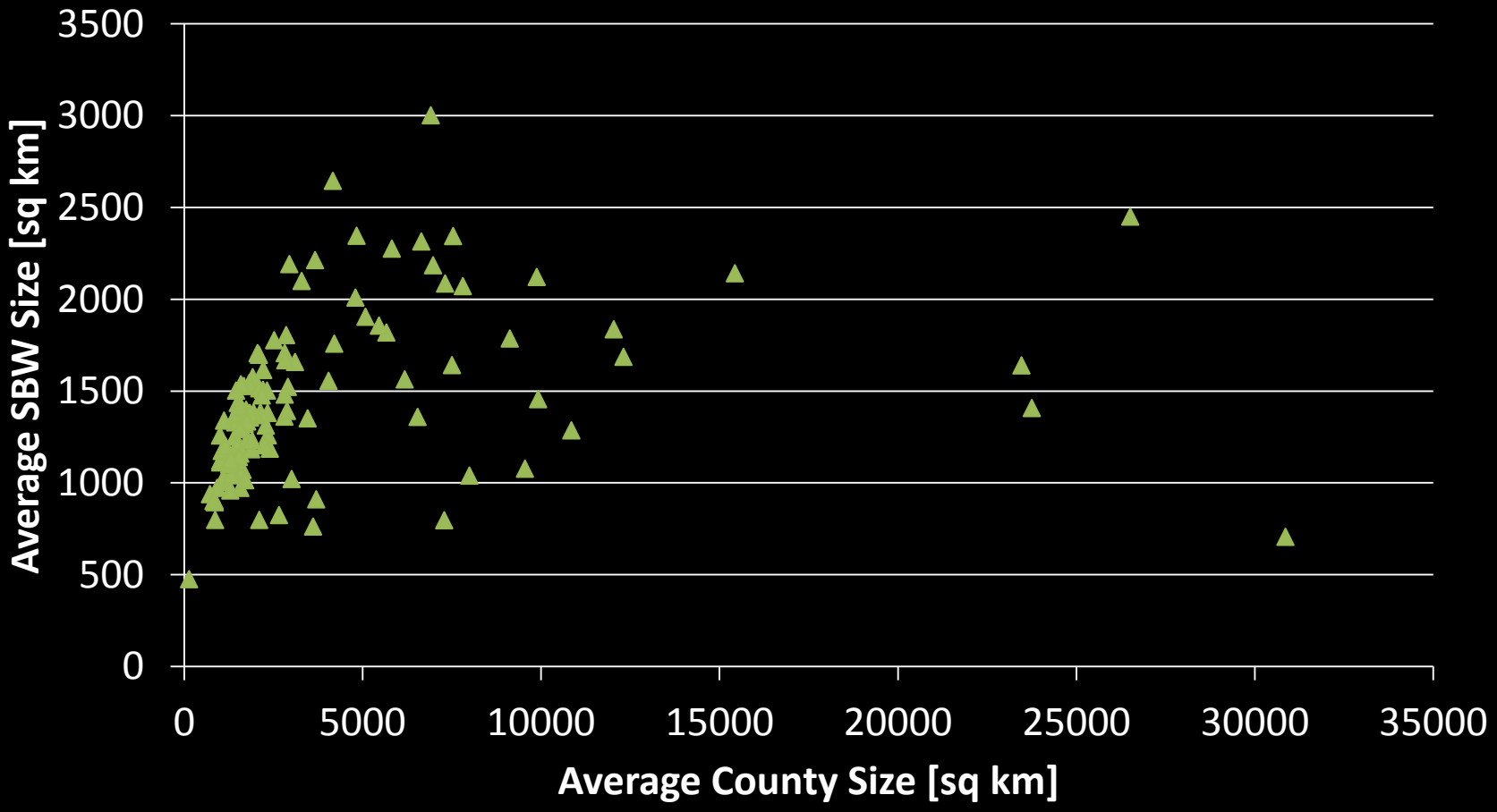
1 Oct 2007 – 15 Mar 2011: Number of Polygon Vertices (SVR+TOR)



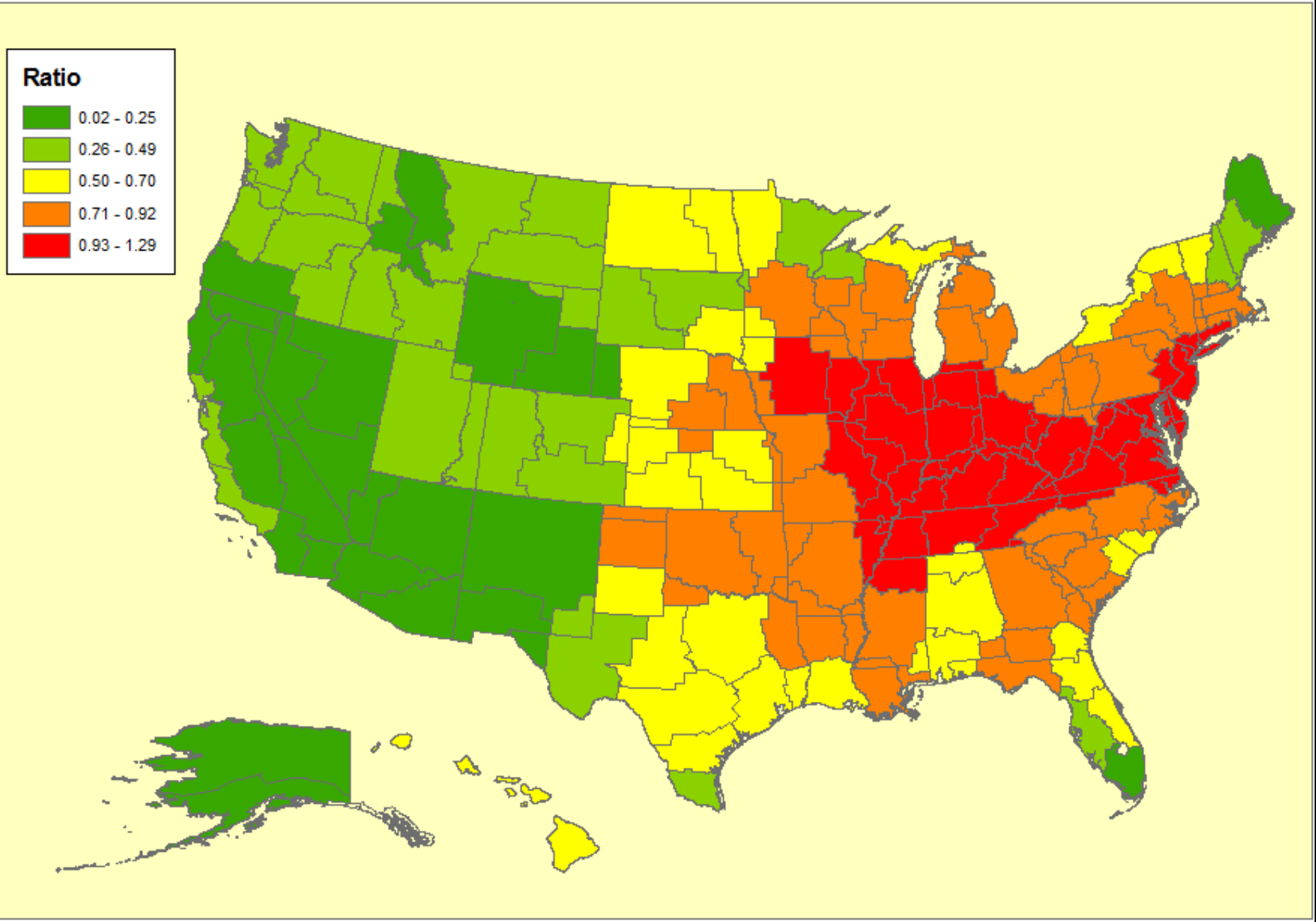
Average Severe Thunderstorm Size (Storm Based Warning)
1 Oct 2007 - 10 Mar 2011



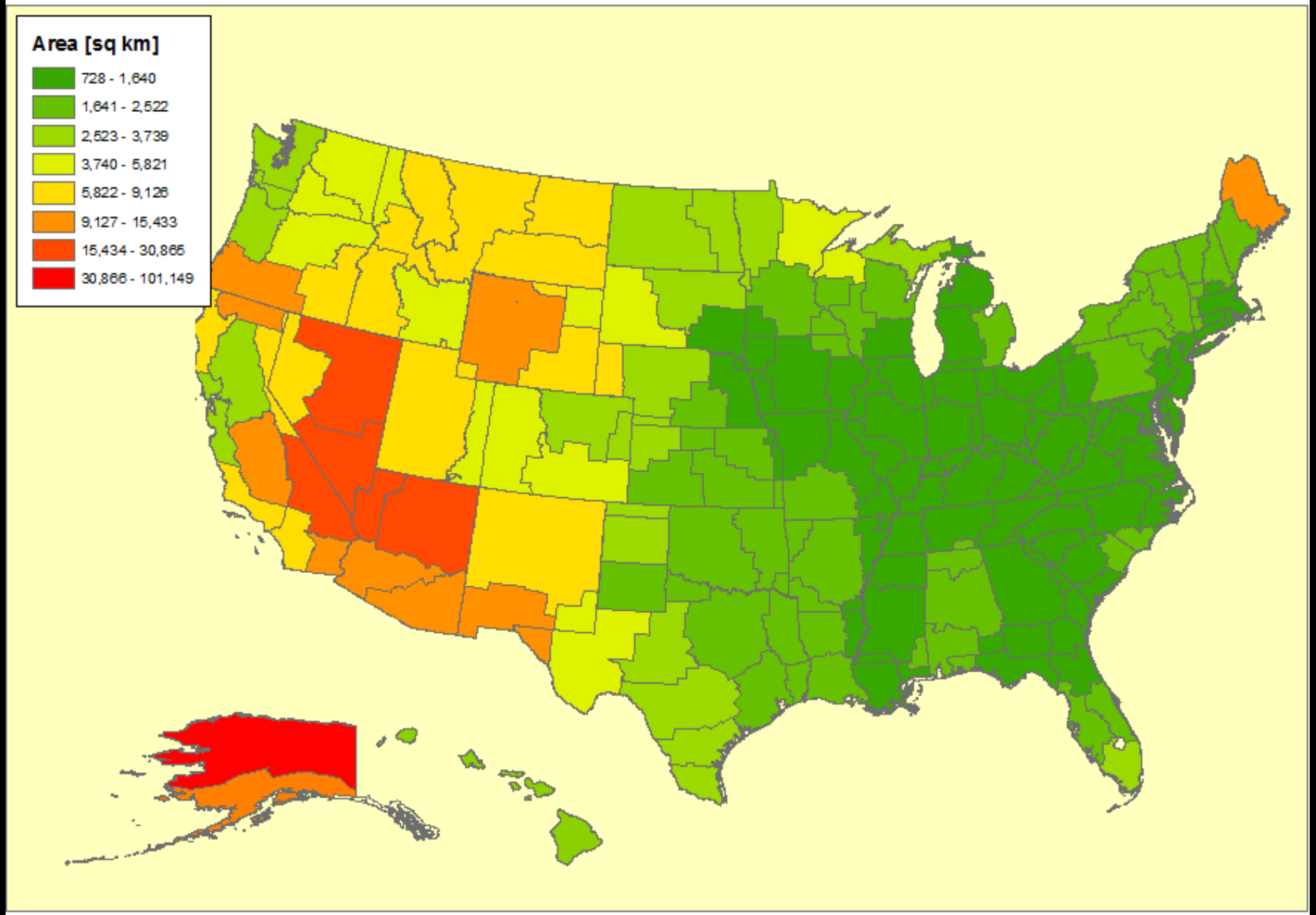
Average SBW Size Versus County Size per WFO (SVR+TOR shown, Alaska not included)



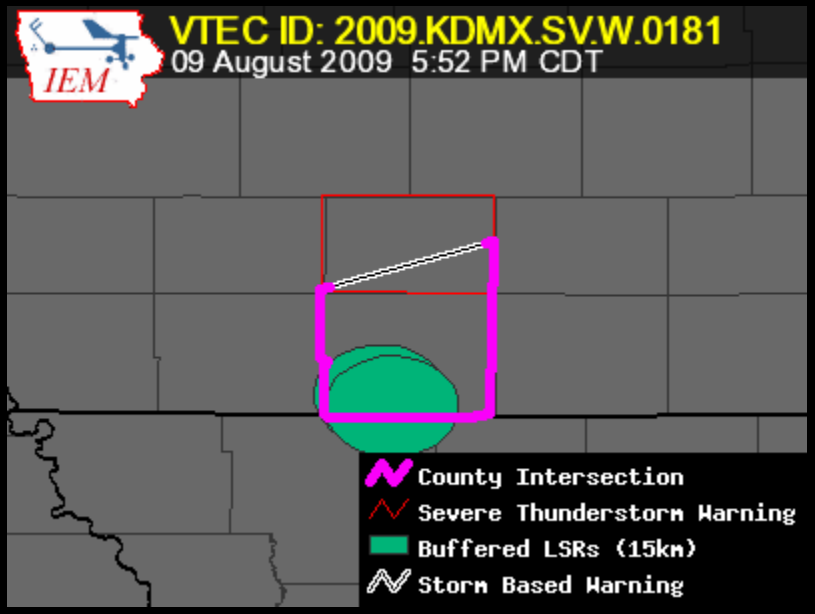
Ratio of Average SBW (SVR+TOR) Size / Average County Size
1 Oct 2007 - 20 Mar 2011



Average County Size by WFO

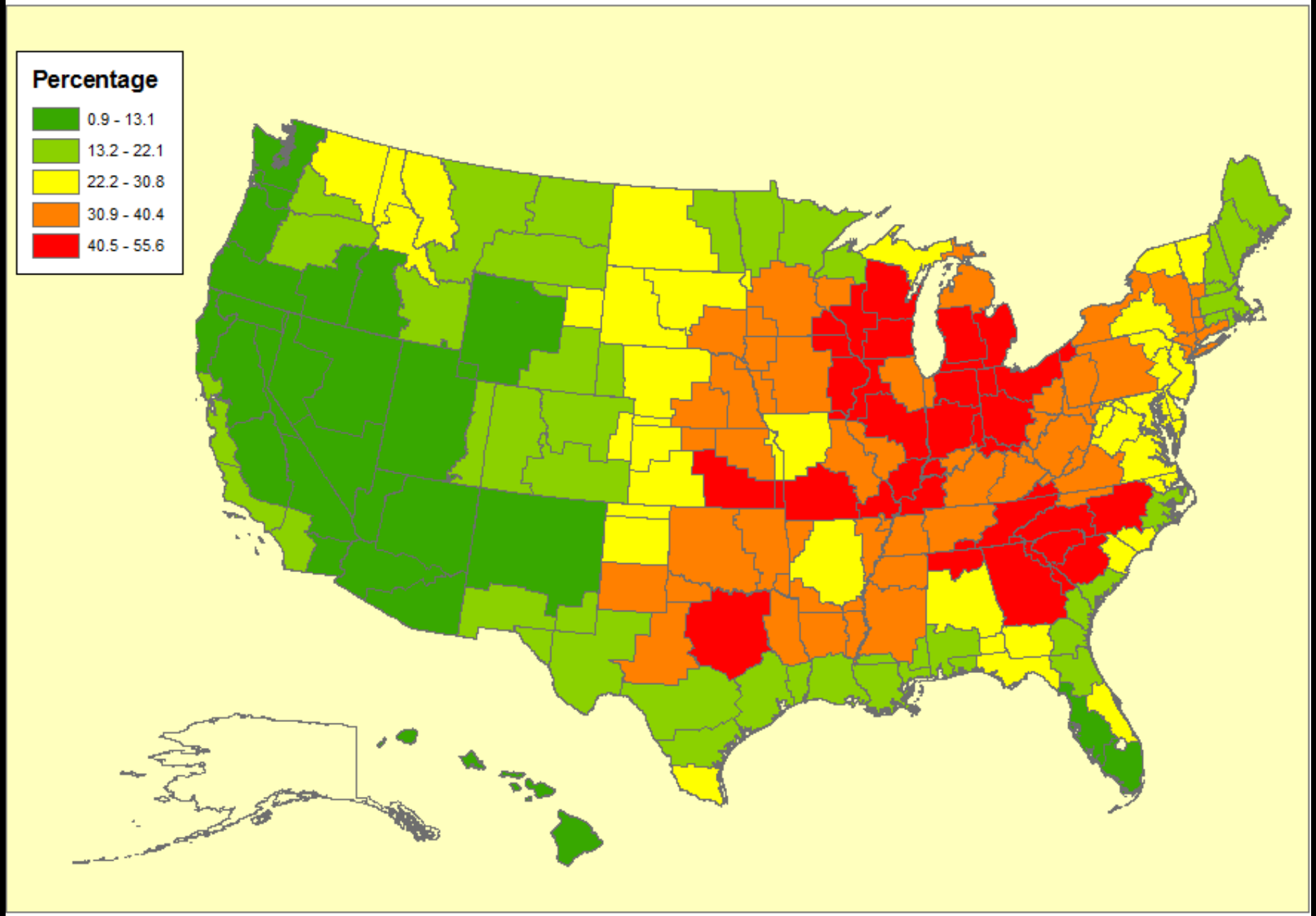


Lets get quantitative

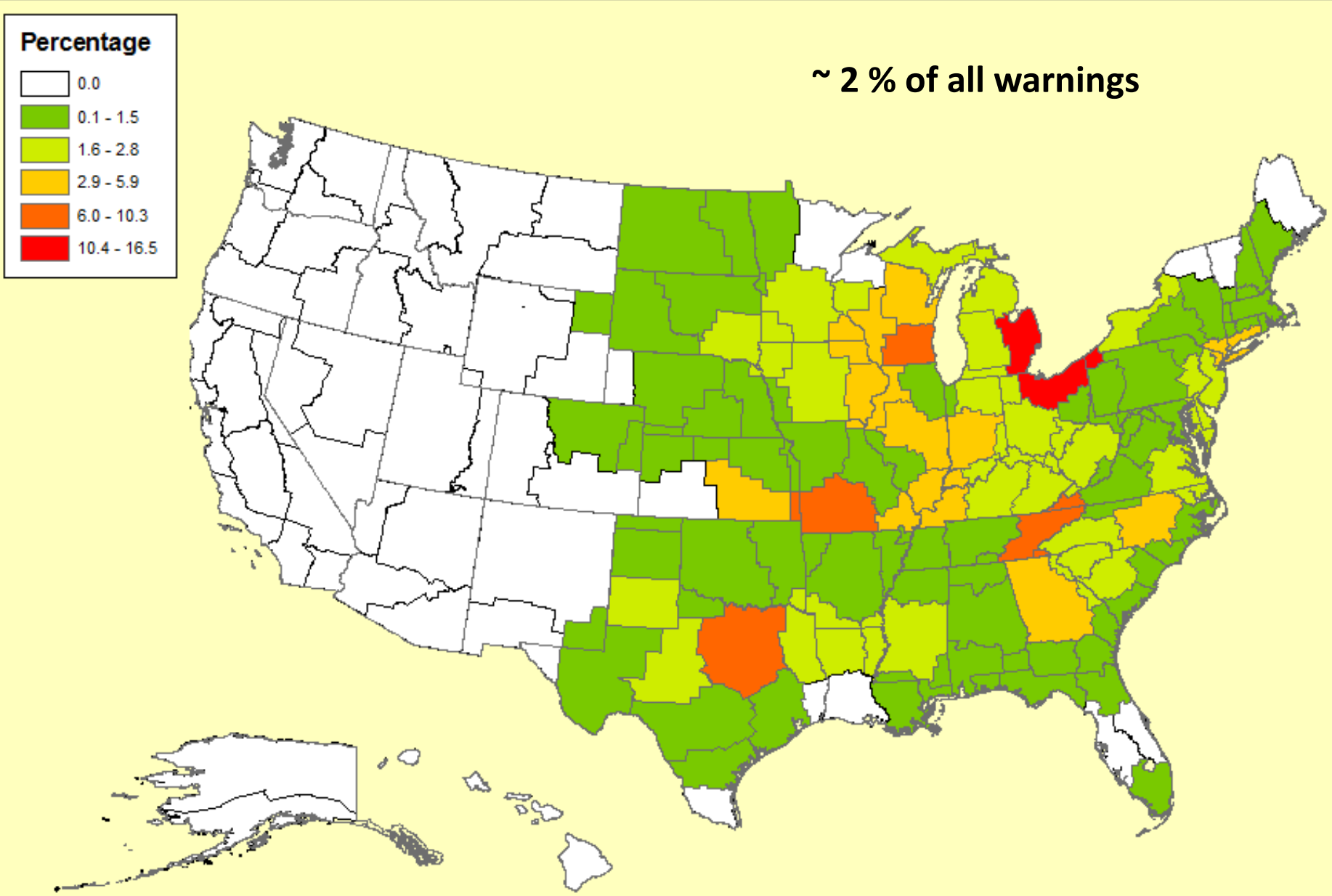


- Perimeter Influence
  - How much of the polygon perimeter coincides with a political boundary
- Areal Verification
  - If the LSRs are buffered, what areal percentage verified
- Size Reduction
  - How much smaller was the warning than the counties it was issued against.

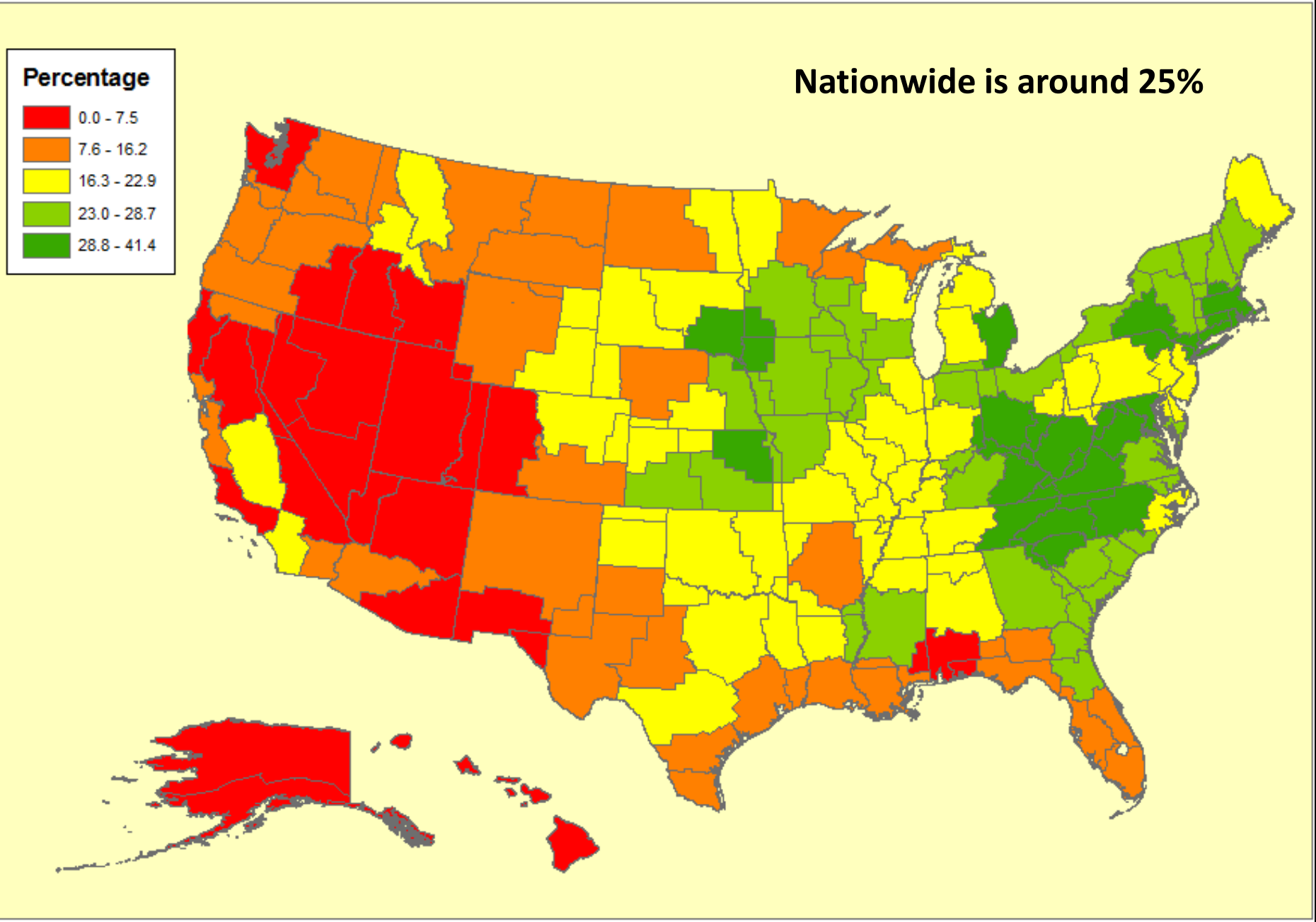
Perimeter Influence by Political Boundary (SVR/TOR Warnings)
1 Oct 2007 - 16 Mar 2011



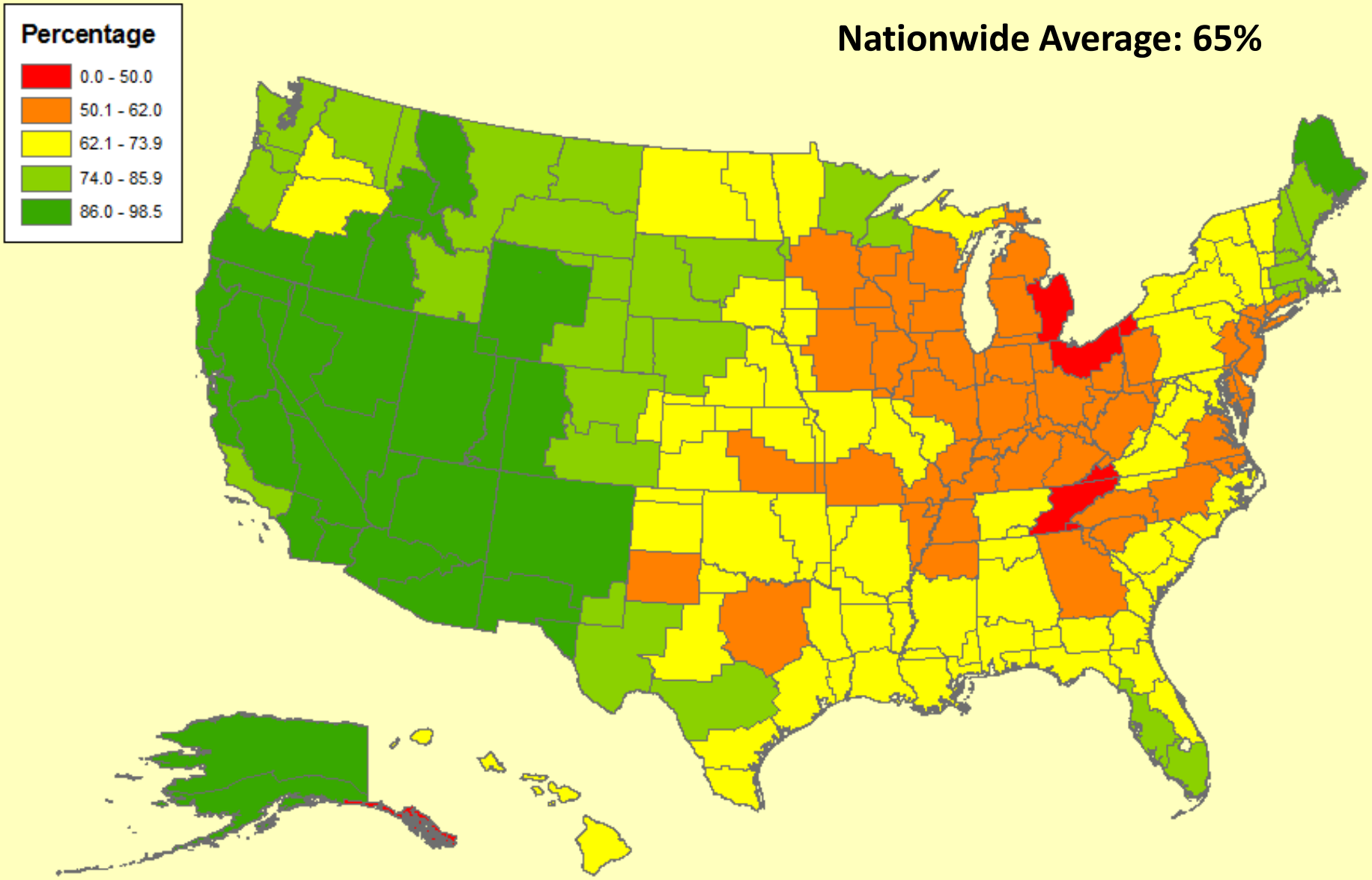
Percentage of SVR/TOR Warnings AOB 90% Political Boundary Influence (non SBW warnings)
1 Oct 2007 - 16 Mar 2011



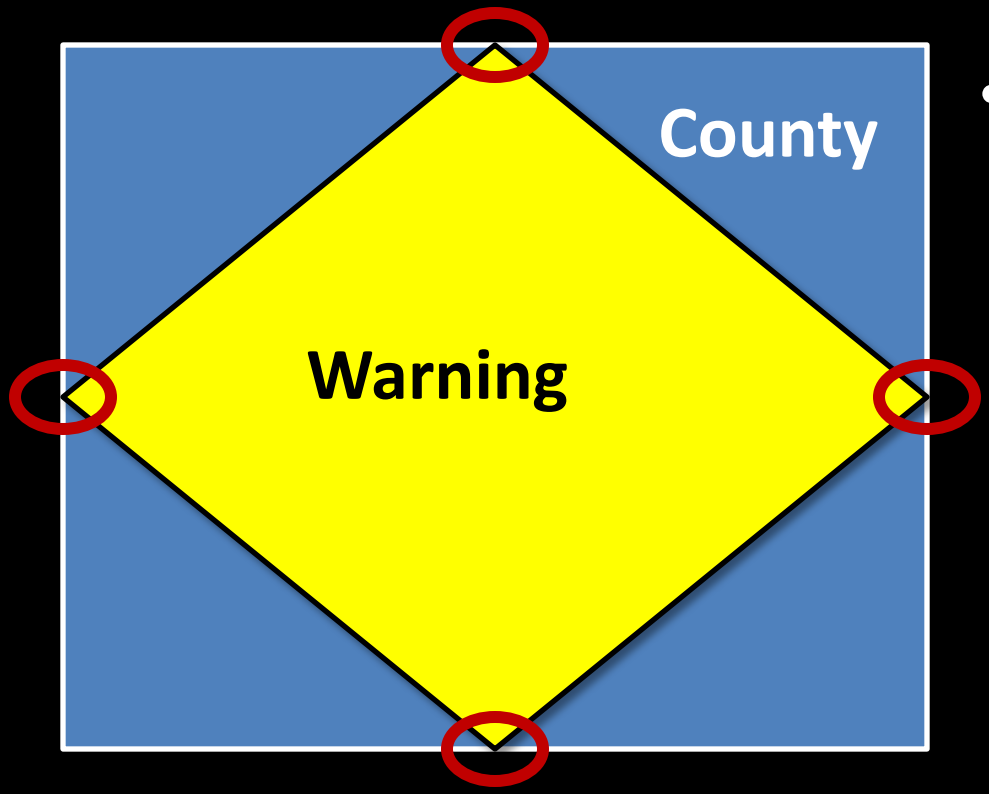
Areal Verification of SBW (SVR/TOR) using Local Storm Reports and 15km circular buffer
1 Oct 2007 - 18 Mar 2011



Size Reduction of SBW (SVR/TOR) versus associated counties
1 Oct 2007 - 18 Mar 2011

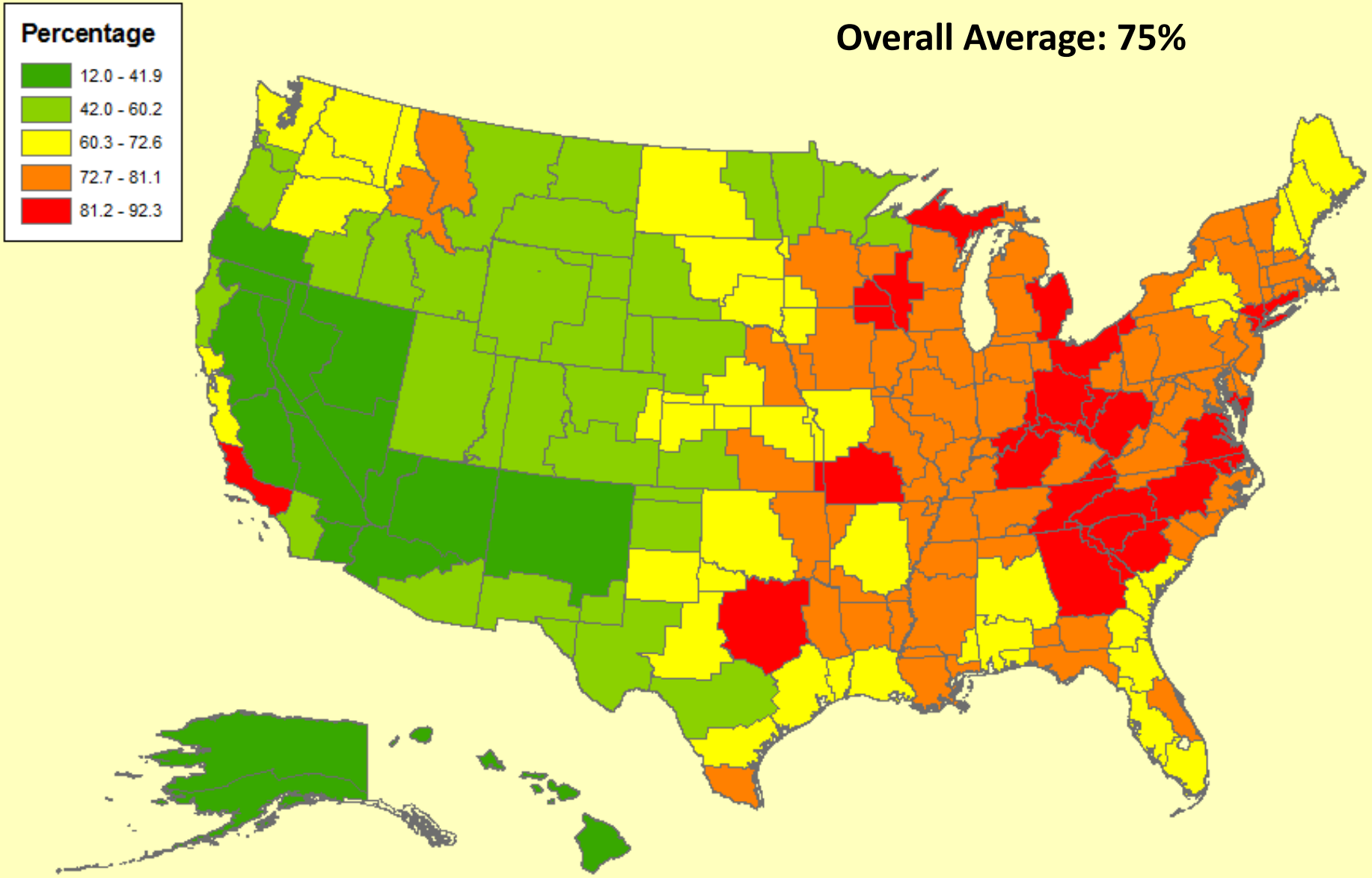


Oh daryl, what about this?



- Perimeter ratio is small
- So lets compute another metric measuring distance of vertex to county border

Percentage of SVR/TOR Warnings Polygon Vertices within 2km of a county border
1 Oct 2007 - 16 Mar 2011



What is broken?

- The warnings are constrained by political boundaries!
  - NWS Office can't issue outside CWA
  - Warning product (VTEC) is still bound to UGC codes
  - Can't issue SVR/TOR over Marine Zones, why ?!?!
- No penalty for warning size in verification
- Warning issuance software
- Warning dissemination software *(bad daryl)*
- Warning display software *(bad daryl)*
- Some local NWS Office policies conflict with NWS directives, where's the sheriff?
- No topology checks, invalid geometries are OK

Summary

- ~ 50% of TOR/SVR Warnings are 4 sided
- Only ~ 2 % of all SVR/TOR warnings are pure county retracements
- 75% of polygon vertices are guided by county borders
- SBWs have cut the size of warnings by over 50%, but the number of warnings has increased by 60%.
- The Cubs will not win the World Series this year

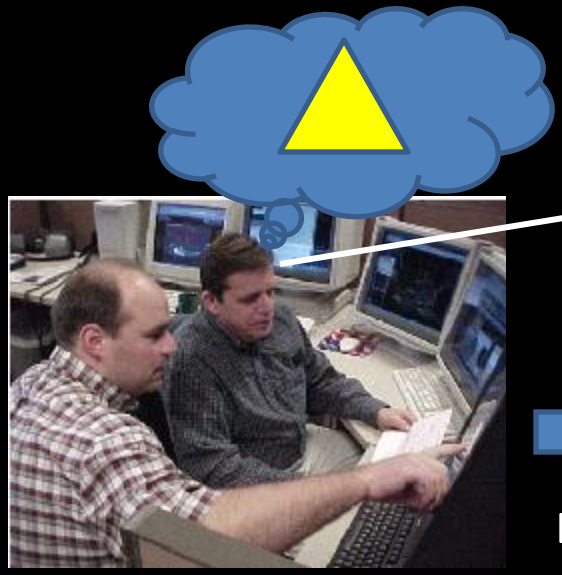
Is this the solution?

Equally, unrealistic solutions

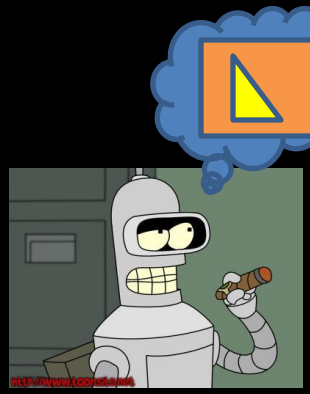
- Warnings should be data, not products
  - Computers are the most important readers…
  - UGC codes should not be included
- Warnings should come from NWS, not WFOs
  - NWS should be working as a team, instead of theftdoms
- Polygons should be limited to 4 to 6 sides.
- The Cubs develop talent from their farm system and not overpay for free agents that struggle with the rigors of playing left field.

NWS Issues Products

Forecaster tries to figure out what the public wants



Disseminates



Computer angry!

Public doesn't call Congress.

NWS Issues Data

Computers deal with various users

Disseminates

Computer happy!

Meathead happy!

Time for Questions?

mesonet.agron.iastate.edu

Daryl Herzmann
515.294.5978
akrherz@iastate.edu