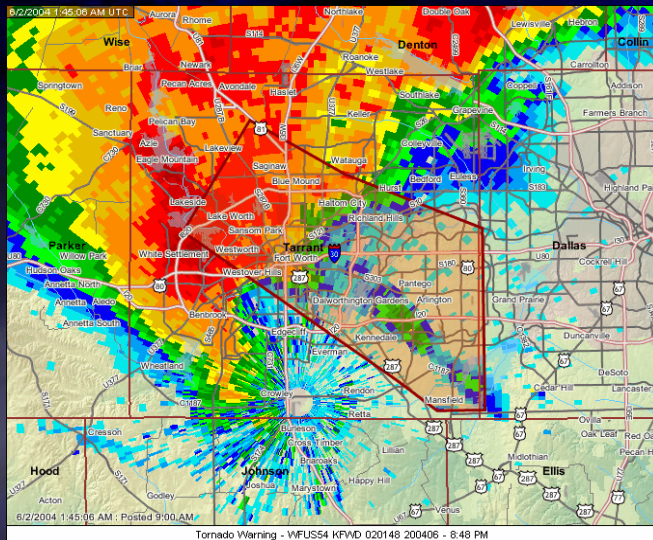




# Graphical Severe Weather Warnings at WFO Fort Worth, TX

Bill Bunting  
WFO Fort Worth

Scott Rae  
North Central Texas Council  
of Governments

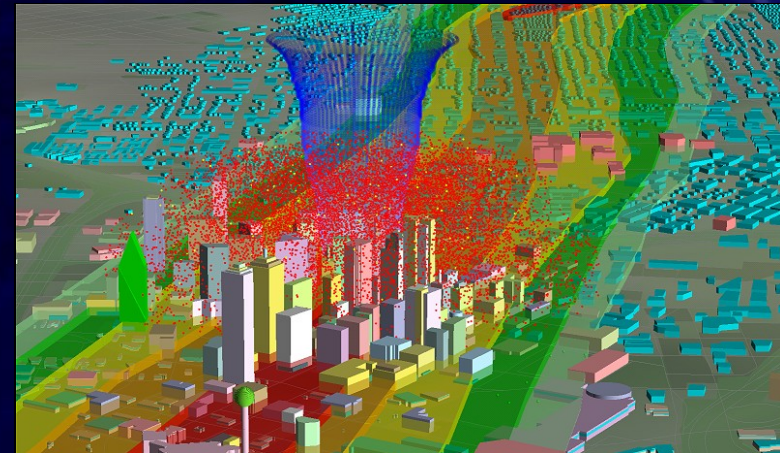
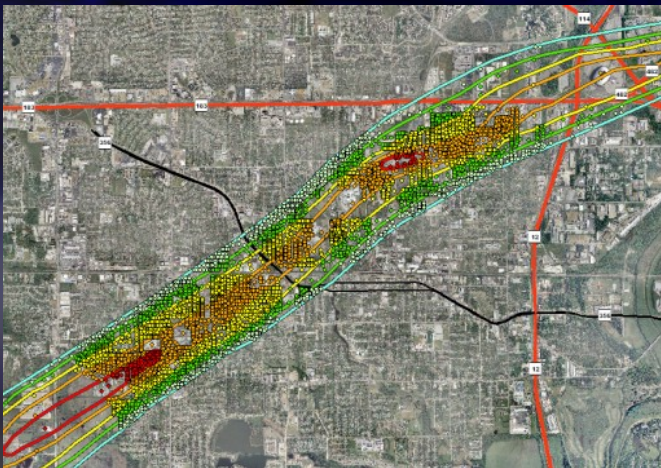
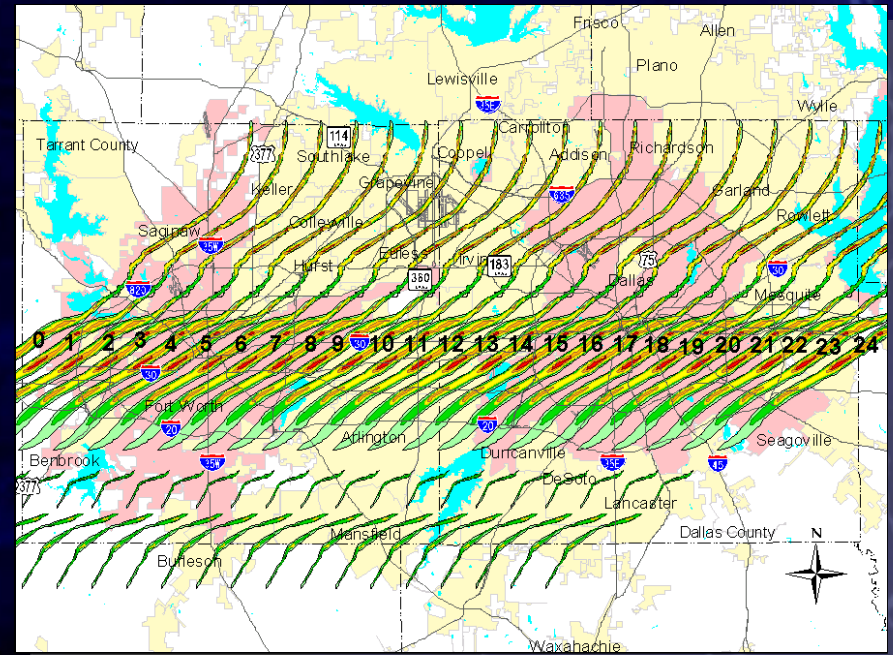


# Presentation Topics

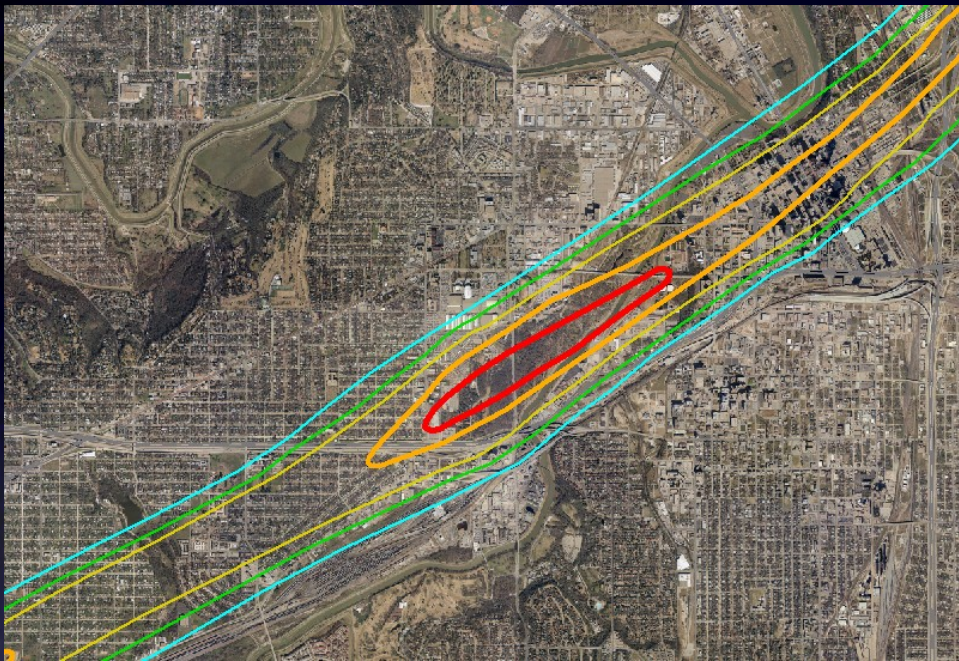
- History of collaboration
  - Tornado damage simulations
  - RIDGE National Radar
- Graphical severe weather warnings
- Future work

# Tornado Damage Simulations

- May 3<sup>rd</sup>, 1999 Oklahoma Outbreak track shapefiles used as reference
- Several simulations done to compare impacts
- Results published in Rae and Stefkovich, 2000



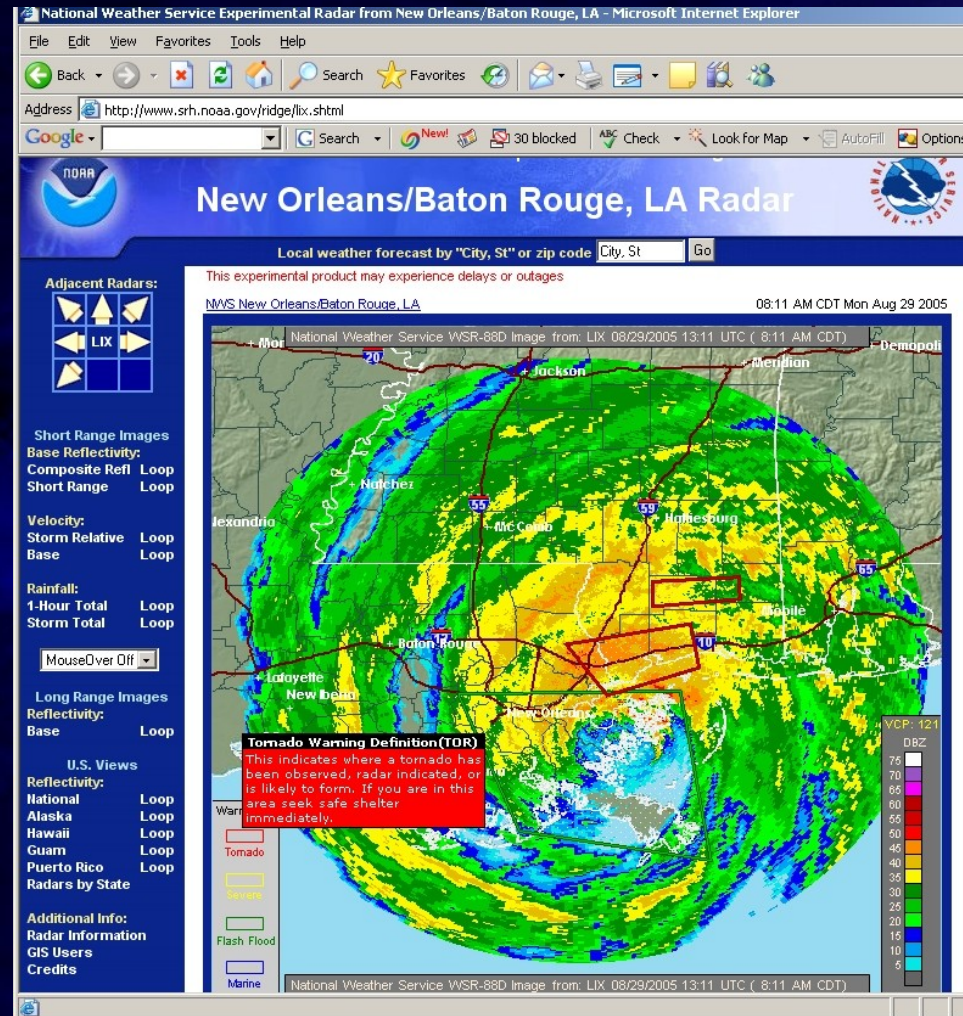
# One Scenario: Downtown Fort Worth



- Residents: 51,300
- Employees: 64,600
- Structures: 23,000
- Structure Value: \$4.2 Bill.
- Damages: \$2.6 Bil.
- Hourly Traffic: 169,000
- Normal Volume: 1,700
- Traffic Jam: 79,500

# RIDGE National Radar

- Radar Integrated Display with Geospatial Elements
- Collaboration between NWS and NCTCOG
- Allows for high – resolution backgrounds
- Capability to add various overlay fields (warnings, roads, rivers, etc.)



# Graphical Severe Weather Warnings

- Project began in 2003
- Goal: Insight into population characteristics in storm's path
  - Useful for Call-To-Action statement selection
- Warning polygon decoded and used to query Census database
- Output available via NWS Fort Worth and NCTCOG Internet sites

BULLETIN - EAS ACTIVATION REQUESTED  
TORNADO WARNING  
NATIONAL WEATHER SERVICE FORT WORTH TX  
627 PM CST SAT APR 5 2003

THE NATIONAL WEATHER SERVICE IN FORT WORTH HAS  
ISSUED A

\* TORNADO WARNING FOR...  
PALO PINTO COUNTY IN NORTH CENTRAL TEXAS  
WESTERN PARKER COUNTY IN NORTH CENTRAL TEXAS

\* UNTIL 730 PM CST

\* AT 627 PM CST...TRAINED WEATHER SPOTTERS REPORTED A  
TORNADO 18 MILES WEST OF MINERAL WELLS OR 3 MILES  
EAST OF POSSUM KINGDOM LAKE...MOVING EAST AT 30 MPH.

\* THE TORNADO IS EXPECTED TO BE NEAR...  
MINERAL WELLS AROUND 650 PM CST  
WEATHERFORD AROUND 715 PM CST

IN ADDITION TO TORNADOES, HAIL TO THE SIZE OF SOFTBALLS  
AND DAMAGING WINDS TO 80 MPH ARE LIKELY.

DO NOT LEAVE SHELTER TO USE YOUR CAR TO OUTRUN A  
TORNADO. CARS ARE EASILY TOSSED AND CRUSHED BY  
TORNADO WINDS.

LAT...LON 3298 9845 3280 9847 3270 9772 3297 9770

# Graphical Severe Weather Warning Process



National Weather Service

Warning Files  
Radar Data Files



NCTCOG

- Live Radar Data
- Severe Storm Expertise
- Storm Spotter Network

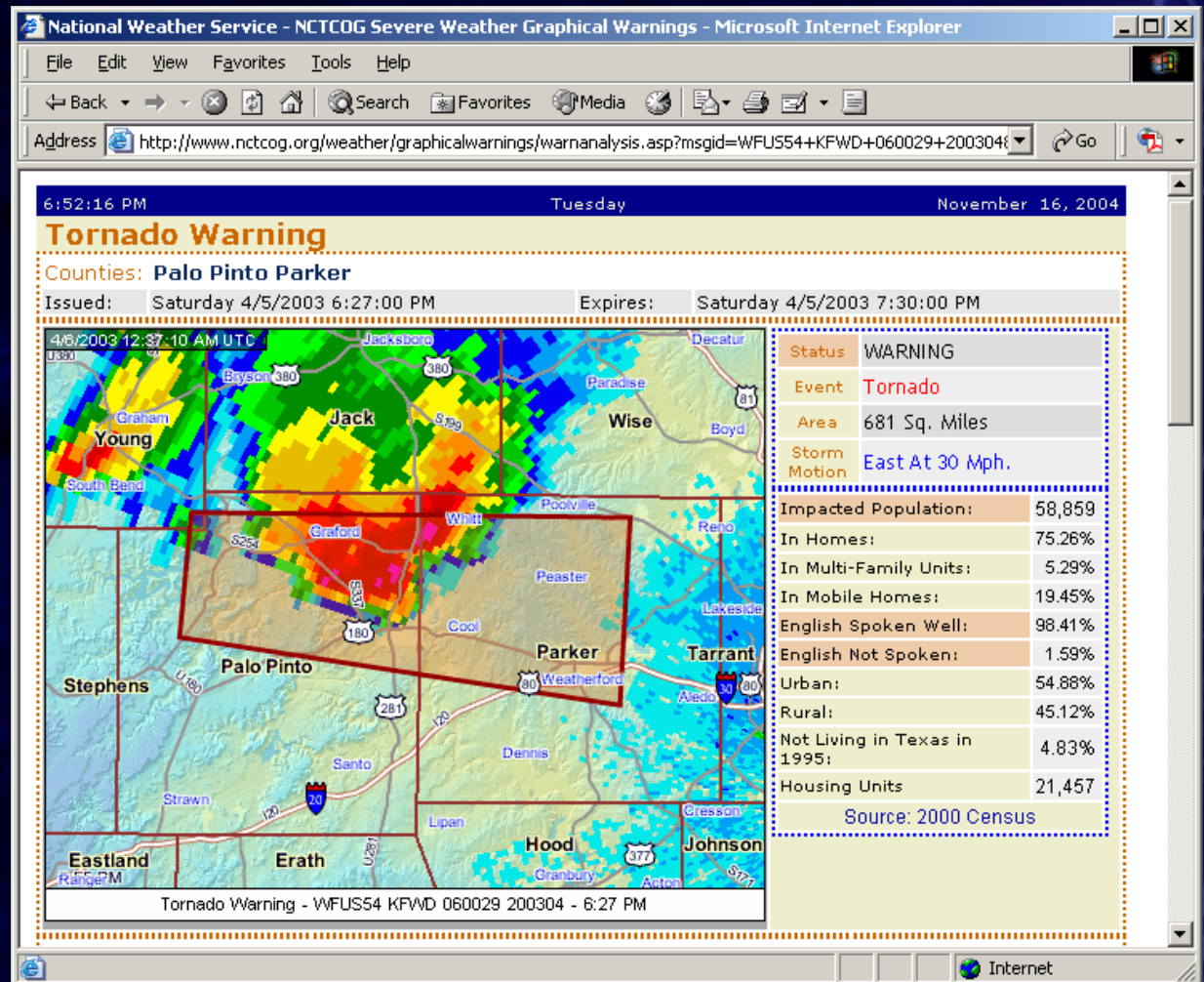
GIS/Demographic Data  
Geo-Spatial-Enabled Warning



- Centralized GIS Data
- Demographics
- Application Development
- EM Coordination

# The Result

- Warning polygon threat area displayed with radar image
- Demographic analysis of population at risk
- Breakdown by city or town beneath graphic
- Radar image updated with each new scan





National Weather Service - NCTCOG Severe Weather Graphical Warnings - Microsoft Internet Explorer provided by NCTCOG

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites

Address http://www.nctcog.org/weather/graphicalwarnings/warnanalysis.asp?msgid=KFWD.TO.0013\_2007 Go Links

**DESCRIPTION**

**\* TORNADO WARNING FOR...  
TARRANT COUNTY IN NORTH CENTRAL TEXAS**  
...

\* At 603 PM CDT... Storm Spotters And Doppler Radar Observed A Developing Tornado Just North Of Downtown Fort Worth... Moving East At 35 Mph. Take Cover In A Basement... Or On The Lowest Floor Of Your Home In An Interior Closet Or Bathroom. Use Blankets Or Pillows For Cover. If You Are Caught Outside... Seek Shelter In A Reinforced Building. As A Last Resort... Lie Flat In A Ditch Or Low Spot And Cover Your Head. A Tornado Watch Remains In Effect Until Midnight CDT Saturday Morning For North Central Texas.

**POPULATION IN WARNING AREA (Up to 10 Top Populations Listed)**

| City/Location            | County  | Persons   | Gender |         | Housing<br>Units | Age      |         |         |         |
|--------------------------|---------|-----------|--------|---------|------------------|----------|---------|---------|---------|
|                          |         |           | Male   | Female  |                  | Under 18 | Over 65 |         |         |
| 1. Fort Worth            | Tarrant | 513,285   | 49.3%  | 253,243 | 50.7%            | 260,042  | 186,576 | 28%     | 10%     |
| 2. Arlington             | Tarrant | 332,969   | 50.0%  | 166,465 | 50.0%            | 166,504  | 124,686 | 28%     | 6%      |
| 3. North Richland Hills  | Tarrant | 51,520    | 49.1%  | 25,319  | 50.9%            | 26,201   | 19,467  | 27%     | 9%      |
| 4. Bedford               | Tarrant | 47,152    | 48.2%  | 22,718  | 51.8%            | 24,434   | 20,251  | 23%     | 9%      |
| 5. Euless                | Tarrant | 46,005    | 49.6%  | 22,837  | 50.4%            | 23,168   | 19,218  | 25%     | 6%      |
| 6. Haltom City           | Tarrant | 39,018    | 50.2%  | 19,587  | 49.8%            | 19,431   | 14,922  | 27%     | 10%     |
| 7. Hurst                 | Tarrant | 36,273    | 48.6%  | 17,632  | 51.4%            | 18,641   | 14,076  | 25%     | 12%     |
| 8. Grand Prairie         | Tarrant | 27,621    | 50.1%  | 13,835  | 49.9%            | 13,786   | 10,462  | 28%     | 4%      |
| 9. Mansfield             | Tarrant | 21,287    | 49.9%  | 10,618  | 50.1%            | 10,669   | 6,942   | 32%     | 6%      |
| 10. Watauga              | Tarrant | 20,955    | 49.5%  | 10,373  | 50.5%            | 10,582   | 6,839   | 32%     | 5%      |
| Total of<br>33 Locations |         | 1,278,349 |        | 632,664 |                  | 645,685  | 474,775 | 392,789 | 109,072 |

Above Warning Information is presented through a cooperative project between the [North Central Texas Council of Governments](#) and the [National Weather Service Fort Worth Office](#)

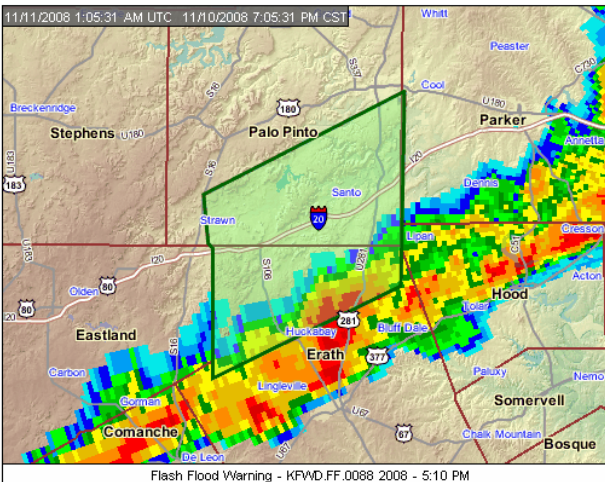
Done Internet

### Flash Flood Warning

Counties: **Erath Palo Pinto**

Issued: Monday 11/10/2008 5:10:00 PM

Expires: Monday 11/10/2008 7:15:00 PM



Status: **WARNING**  
 Event: **Flash Flood**  
 Area: **594 Sq. Miles**

Impacted Population: **7,196**  
 In Homes: **64.99%**  
 In Multi-Family Units: **0.06%**  
 In Mobile Homes: **34.94%**  
 English Spoken Well: **99.32%**  
 English Not Spoken: **0.68%**  
 Female: **3,556**  
 Male: **3,640**  
 Under Age 18: **1,789**  
 Over Age 65: **1,073**  
 Housing Units: **2,838**  
 Source: 2000 Census

Flash Flood Warning - KFWD.FF.0088 2008 - 5:10 PM

**DESCRIPTION**

\* **FLASH FLOOD WARNING FOR... NORTHWESTERN ERATH COUNTY IN NORTH CENTRAL TEXAS AND SOUTHERN PALO PINTO COUNTY IN NORTH CENTRAL TEXAS**

\* At 5:09 PM CST... National Weather Service Meteorologists Detected A Severe Thunderstorm Capable Of Producing Quarter Size Hail... And Damaging Winds In Excess Of 60 Mph. This Storm Was Located 19 Miles West Of Centerville... And Moving East At 30 Mph.

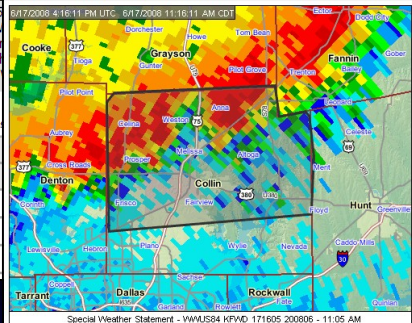
**POPULATION IN WARNING AREA (Up to 10 Top Populations)**

| City/Location  | County     | Persons |
|----------------|------------|---------|
| 1. County Land | Palo Pinto | 4,835   |
| 2. County Land | Erath      | 1,470   |
| 3. Gordon      | Palo Pinto | 451     |

National Weather Service Forecast Office  
**Fort Worth, TX**  
 Site Map News Organization Search

### Special Weather Statement

Issued: Tuesday 6/17/2008 11:05:00 AM Expires: Tuesday 6/17/2008 11:25:00 AM



Status: **WARNING**  
 Event: **Advisory**  
 Area: **629 Sq. Miles**  
 Storm Motion: **Moving East At 30 Mph.**

Impacted Population:  
 In Homes:  
 In Multi-Family:  
 In Mobile Home:  
 English Spoken Well:  
 English Not Spoken:  
 Source: 2000 Census

**DESCRIPTION**

\* **SIGNIFICANT WEATHER ADVISORY FOR... COLLIN COUNTY**  
 At 11:05 AM CDT... National Weather Service Meteorologists Detected A Strong Thunderstorm 12 Miles North Of McKinney... Moving Southeast At 36 Mph. Very Heavy Rain And Wind Gusts To 40 Mph Are Likely With This Storm. The Path Of This Storm Includes Allen... Anna... Celina... Fairview... Farmersville... Freese... Lowry Cross... McKinney... Princeton And Prosper. Heavy Rainfall May Result In Flooding Of Low Lying Areas Such As Ditches And Underpasses. Avoid These Areas And Do Not Cross Flooded Roads As They May Be Washed Out.

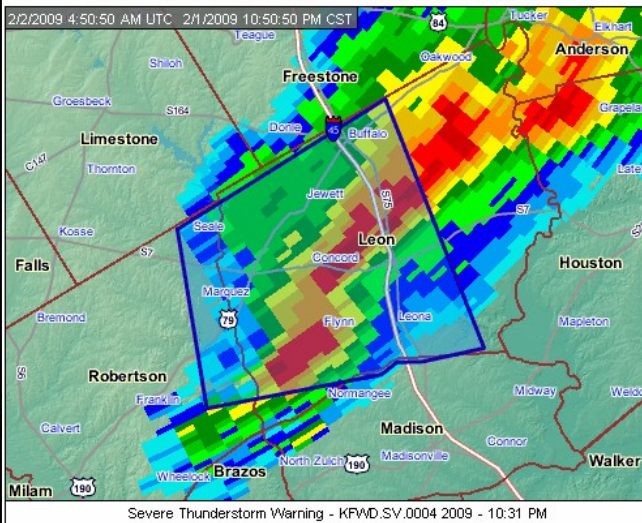
National Weather Service Forecast Office  
**Fort Worth, TX**  
 Site Map News Organization Search

### Severe Thunderstorm Warning

Counties: **Leon Robertson**

Issued: Sunday 2/1/2009 10:31:00 PM

Expires: Sunday 2/1/2009 10:57:00 PM (Originally 11:30:00 PM)



Status: **WARNING**  
 Event: **Severe Thunderstorm**  
 Area: **772 Sq. Miles**  
 Storm Motion: **Moving East At 30 Mph.**

Impacted Population: **12,471**  
 In Homes: **63.27%**  
 In Multi-Family Units: **2.72%**  
 In Mobile Homes: **34.00%**  
 English Spoken Well: **99.12%**  
 English Not Spoken: **0.88%**  
 Female: **6,345**  
 Male: **6,126**  
 Under Age 18: **3,017**  
 Over Age 65: **2,505**  
 Housing Units: **5,042**  
 Source: 2000 Census

Severe Thunderstorm Warning - KFWD.SV.0004 2009 - 10:31 PM

**DESCRIPTION**

\* **SEVERE THUNDERSTORM WARNING FOR... LEON COUNTY IN NORTHEAST TEXAS AND NORTHEASTERN ROBERTSON COUNTY IN SOUTH CENTRAL TEXAS**

\* At 10:31 PM CST... National Weather Service Meteorologists Detected A Severe Thunderstorm Capable Of Producing Quarter Size Hail... And Damaging Winds In Excess Of 60 Mph. This Storm Was Located 19 Miles West Of Centerville... And Moving East At 30 Mph.

**TIMING**

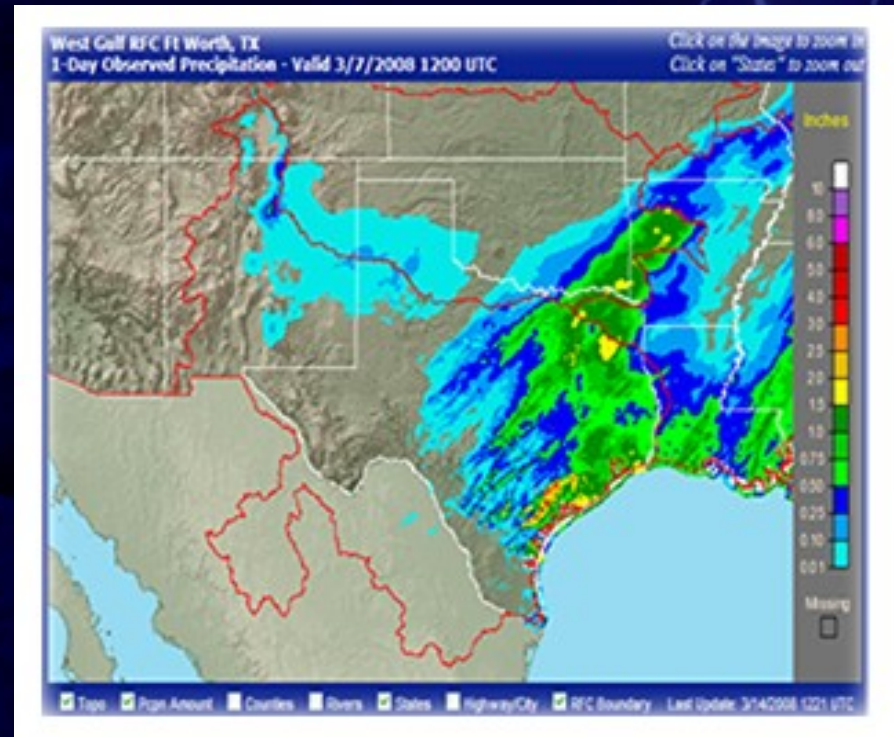
\* **THE SEVERE THUNDERSTORM WILL BE NEAR... BUFFALO BY 1045 PM CENTERVILLE BY 1100 PM FOR YOUR PROTECTION MOVE TO A STURDY SHELTER UNTIL THE STORM HAS PASSED, REPORT SEVERE WEATHER TO THE NEAREST LAW ENFORCEMENT AGENCY...FOR RELAY TO THE NATIONAL WEATHER SERVICE FORECAST OFFICE IN FORT WORTH.**

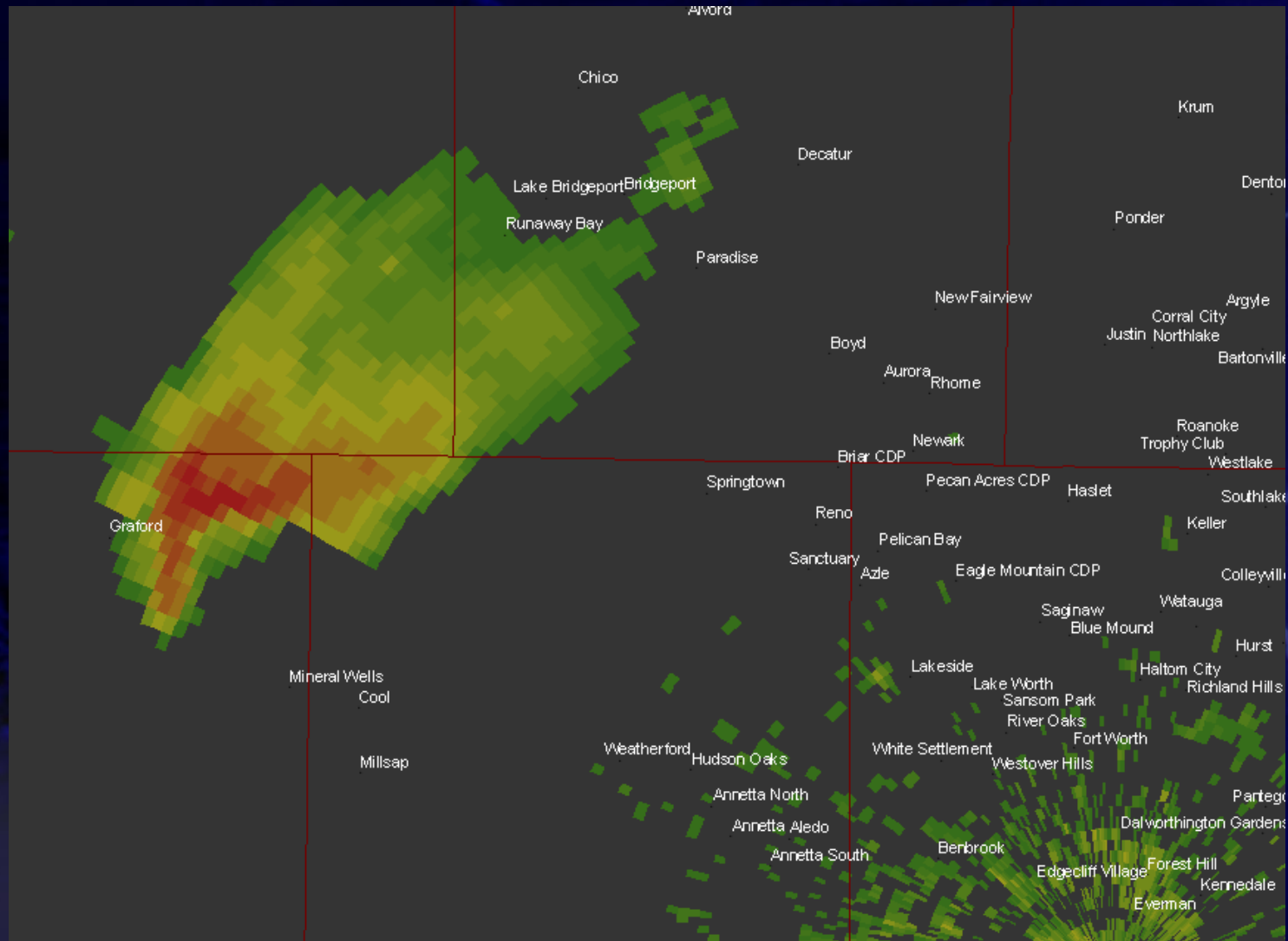
# Feedback from Emergency Managers

- “It's like having you and your team of experts standing right with us. Your credibility is never questioned when we can show the hazards approaching using a BlackBerry or other PDA.”
- “We used the graphical warning when making the decision to sound the sirens during the February 10 storm. We also captured screen shots of the graphical warning page to include in our "event" file for the day.”
- “When questioned by elected officials as to why the sirens were sounded when the damages were in the city immediately adjacent to us, the picture and data really told the story.”
- “The best thing about it for me is putting as much simplified info on the page with the map as possible and I think you have that down pretty well.”

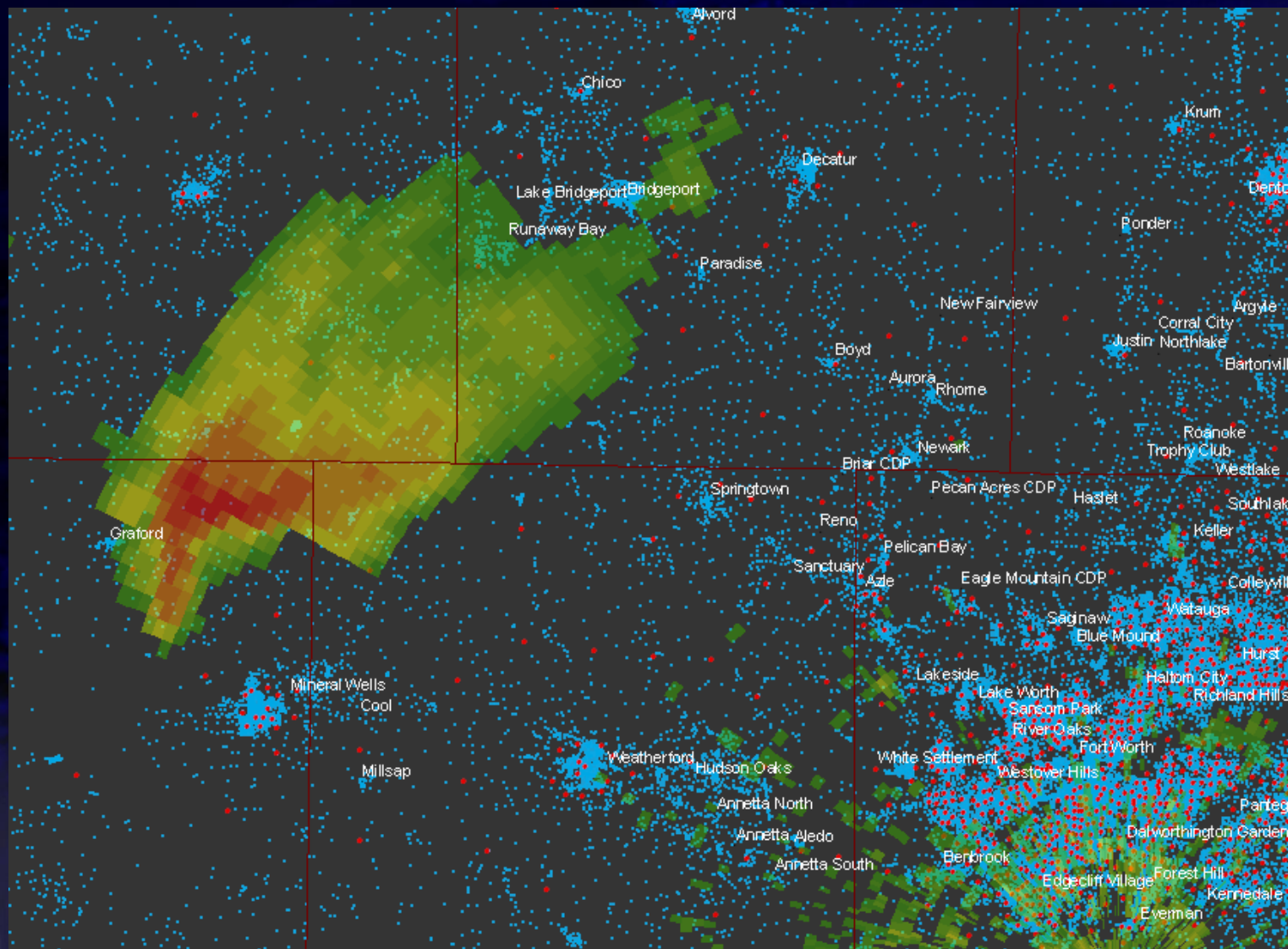
# Future Work

- Demographic information to NWS AWIPS workstations for use in warning composition
- Hypothetical and post-storm impact scenarios
- Graphical warnings to Google/Virtual Earth technology
- Bring precipitation products into regional GIS for Storm water Management
- Incorporate 2010 Census (March 2011)

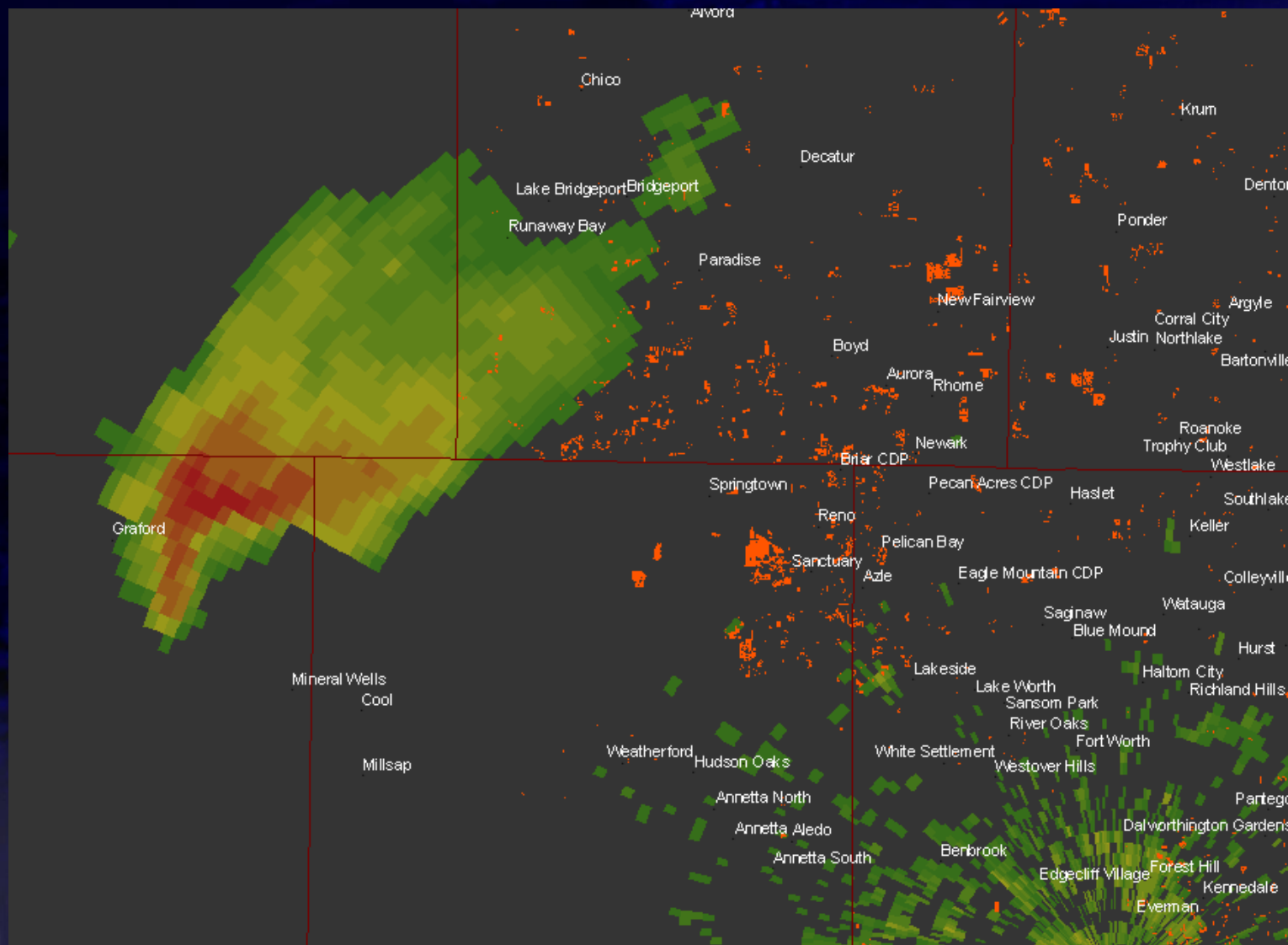




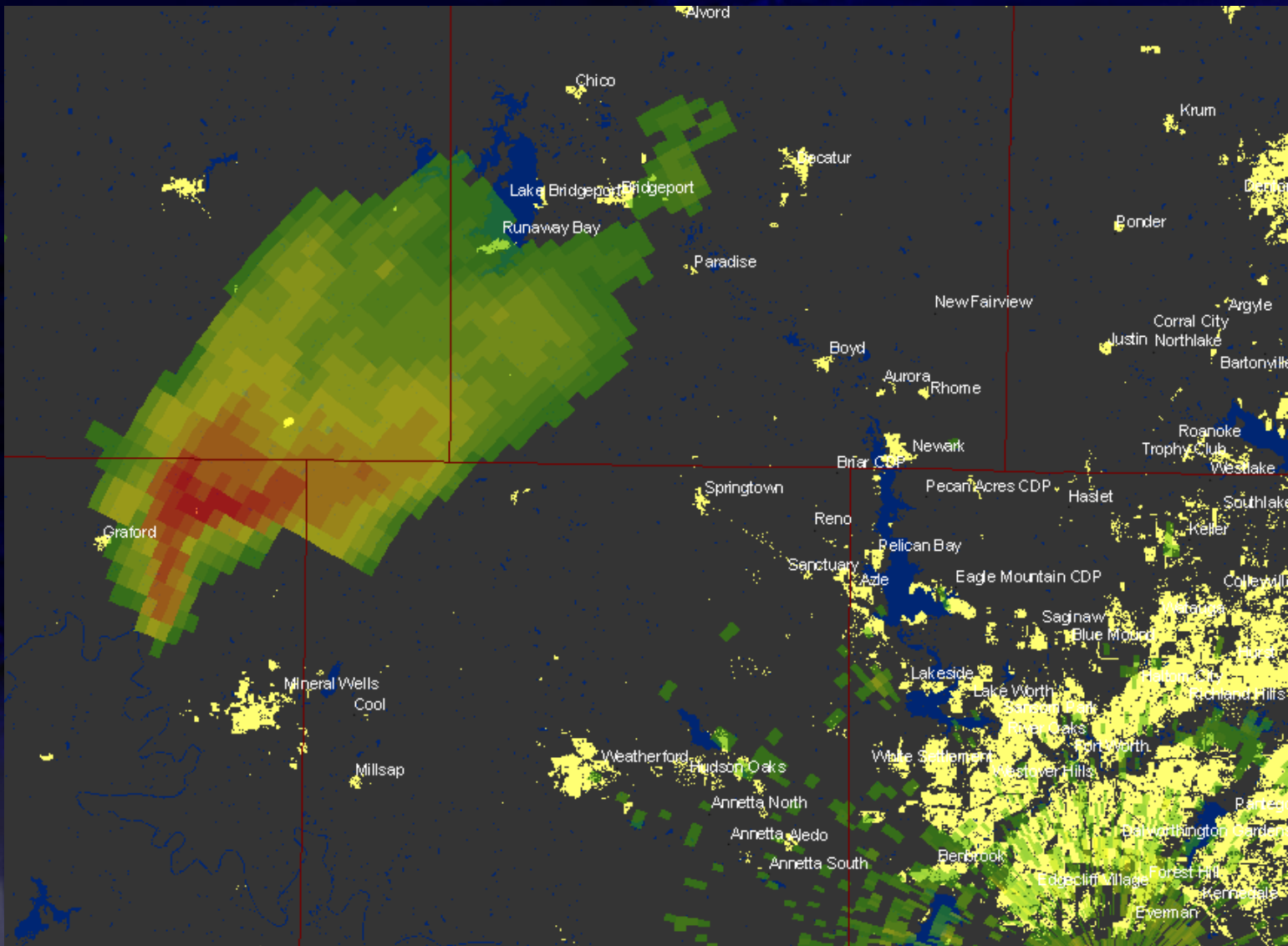
Approaching Severe Storm



Census Block Data



Mobile Home Parks



Single and Multi-Family Residential



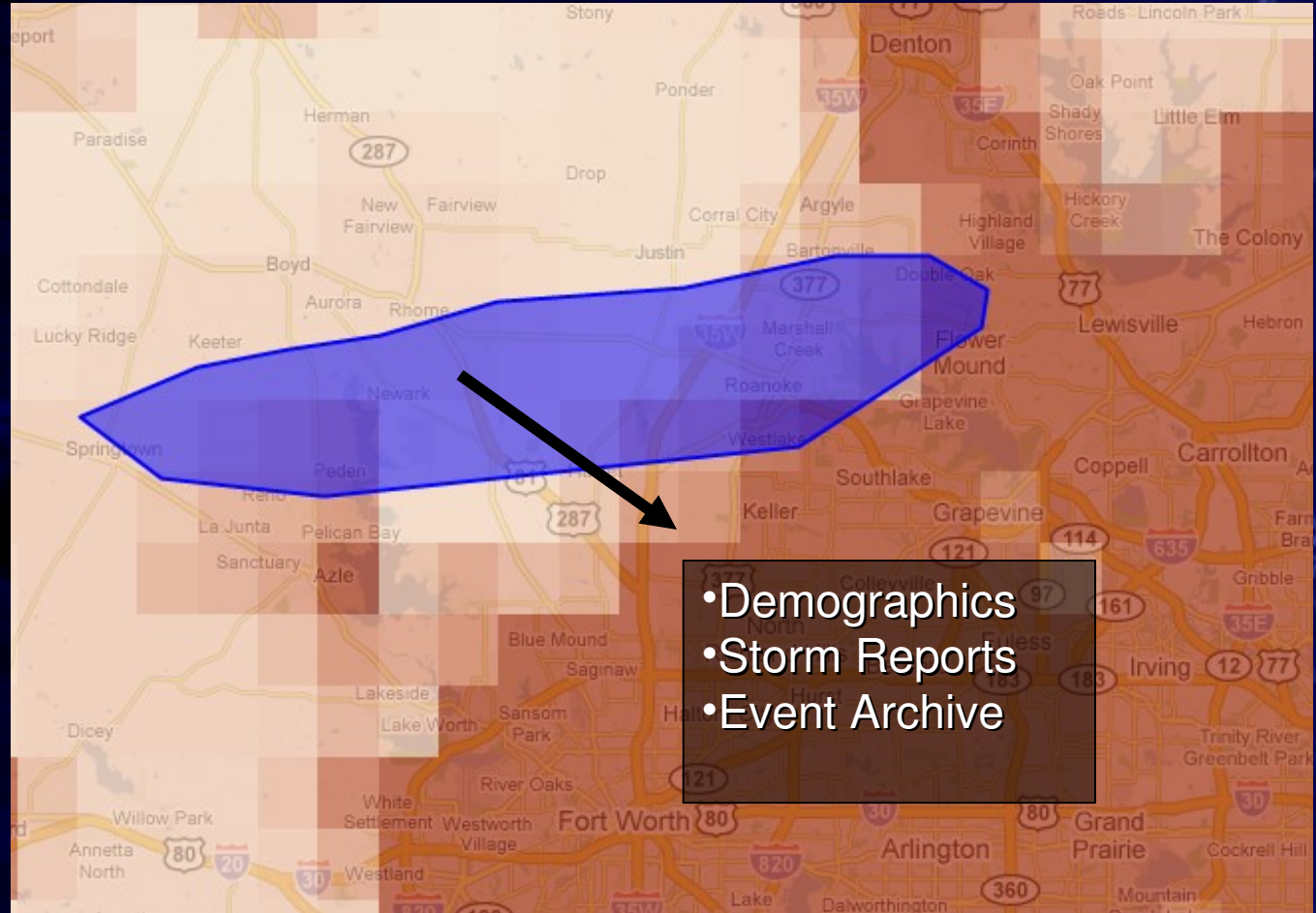
# Interactive Pre and Post Storm Scenarios



Mesocyclone Paths



Hail Swaths



# weather.gov/fortworth

www.weather.gov

National Weather Service Forecast Office

## Fort Worth, TX

SR News   SRH Home   Organization   Search

Local weather forecast by "City, St" or zip code

Current Hazards  
North Texas  
Graphical Warnings  
National

Current Conditions  
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**Top News of the Day**   Last 30 Products Issued   
**Red Flag Warning Today Along and West of I-35**   **New Homepage Survey**  
**New! Drought Information Statement**  
**Skywarn Spotter Schedule for 2009**

### Breezy and Warm Today

**Fire Danger** (multiple locations)

**Red Flag Warning (In red): Dry Conditions and Gusty Winds will result in Critical Fire Danger Today.**

\* Southeast Winds 15 to 25 mph...  
Gusts to 35 mph  
\* Minimum Relative Humidities 15 to 30 Percent

**Elevated Fire Danger Across the Rest of North Texas.**  
\* Southeast Winds 15 to 25 mph  
\* Minimum Relative Humidities 30 to 35 Percent

5:41 AM CST  
Tue Mar 3, 2009  
National Weather Service  
FL Worth/Dallas

Click on map for Point Forecast ([Point forecast?](#))   [Submit Storm Reports](#)

Click on the map below for the latest forecast.   [En Español](#)

Wichita Falls   Sherman   Paris

Read watches, warnings & advisories



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