



DFW Modeling Update

Pete Breitenbach

DFW Photochemical Technical Modeling
Committee

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Overview

- Three Source Apportionment Runs
 1. DFW 2009 Future Case
 2. EGU impacts with fuel specific controls
 3. CENRAP (2002) Transport Modeling



APCA

- “APCA” is a source apportionment accounting tool that works inside the CAMx model
 - “Anthropogenic Precursor Culpability Assessment”
 - Tracks which sources contribute to ozone formation
 - Focuses on anthropogenic contributions
 - Used in all three cases



DFW 2009 APCA Model Runs

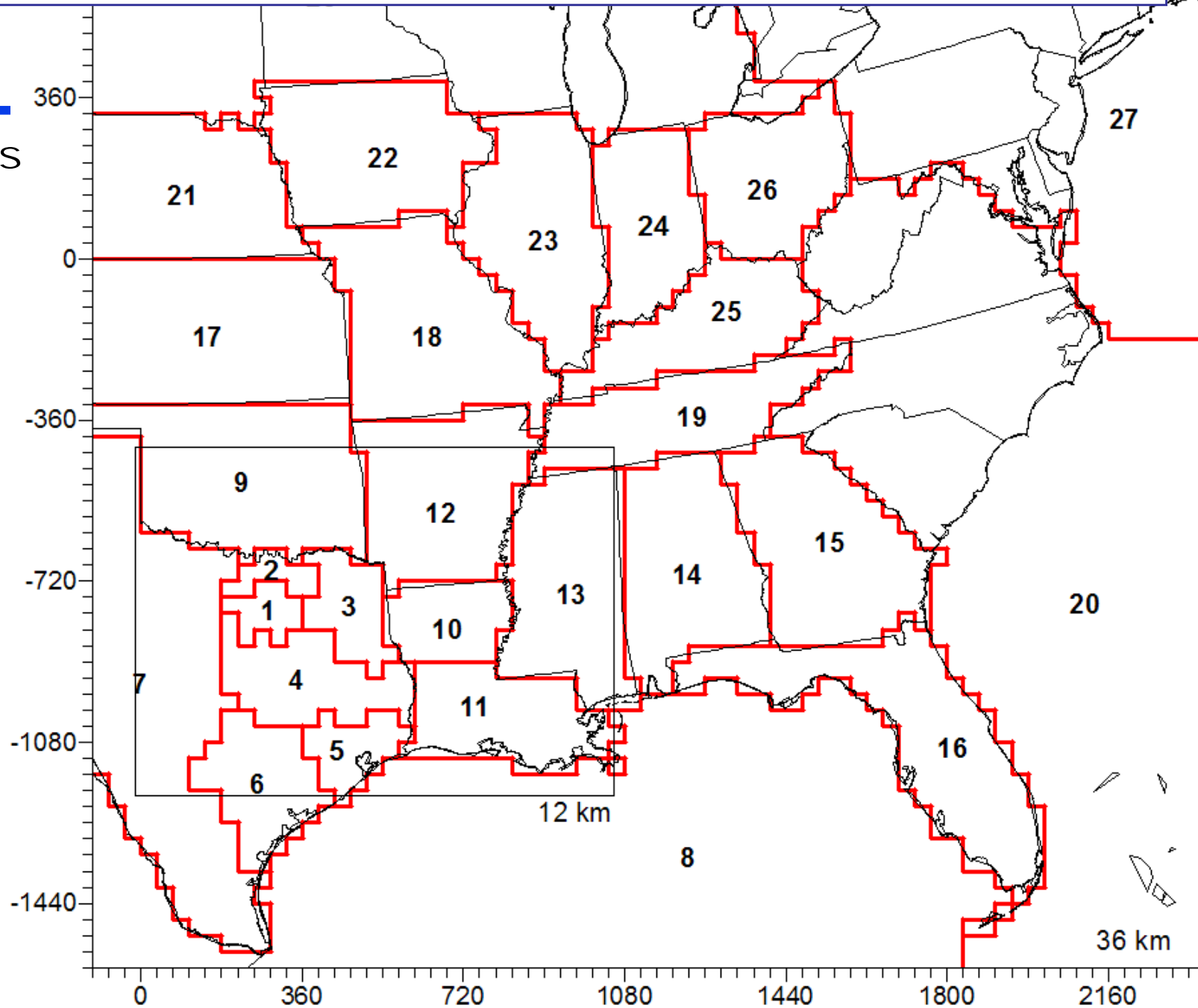
- First Run: Identify ozone formed from:
 - Sources outside of Texas (other states)
 - Sources inside Texas (other counties)
 - Sources inside DFW 9-county area
- How to use APCA
 - Identify sources and regions during CAMx setup
 - CAMx assigns the ozone to anthropogenic sources as it is formed along the path



Example of APCA Modeling Domain

Source Regions

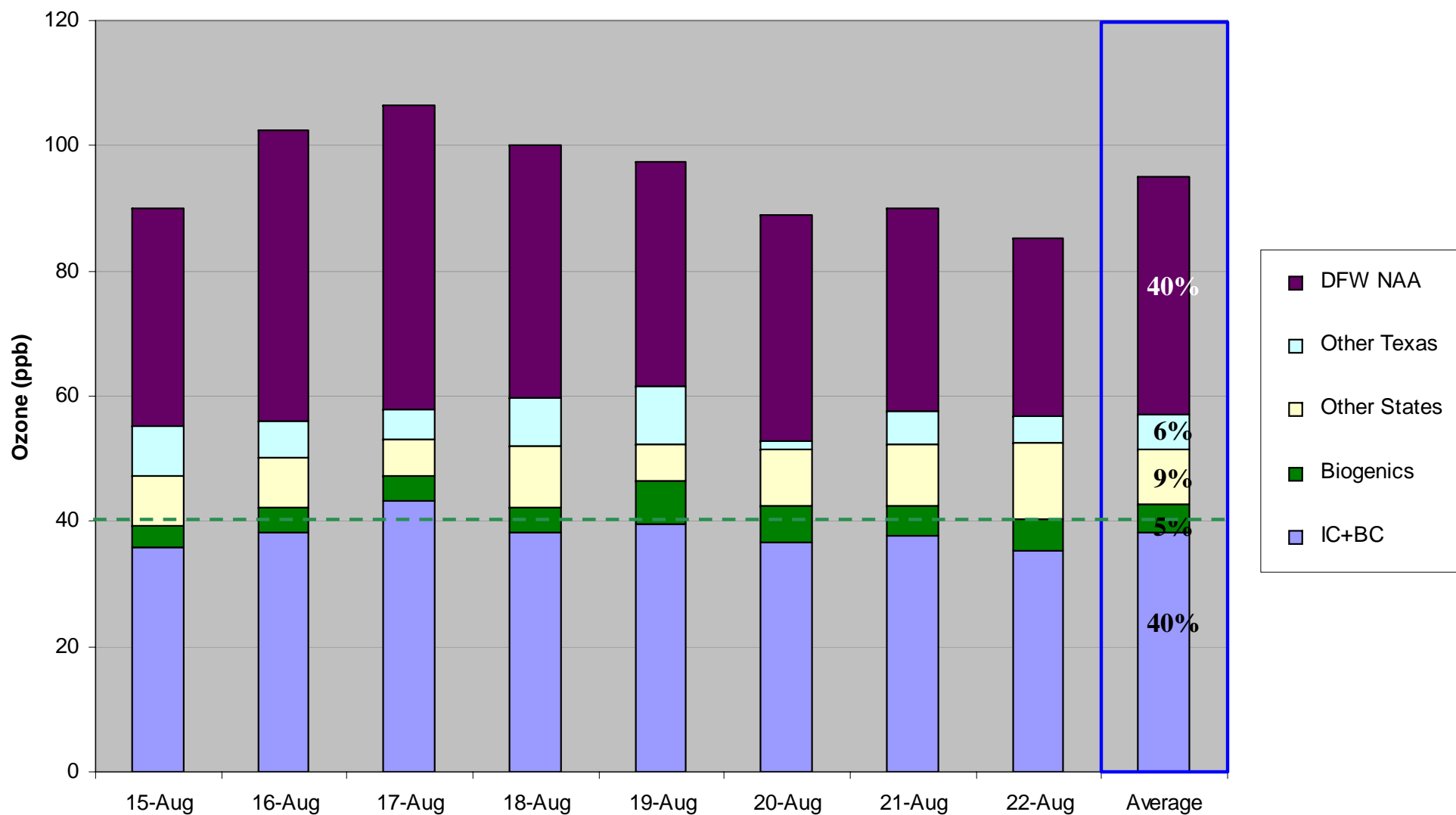
1. DFW NNA
2. North Texas
3. NE Texas
4. Central Texas
5. Houston
6. South Texas
7. West Texas
8. Gulf of Mexico + Mexico
9. Oklahoma
10. North Louisiana
11. South Louisiana
12. Arkansas
13. Mississippi
14. Alabama
15. Georgia
16. Florida
17. Kansas
18. Missouri
19. Tennessee
20. Mid Atlantic States
21. Nebraska
22. Iowa
23. Illinois
24. Indiana
25. Kentucky
26. Ohio
27. Northeast US
28. Northern Plains





Contributions to DFW 9-County NAA 8-Hour Ozone

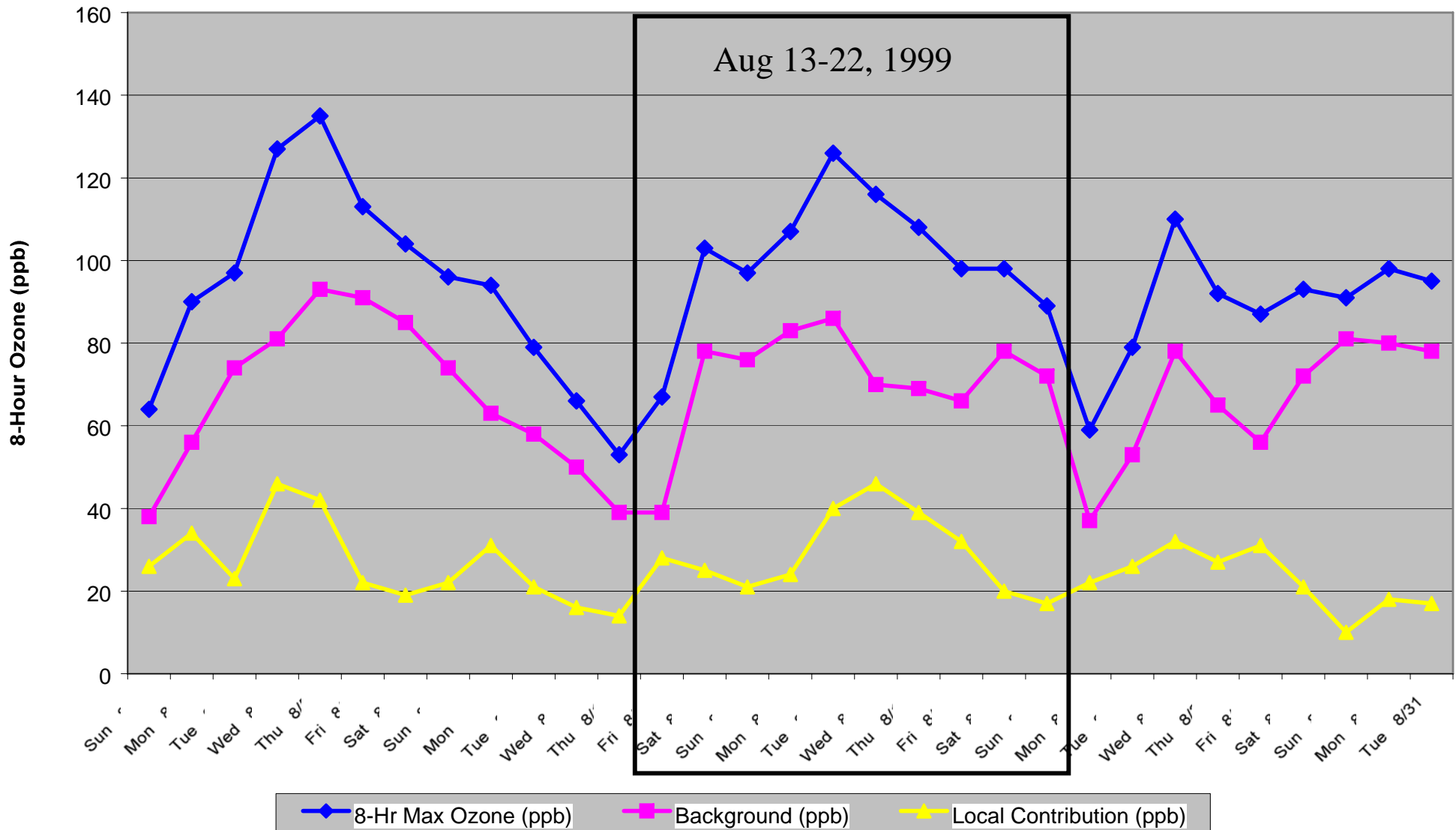
Task 20: APCA Analysis of 2009 Baseline Impacts





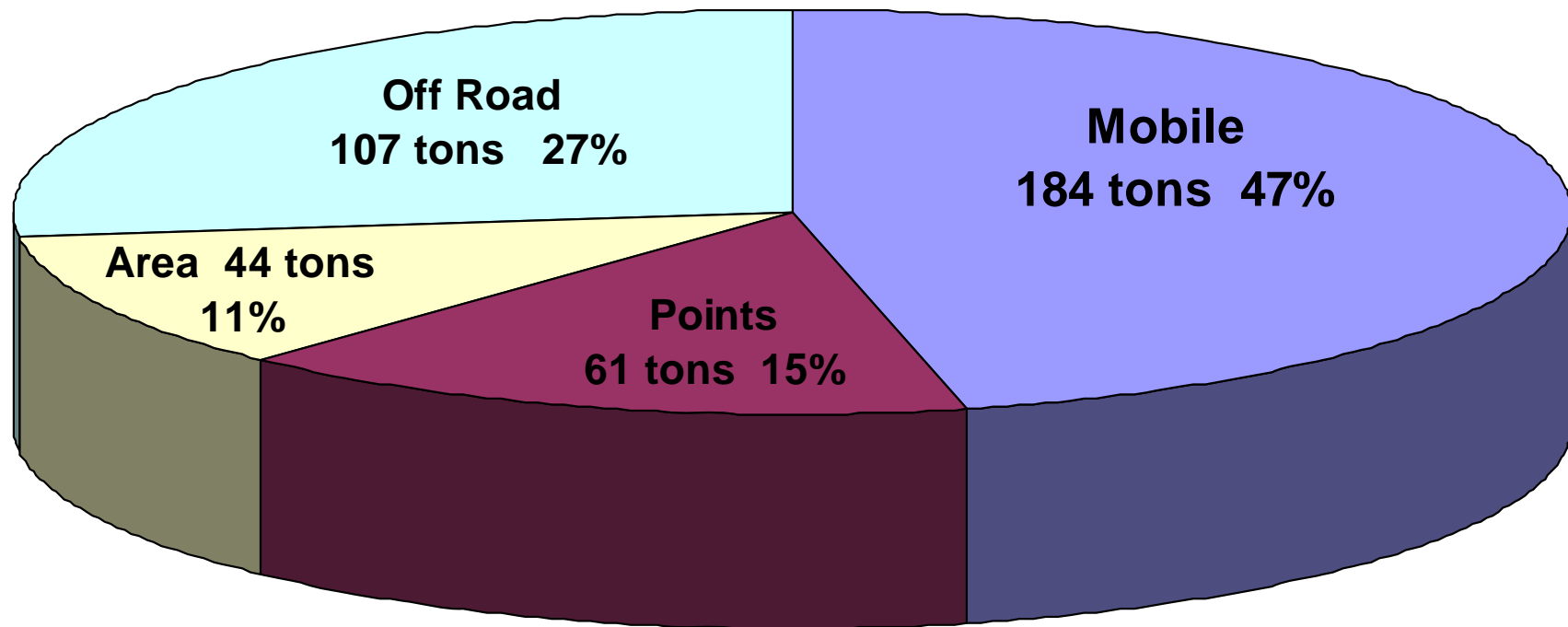
DFW 8-Hour Ozone Data, August 1999

Daily Max, Background and Local Contribution





DFW 9-County Future Case (2009) NO_x Emissions Model Run44.fy2009.a1

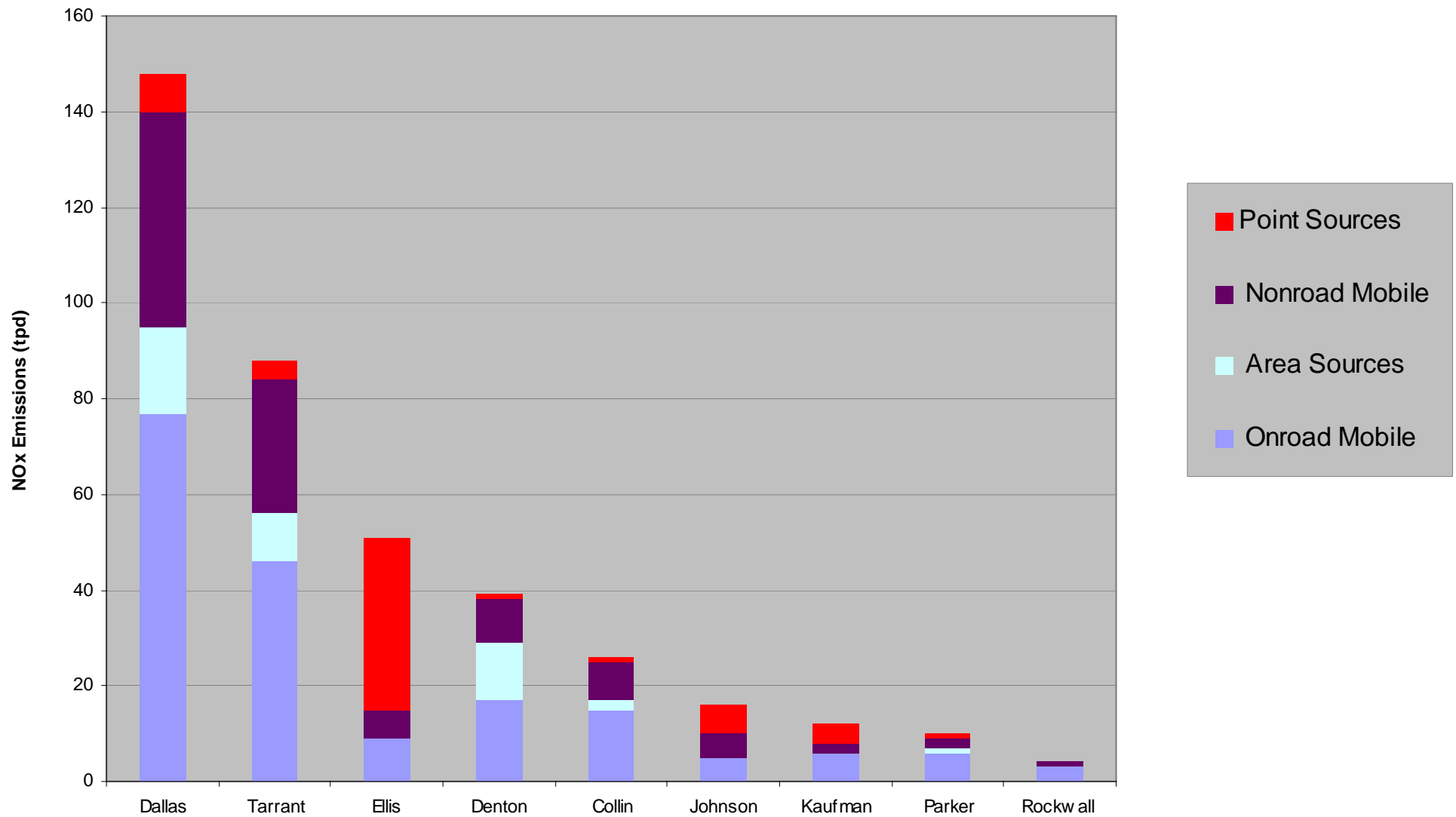


DFW Total 9-County Anthropogenic NO_x = 396 tons/day



DFW 2009 Anthropogenic NOx Emissions by County

Run44.fy2009.a1





DFW Future Case Summary

2009 Modeling with .a1 Inventory

- Sources inside the DFW NAA contribute 40%
- Sources inside of Texas contribute 6%
- Other states contribute about 9%
- IC/BC and Biogenics contribute about 45%



DFW EGU APCA Modeling

- Identify ozone formed from sources inside DFW, inside Texas, and from other states
- Quantify ozone coming from Texas Electric Generating Units (EGUs)
 - Inside DFW 9-county area
 - Inside 100 km
 - Inside 200 km
 - All other EGUS in Texas
- Then re-evaluate contributions if fuel-specific controls are applied

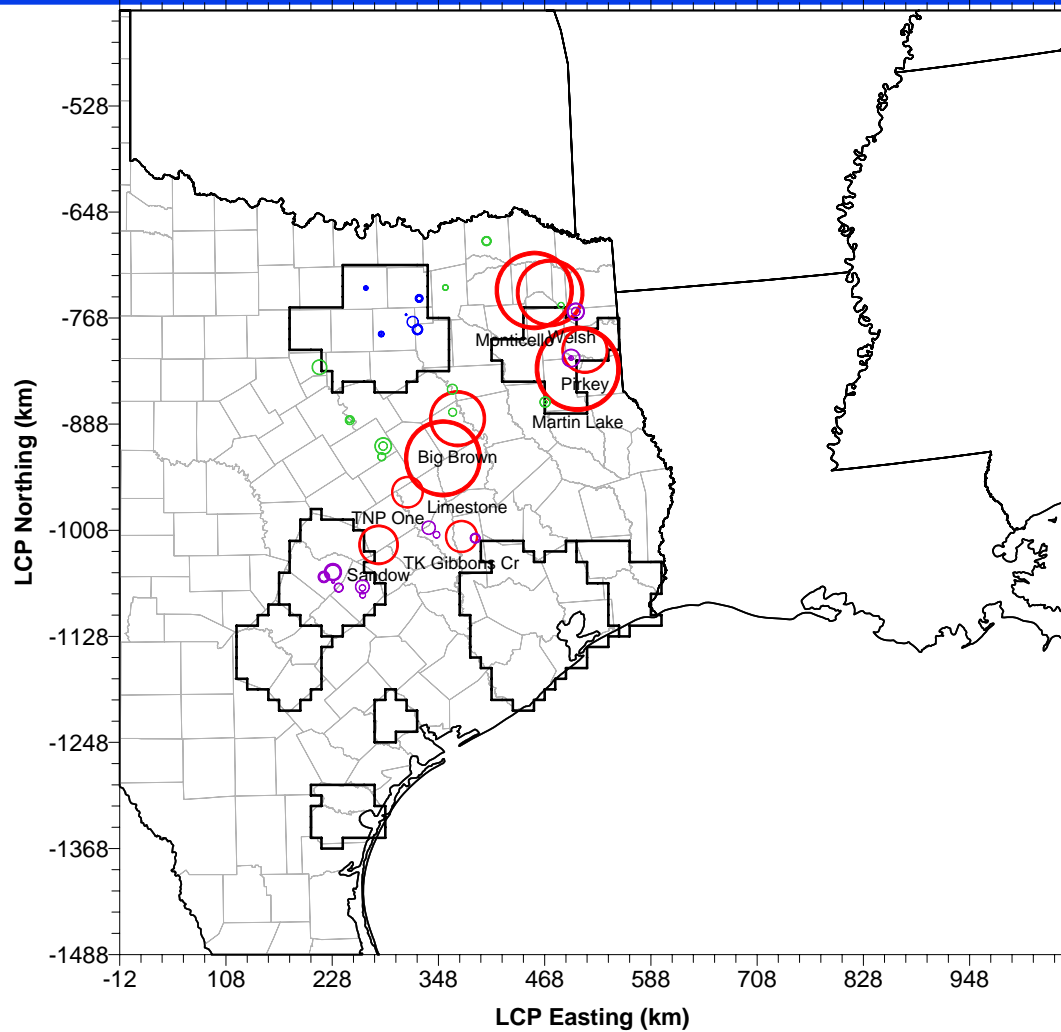


EGU Impacts with Fuel Specific Emissions Reductions

- Different fuels have different potential control levels
 - For this DFW APCA modeling, we assumed control levels similar to those in the Houston Cap
- Sensitivity Test on EGU Controls
 - TX Lignite 0.08 # NO_x /MMBtu
 - PRB Coal 0.05 # NO_x /MMBtu
 - Gas Fired 0.03 # NO_x /MMBtu



Texas EGU NO_x Emissions



2009 Baseline NO_x Emissions [tpd] from East Texas EGUs

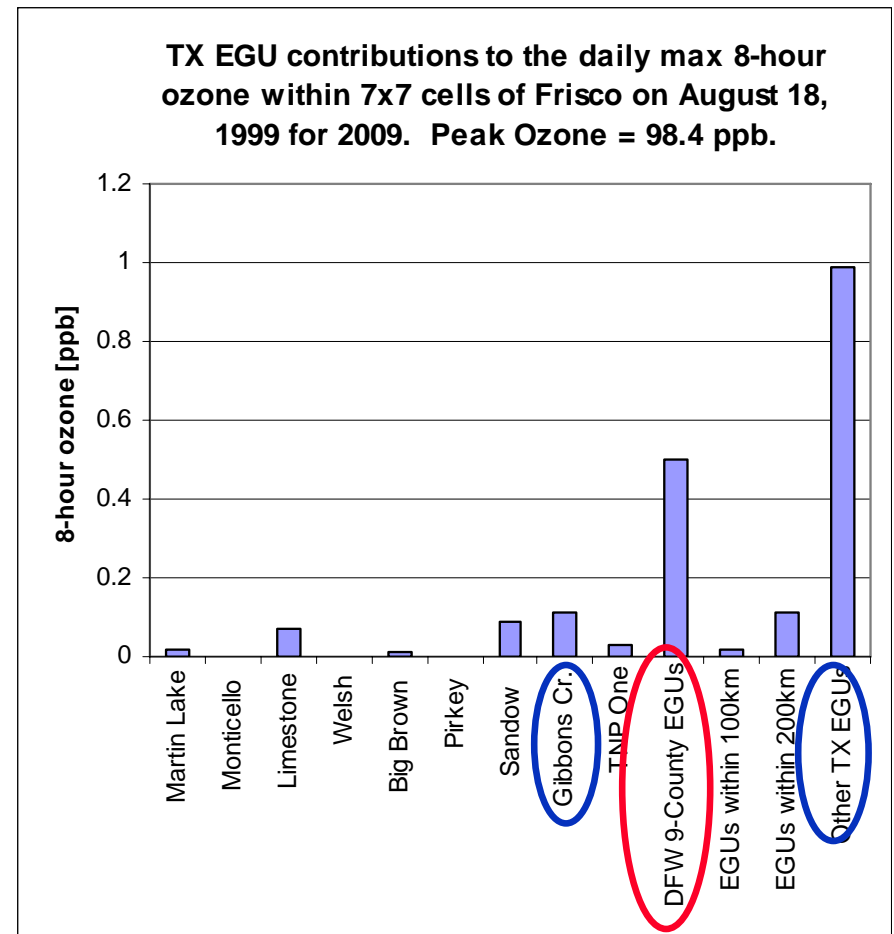
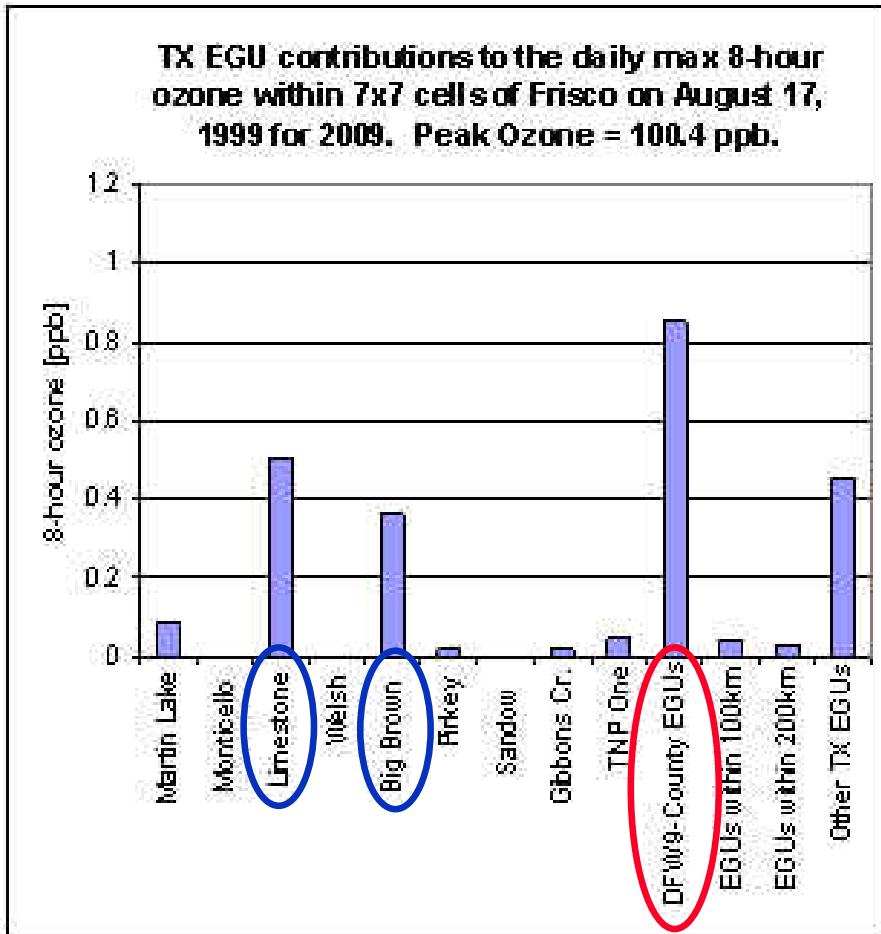




EGU Contributions to Frisco

August 17

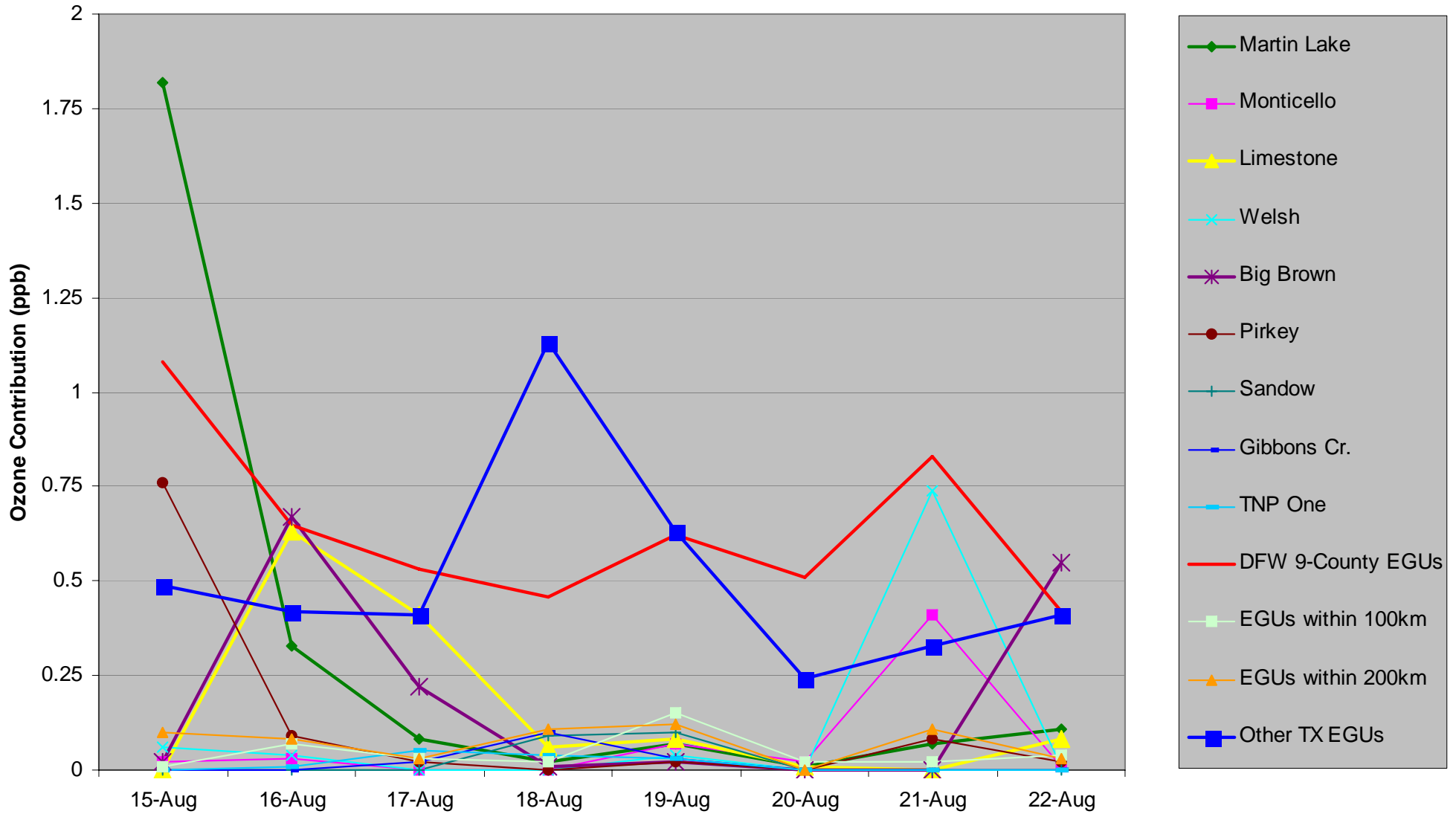
August 18





Daily EGU Contributions to DFW Daily Max Ozone

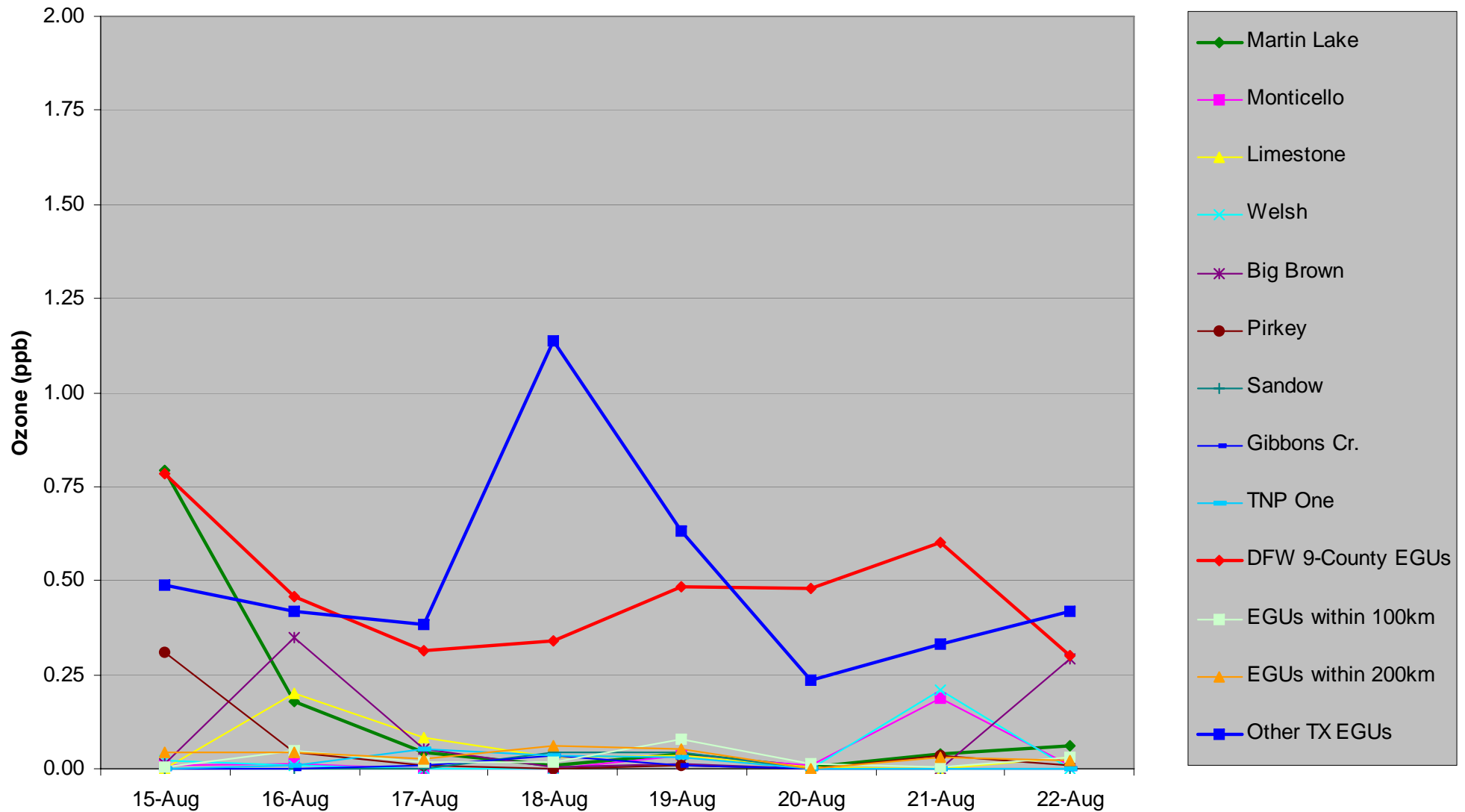
DFW Future Case - No Fuel Specific Emissions Controls





EGU Contributions to DFW NAA Daily Max Ozone

Task 19 - EGU Impacts with Fuel Specific Emissions

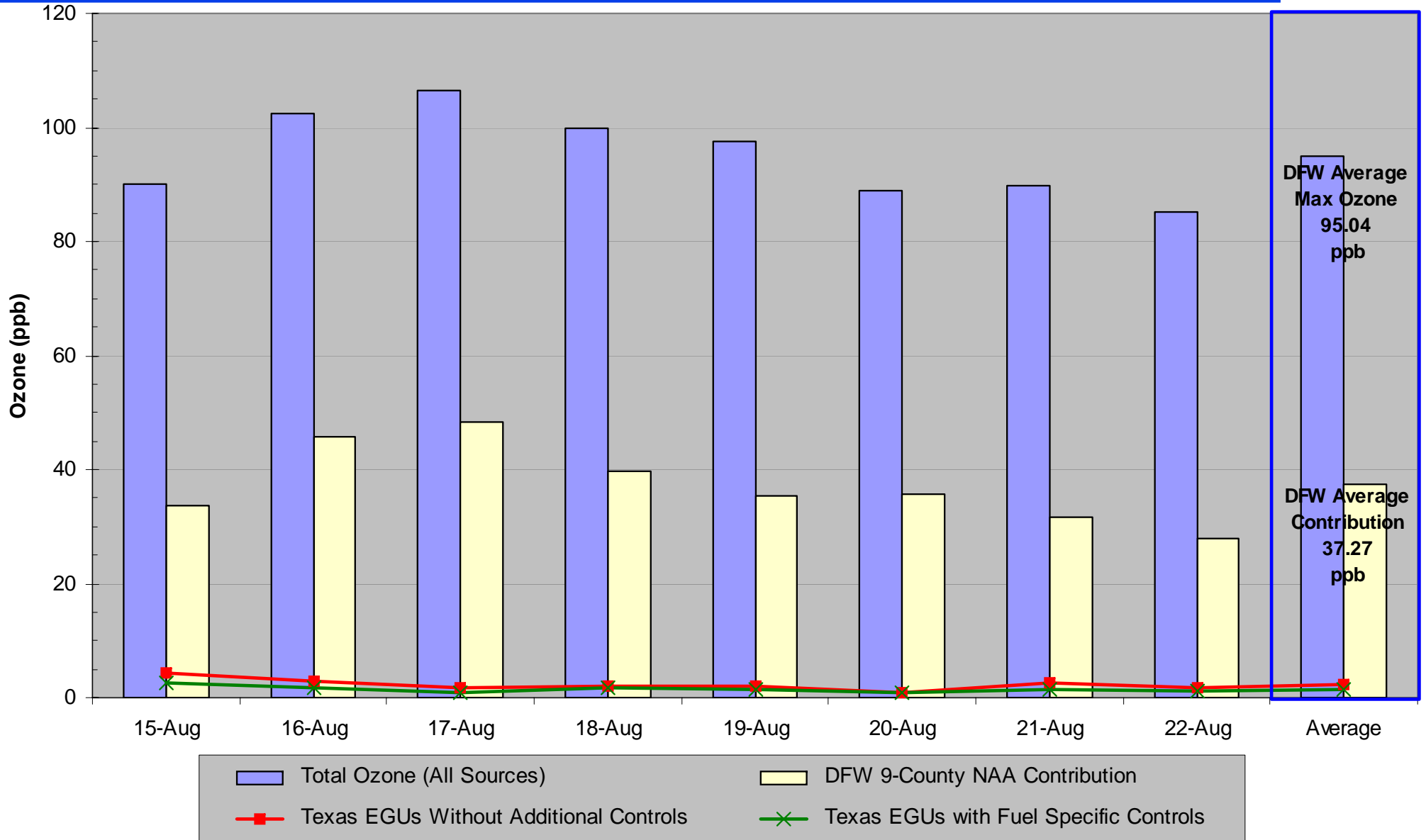




Contributions to DFW Future 8-Hour Ozone

Task 19: 2009 APCA with Fuel Specific Controls (Run44.fy2009.a1.apca.et_egu)

Task 20: 2009 APCA without Additional Controls (Run44.fy2009.a1)





EGU Contributions

- The DFW future case design value is 91.2 ppb, the area needs 6.2 ppb to reach attainment.
- The average Texas EGU contribution to DFW ozone without additional controls is 2.29 ppb
- The average contribution with the fuel specific controls on EGUs was 1.44 ppb
- Fuel specific controls applied to EGUs inside 200 km can reduce DFW ozone by 0.85 ppb.



EGU Summary

- On average, Texas EGUs contribute about 2.3 ppb (2.4%) to DFW future case ozone
- Contributions from individual EGUs are highly dependent upon daily changes in wind direction
- Fuel specific EGU controls can reduce DFW ozone by about 0.85 ppb



CENRAP Modeling

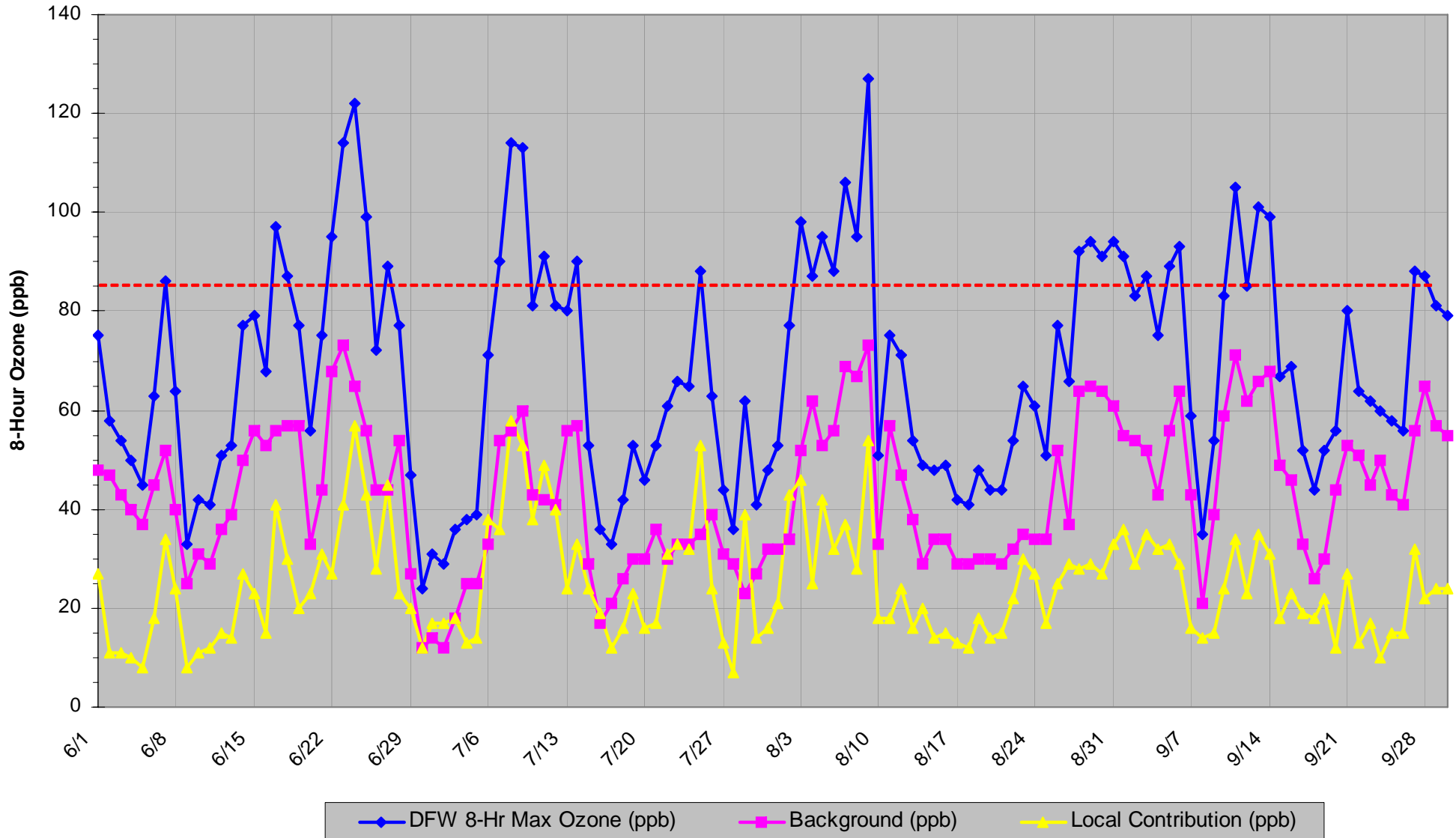
- Summer of 2002 used for evaluating transport
 - Many days with easterly/northeasterly winds during the period
 - Four months (June 1-September 30, 2002)
 - Period includes 35 out of the 37 DFW exceedance days
 - Modeled on coarse and medium grids (36 and 12 km)
- CENRAP APCA Modeling was designed geographically, to evaluate contributions coming from:
 - DFW local area,
 - Other Texas counties and
 - Other states
- Events were classified by location of ozone peak



DFW Daily 8-Hour Ozone Data

CENRAP Episode (June 1 - September 30, 2002)

Daily Max, Background and Local Contribution

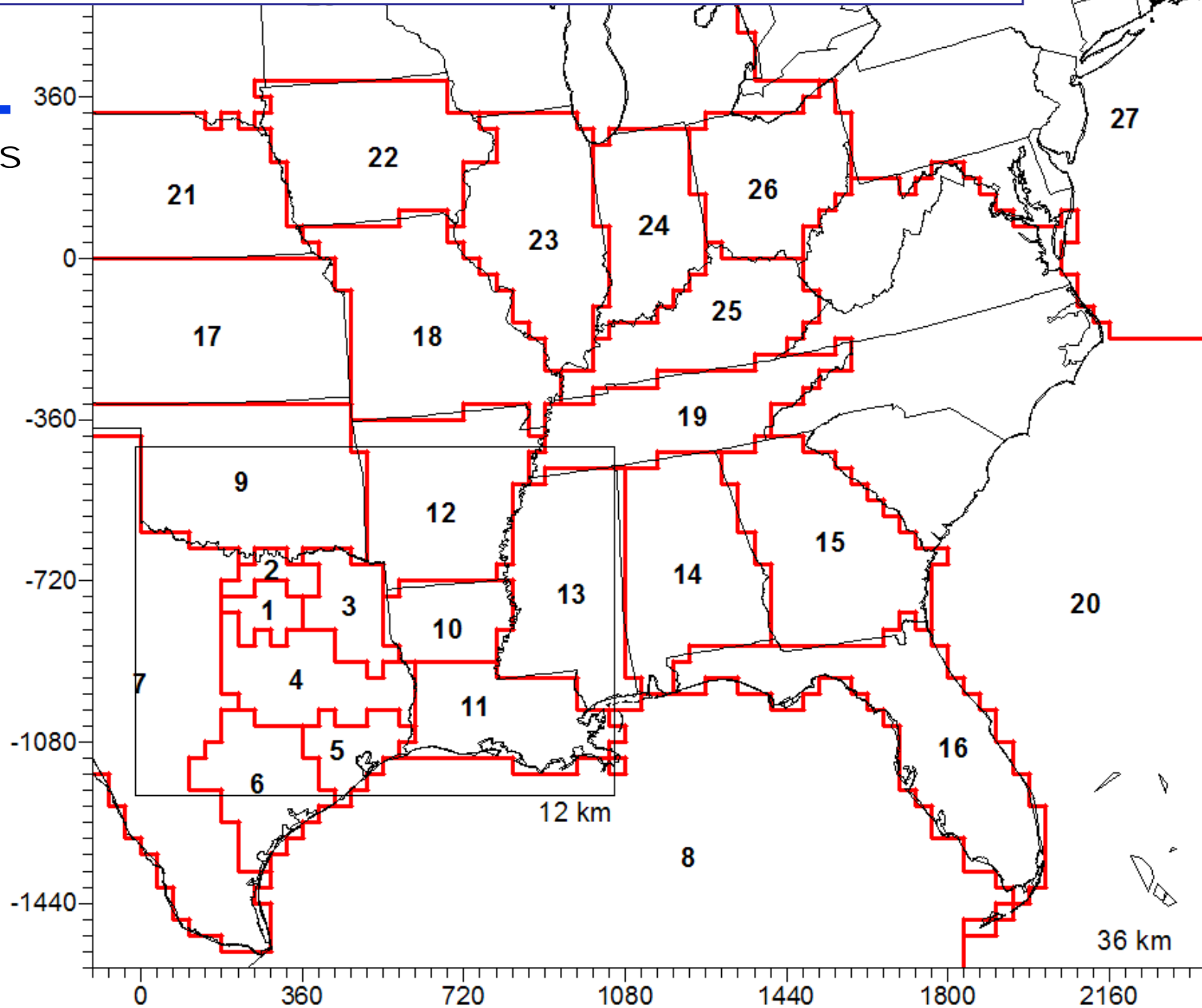




CENRAP APCA Modeling Domain

Source Regions

1. DFW NNA
2. North Texas
3. NE Texas
4. Central Texas
5. Houston
6. South Texas
7. West Texas
8. Gulf of Mexico + Mexico
9. Oklahoma
10. North Louisiana
11. South Louisiana
12. Arkansas
13. Mississippi
14. Alabama
15. Georgia
16. Florida
17. Kansas
18. Missouri
19. Tennessee
20. Mid Atlantic States
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22. Iowa
23. Illinois
24. Indiana
25. Kentucky
26. Ohio
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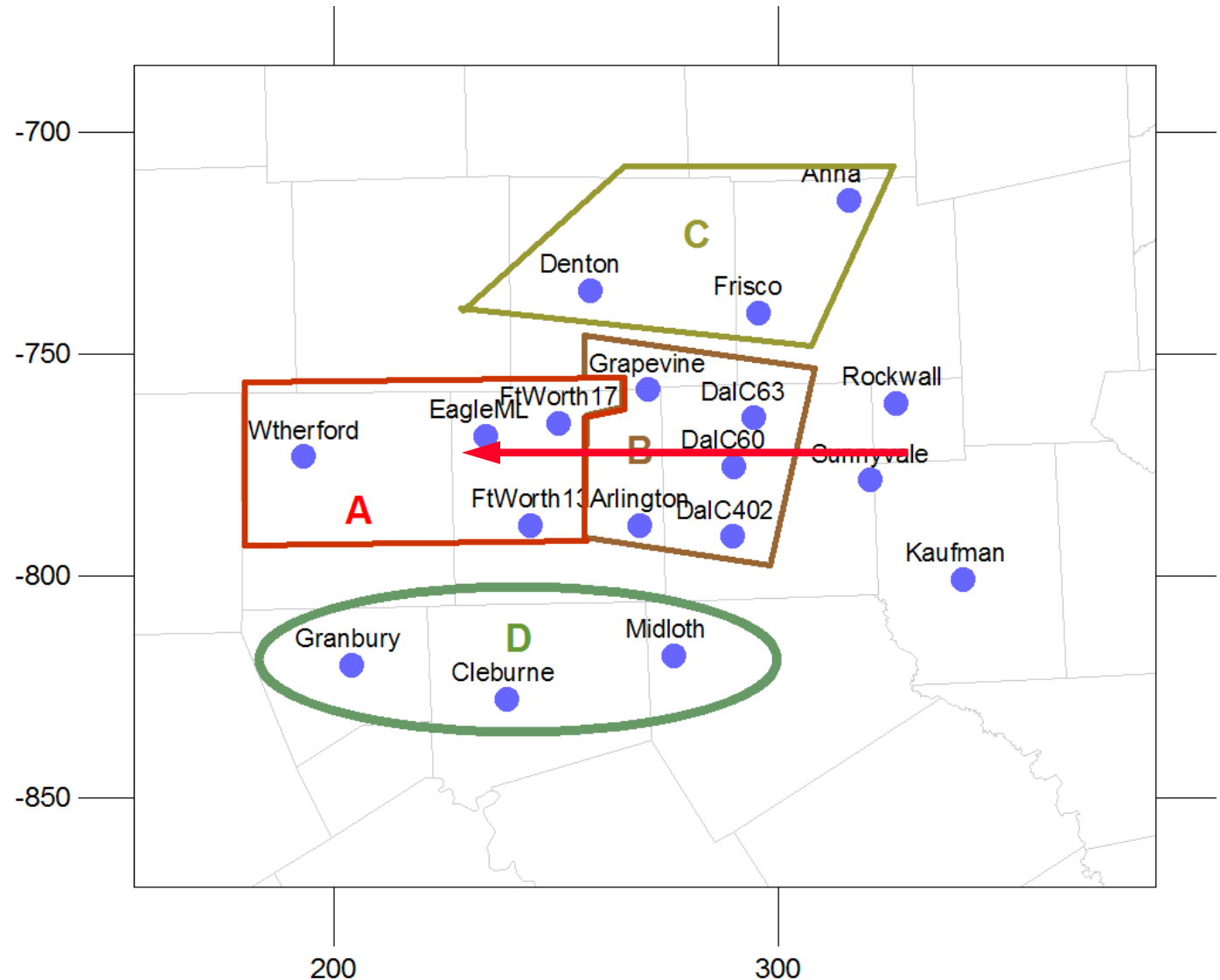




Classification Scheme

Exceedance days were classified according to where the 8-hour ozone peak was observed

- a. West of DFW (23 days)
- b. Inside DFW (3 days)
- c. North of DFW (7 days)
- d. South of DFW (2 days)





Average Contributions to DFW High 8-Hour Ozone

H60 CENRAP 2002 Transport Modeling

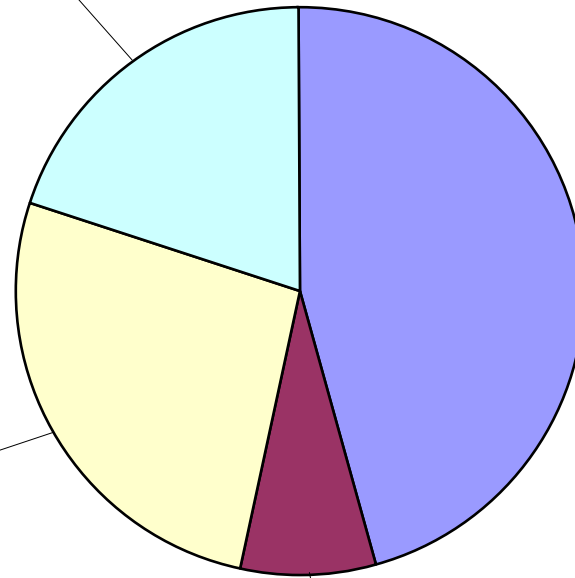
**Biogenics, Initial and
Boundary Conditions**

20.3 ppb, 20%

Other States
26.7 ppb, 26%

Other Texas
8.0 ppb, 8%

**DFW
NonAttainment
Area**
45.9 ppb, 46%

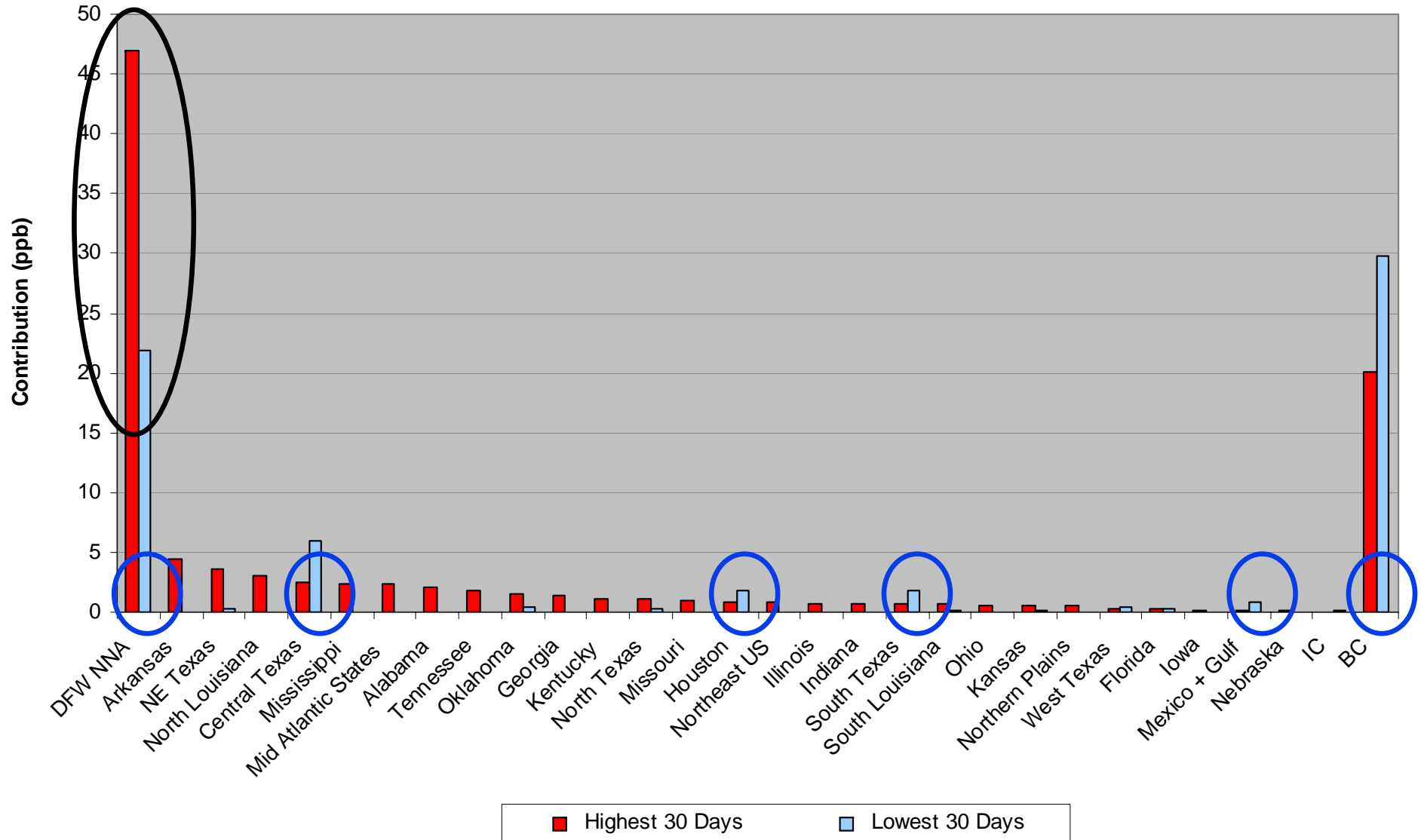


**The DFW Average 8-hour Ozone
during the 35 highest CENRAP
days was 100.9 ppb**



Average Contributions to DFW Ozone on High and Low Days

CENRAP 2002 APCA Transport Modeling



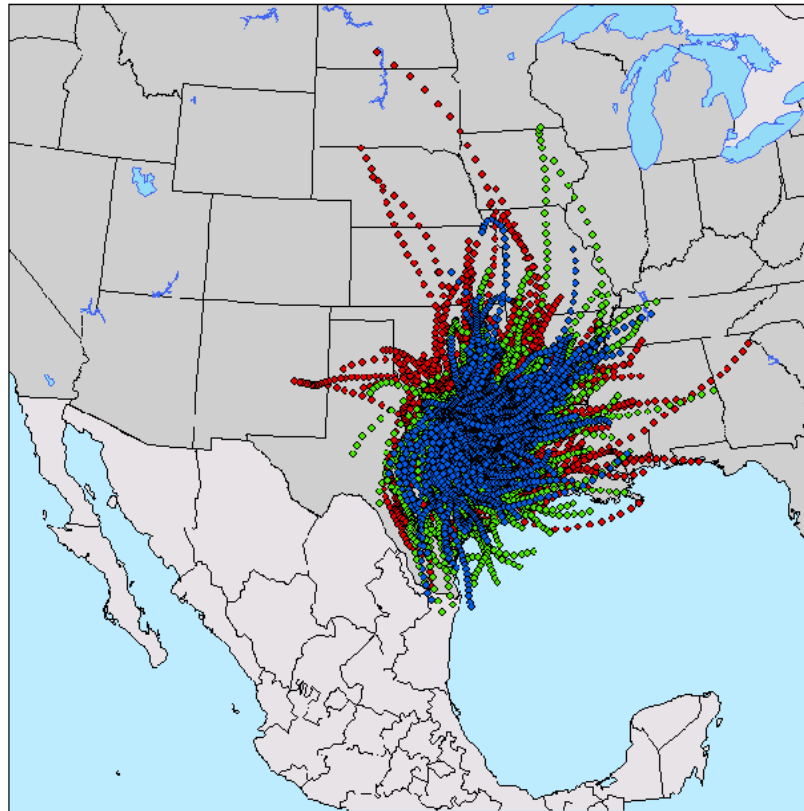


Upper Level Back Trajectories for DFW

(2000–2004)

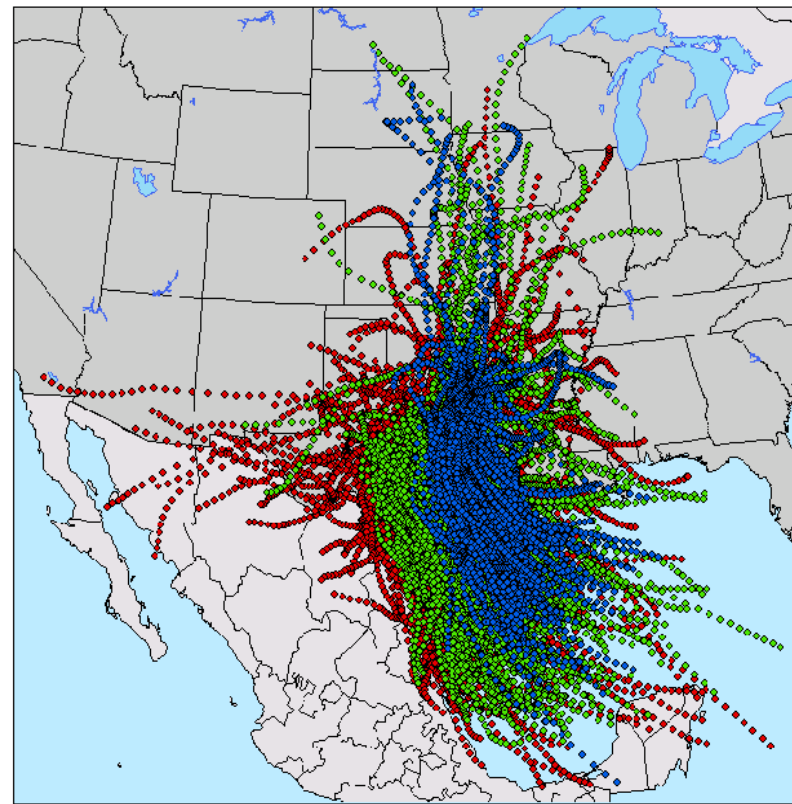
8-Hour High Ozone Days for Dallas-Fort Worth

8-hour Ozone value greater than 85 ppm
155 days during ozone season, May- Sept
For 2000-2004



8-Hour Low Ozone Days for Dallas-Fort Worth

8-hour Ozone value less than 40 ppm
335 days during ozone season, May- Sept
For 2000-2004



Height in Meters

- 100
- 500
- 1300



CENRAP Summary

- The CENRAP modeling (Summer of 2002)
 - Includes 35 exceedance days (ozone > 85)
- Averaged over the 35 high ozone days,
 - DFW contributed about 45%
 - Other Texas 8%
 - Other states 26%
 - IC/BC and Biogenics contribute about 20%
- Contributions from other states are larger during the CENRAP episode because the chemistry along the path reassigns the boundary conditions to states



Conclusions

Three APCA Runs

- The DFW 1999 episode and the CENRAP 2002 modeling give similar results.
- DFW contributes between 40% and 45% to its own ozone
 - Other Texas sources contribute between 6% to 8%
- The total ozone from boundary conditions and other states is 47% to 54%
 - Chemistry along the path reassigns BC ozone to states.



What's Next?

1. Upgrade 2009 inventory from .a1 => .a2
2. Upgrade CAMx from 4.03 => 4.40
3. Evaluate 2009 results with upgrades
4. Evaluate 2012 future case