



# Nitrogen Concentration and Deposition in Alberta

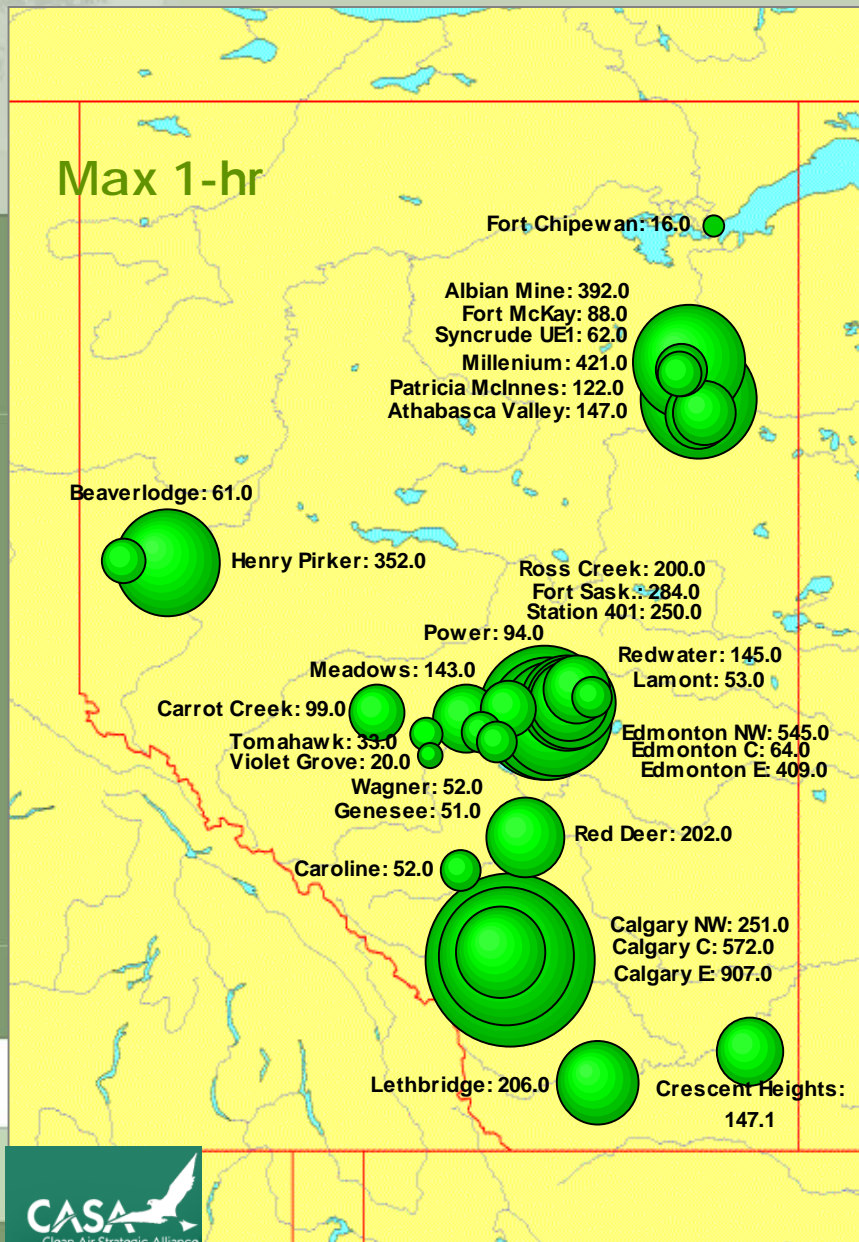
CASA N Symposium  
Dr. Karen McDonald  
September, 2006

# The Alberta Airshed Context

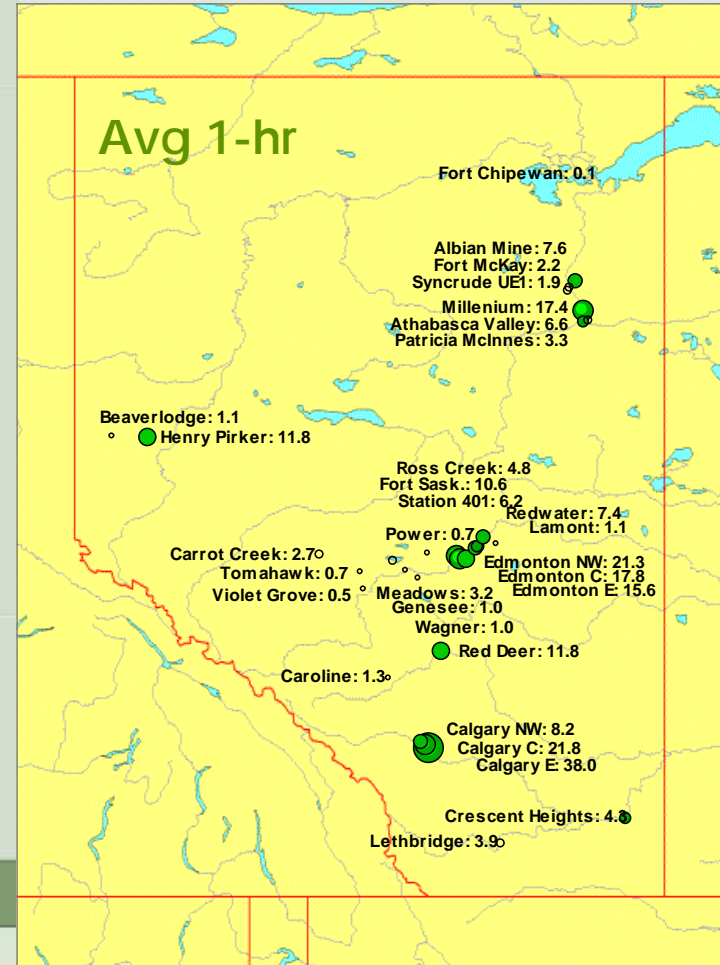
- ▶ Local stakeholder values and goals
- ▶ Issue driven networks
- ▶ Scientifically credible monitoring methods
- ▶ Consistent and timely data analysis
- ▶ Direct public access



# Measured NO Concentrations

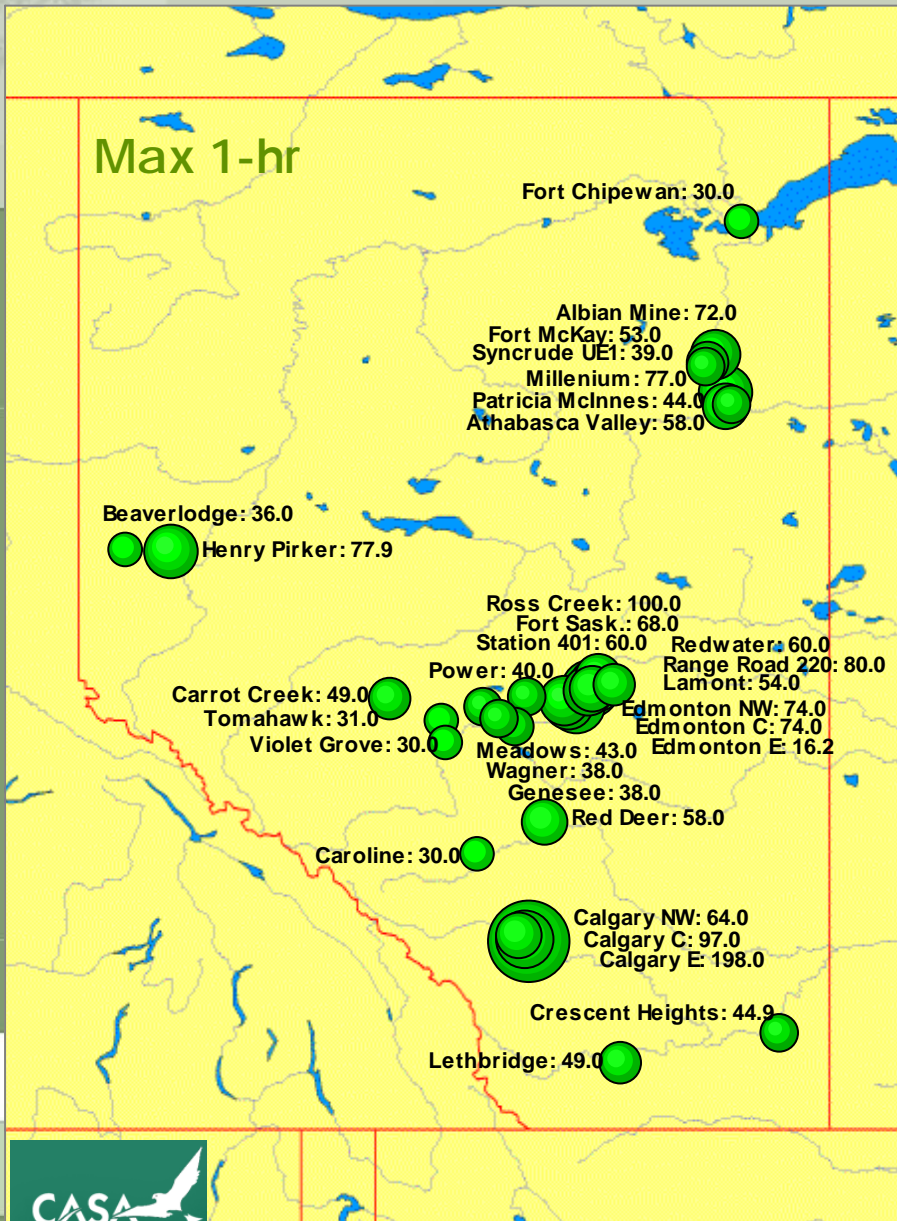


Average 1-Hour NO value for 2005 (PPB)

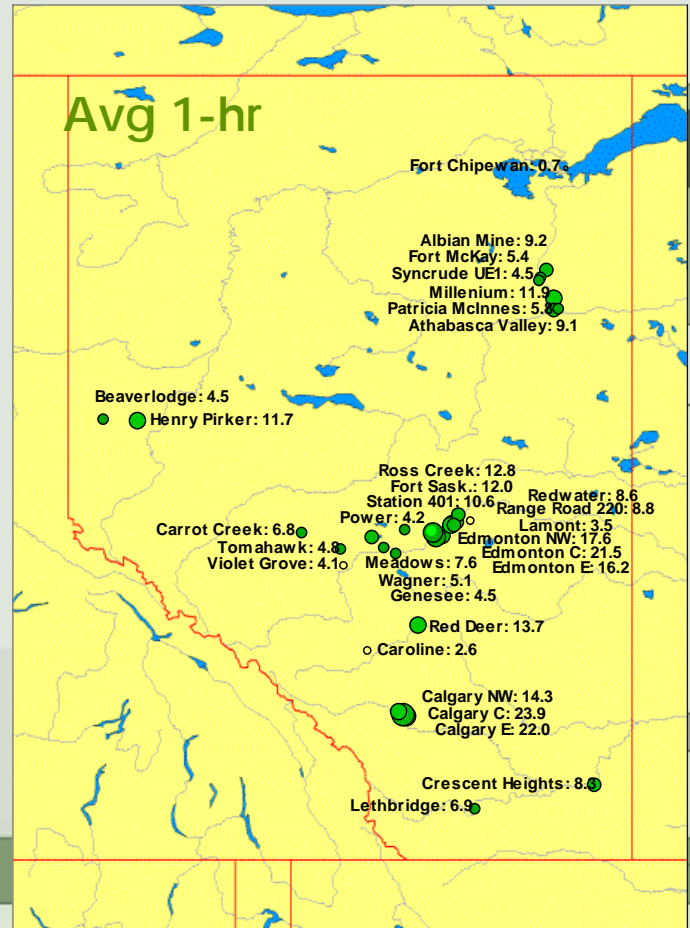


# Measured NO<sub>2</sub> Concentrations

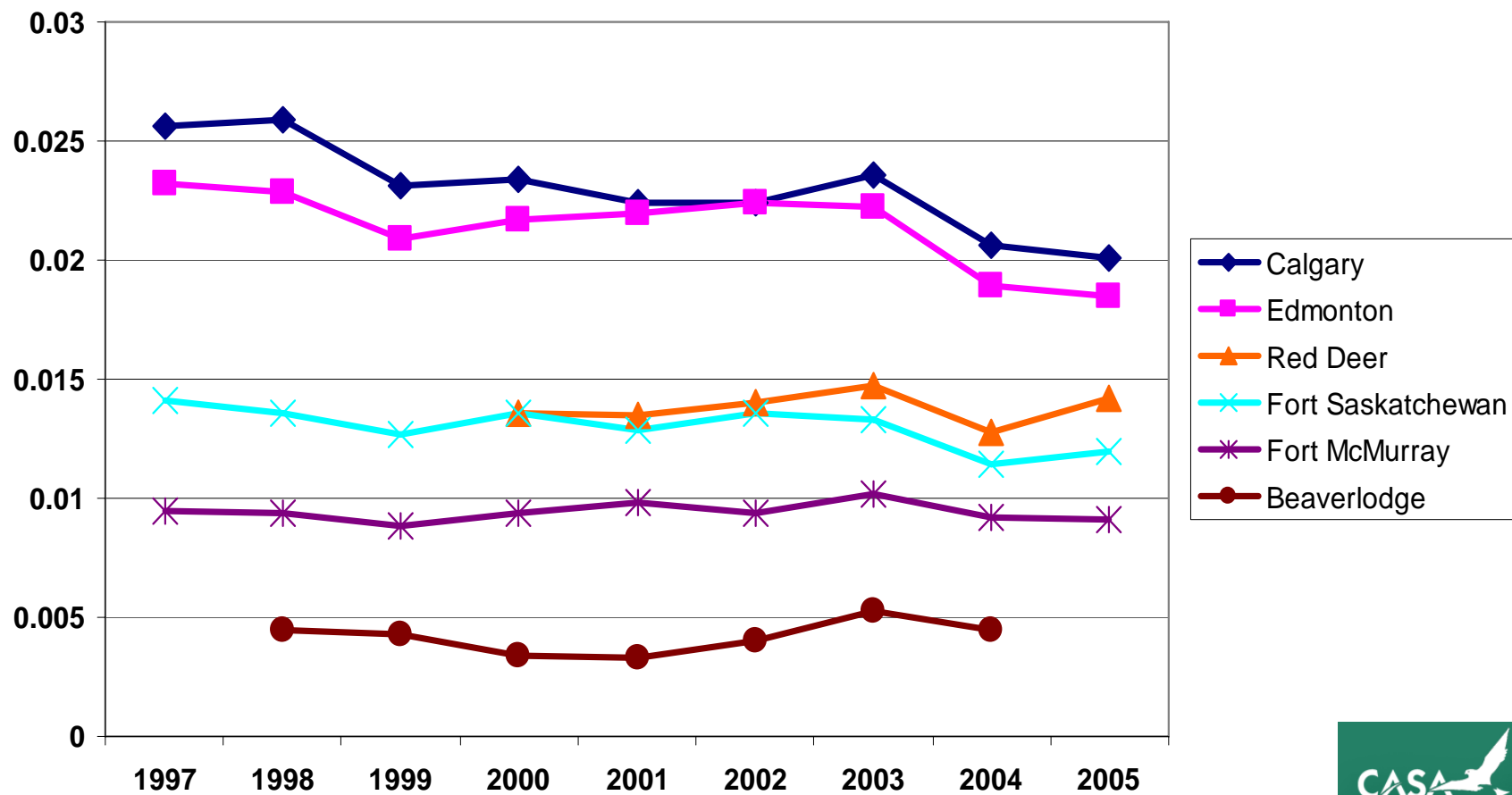
1-hr objective = 210 ppb



Average 1-Hour NO<sub>2</sub> value for 2005 (PPB)



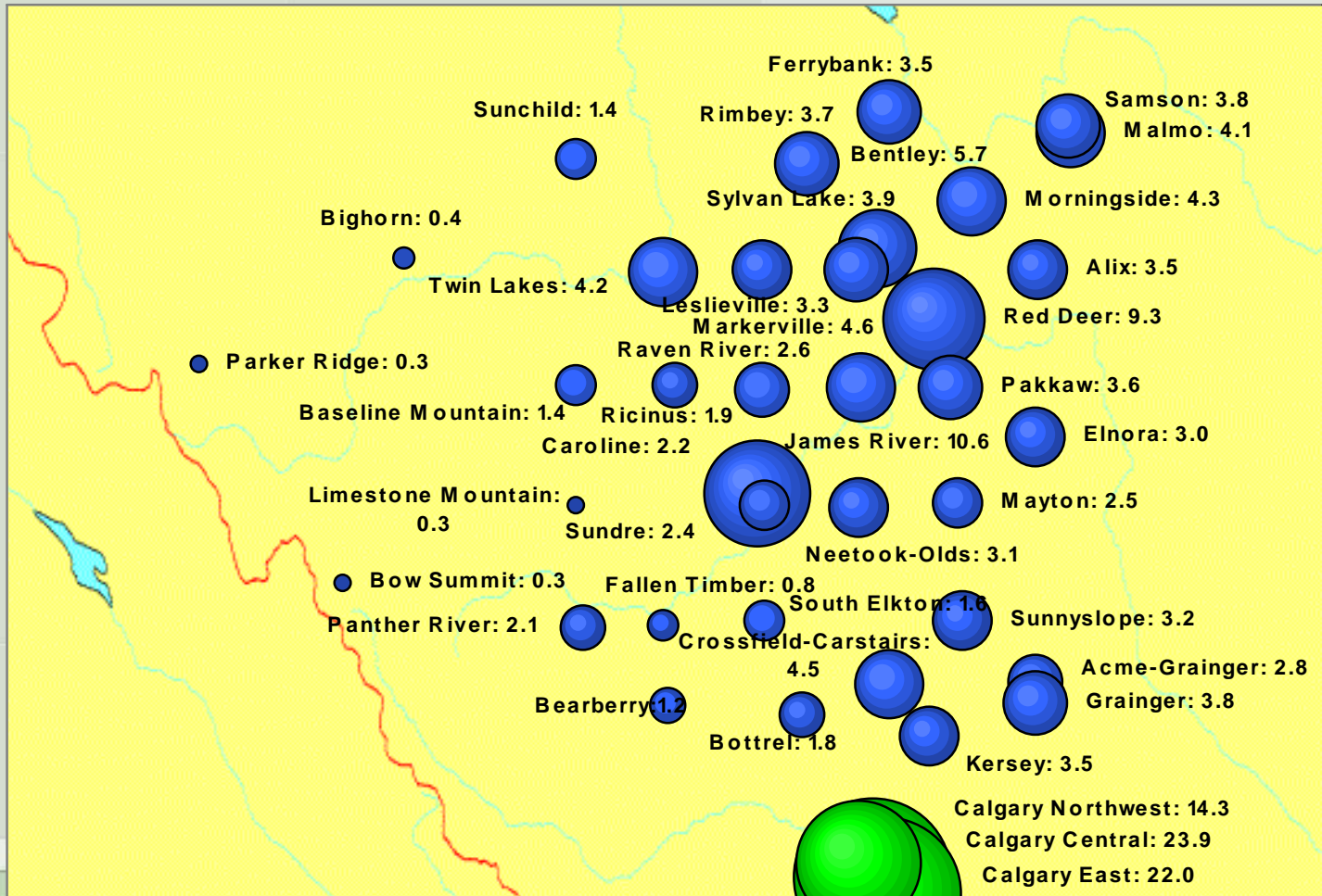
# Changing NO<sub>2</sub>(ppm)



PAMZ Passive NO<sub>2</sub> Concentrations - 2005 Annual Average

# Passive NO<sub>2</sub> Concentrations (ppb)

● Passive Data ● Continuous Data



53

L  
a  
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e

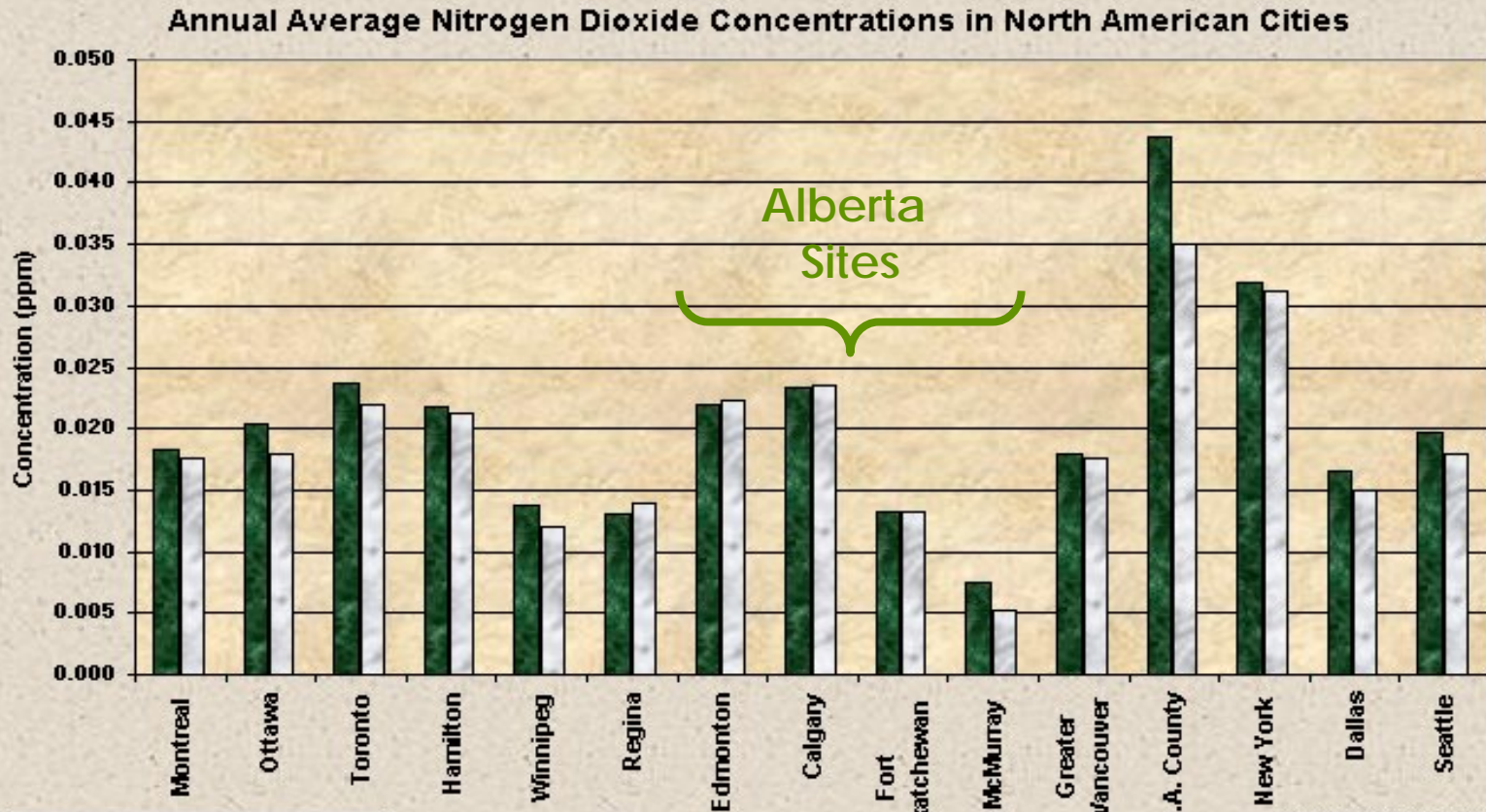
51

-118

Longitude

-112

# Comparing Concentrations



■ 5 Year Average (1998-2003)

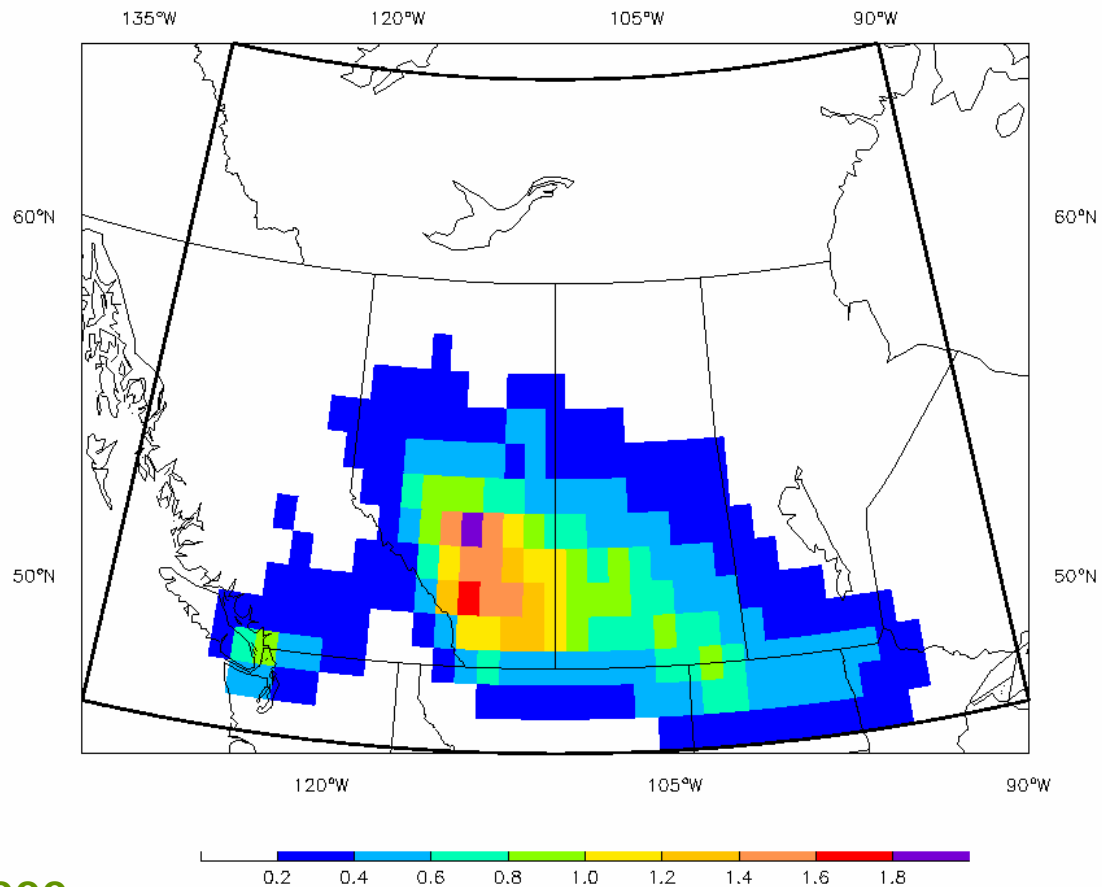
□ 2003

Canadian data based on NAPS Annual Reports (1998-2004).

U.S. data based on EPA AirData (1998-2004).

# Modeled N Concentrations

30 YEAR MEAN NITROGEN CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )

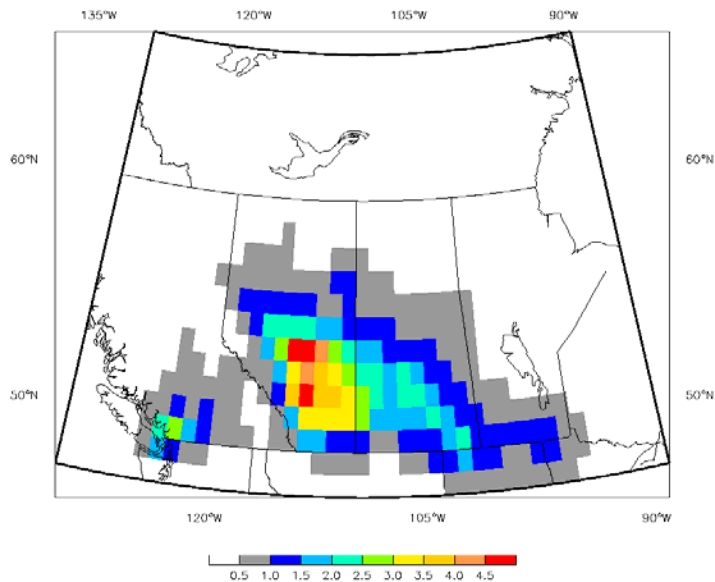


1971-2000



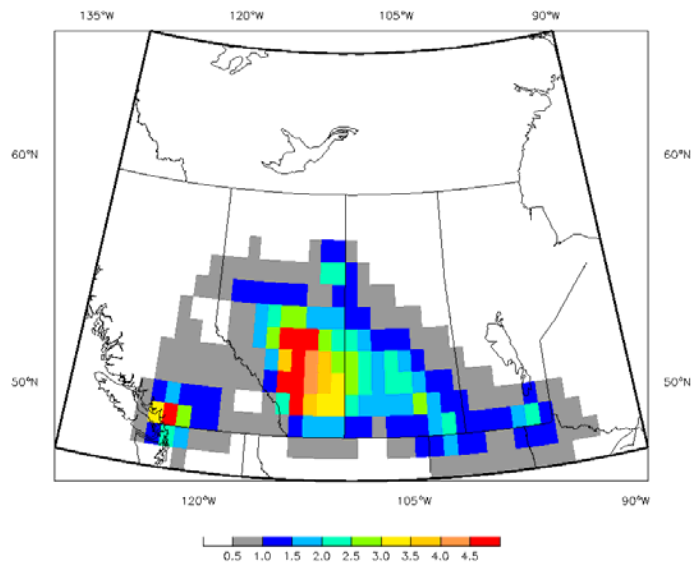
# Total N Concentration ( $\mu\text{g}/\text{m}^3$ )

1995 NO<sub>x</sub> CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )



1995

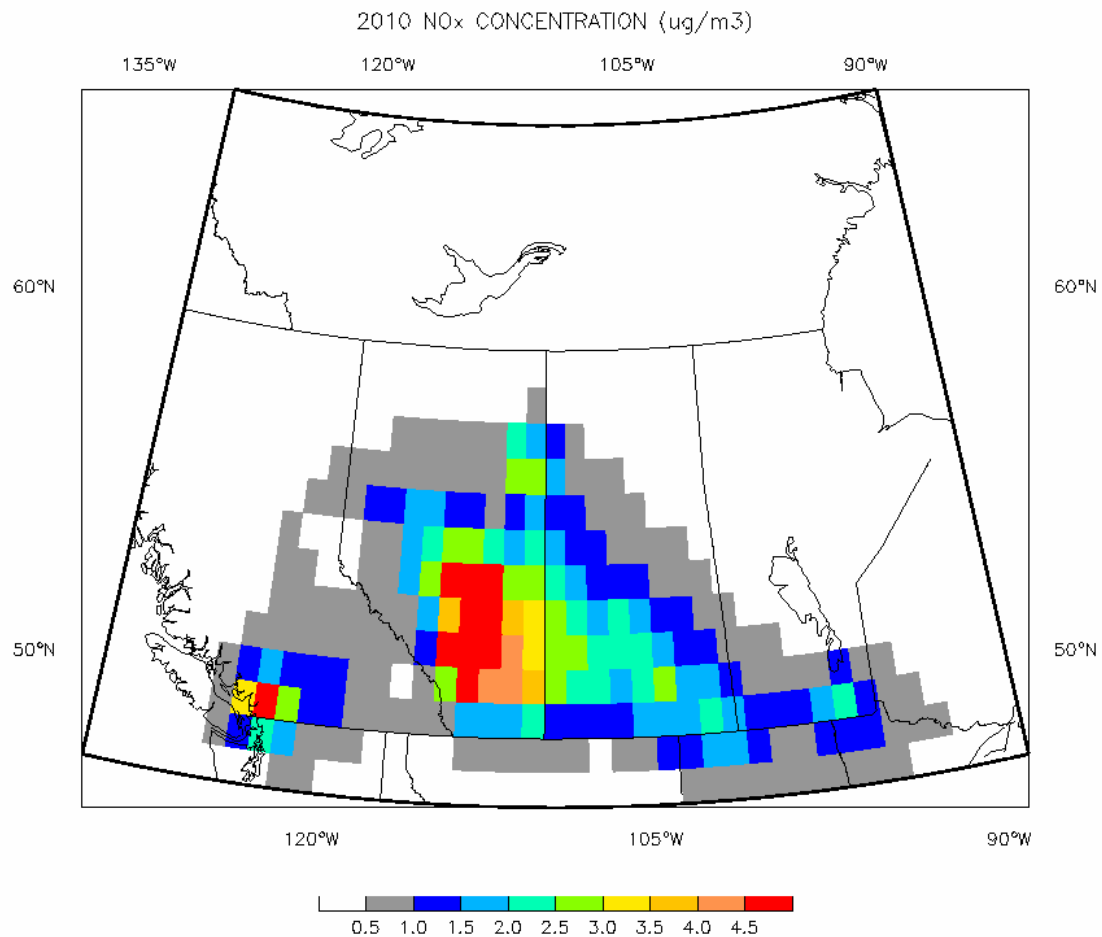
2000 NO<sub>x</sub> CONCENTRATION ( $\mu\text{g}/\text{m}^3$ )




2000

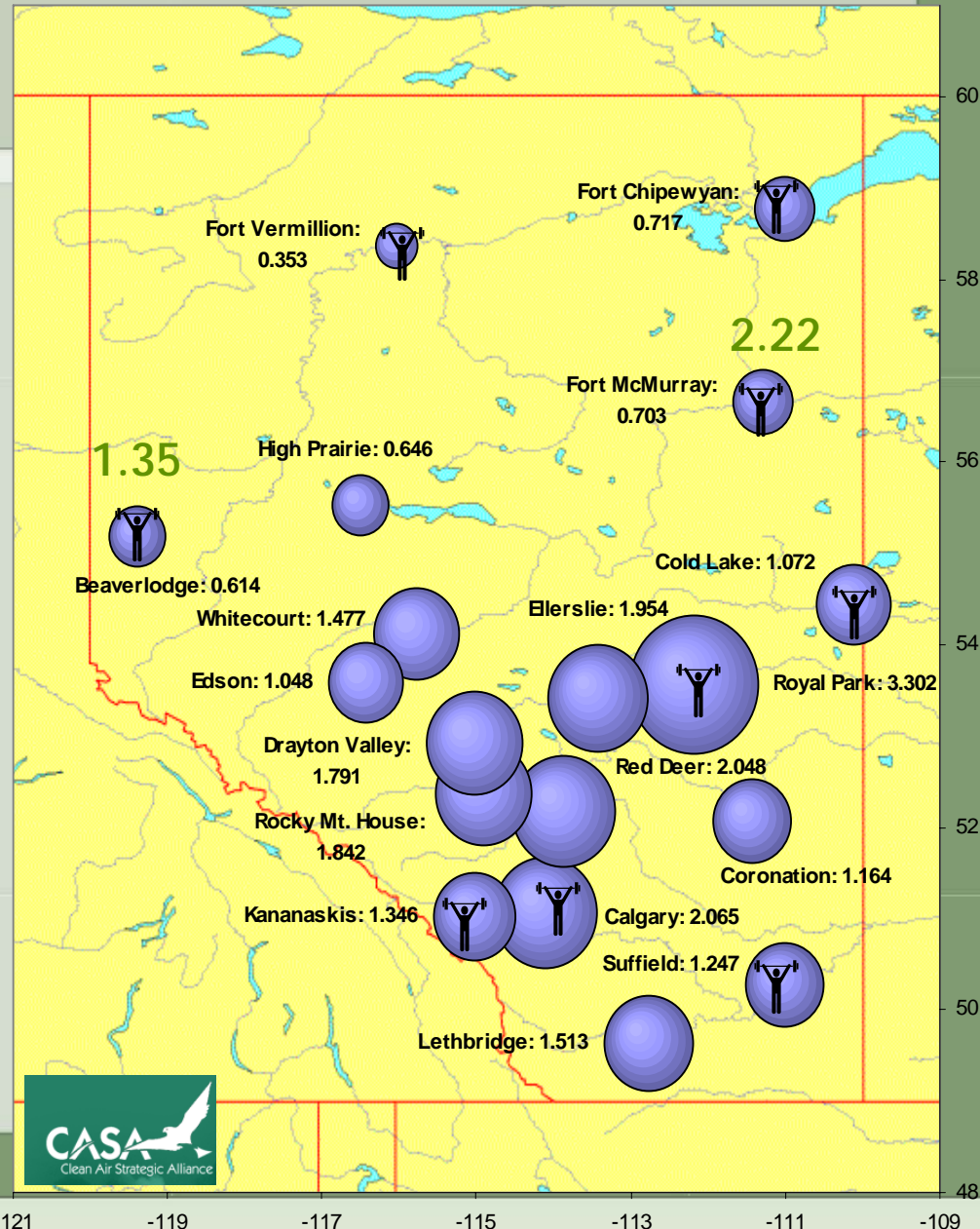


# 2010 N Concentration ( $\mu\text{g}/\text{m}^3$ )



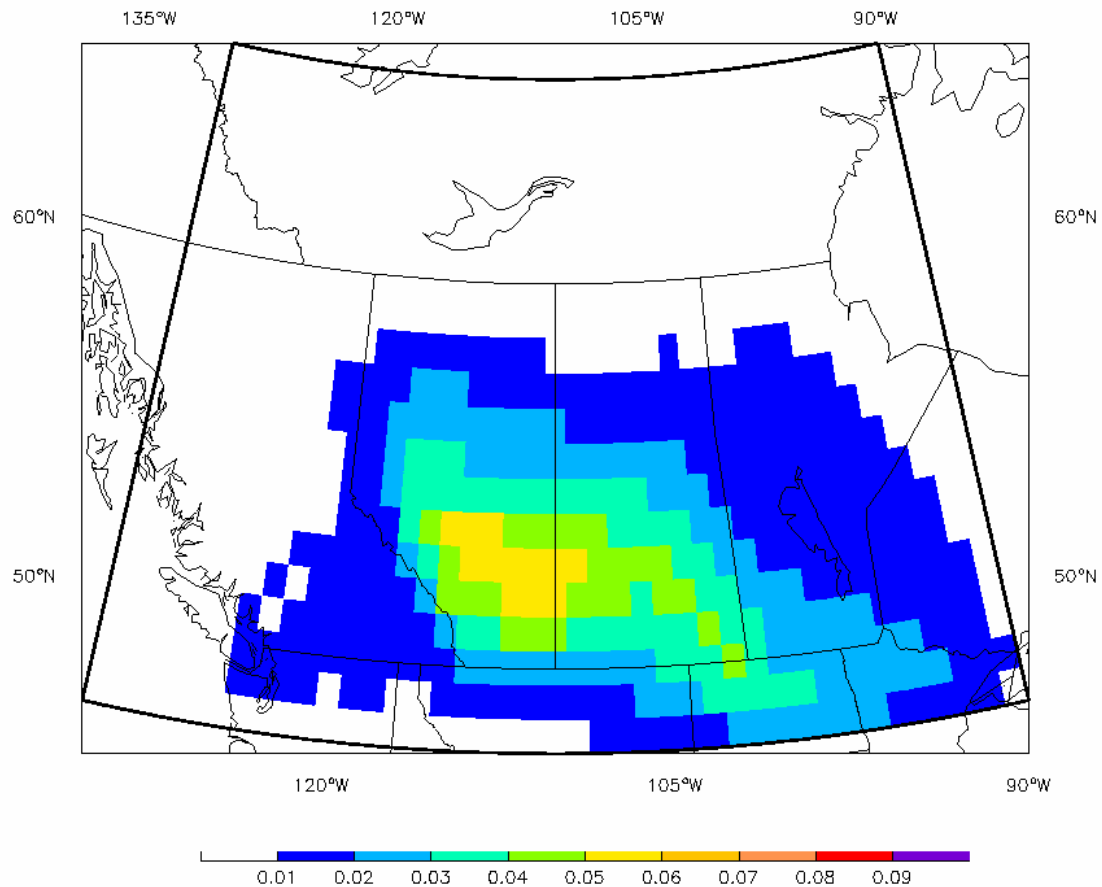
# N Deposition

- Measured **Wet** N Deposition
- Running 3-24 years
- Currently 9  operating stations
- Measured **Dry** N Deposition
- 2 case studies
- Units: kg/ha/yr



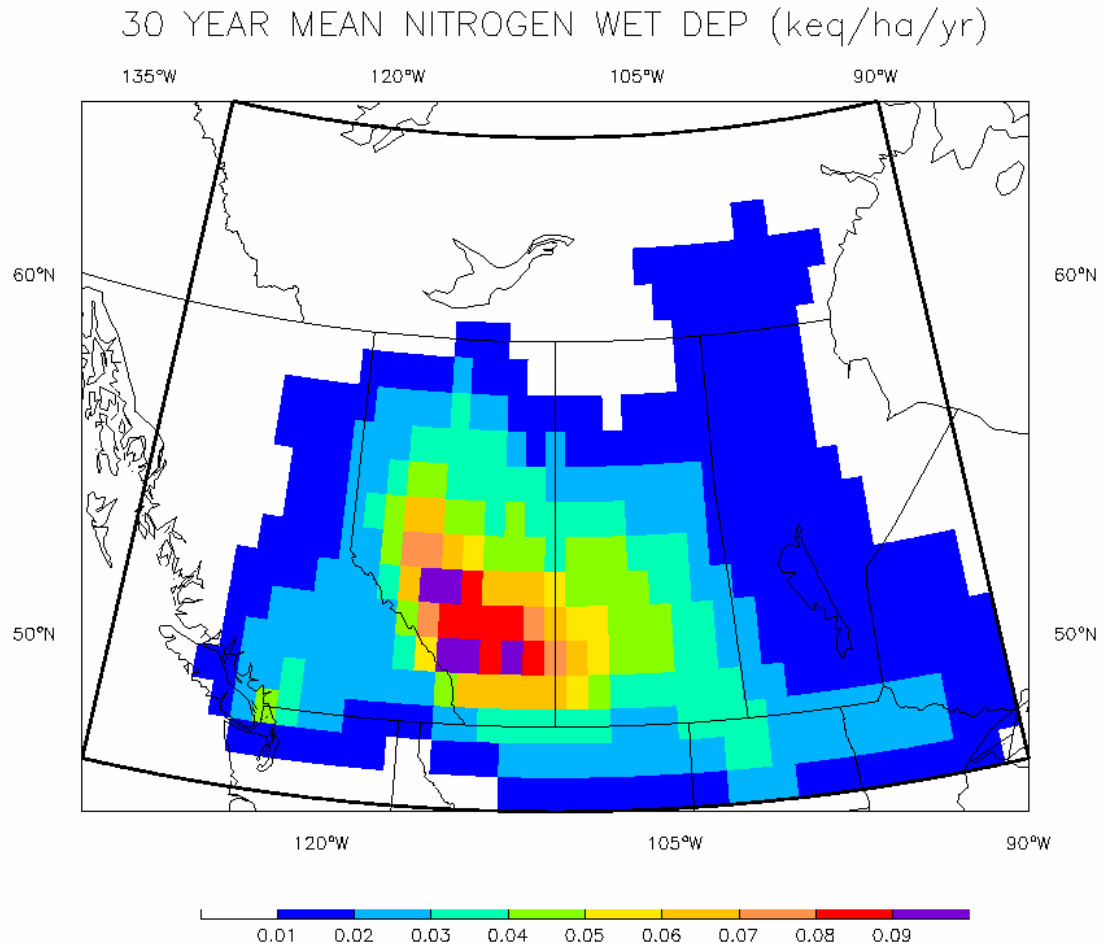
# Modeled Dry N Deposition

30 YEAR MEAN NITROGEN DRY DEP (keq/ha/yr)



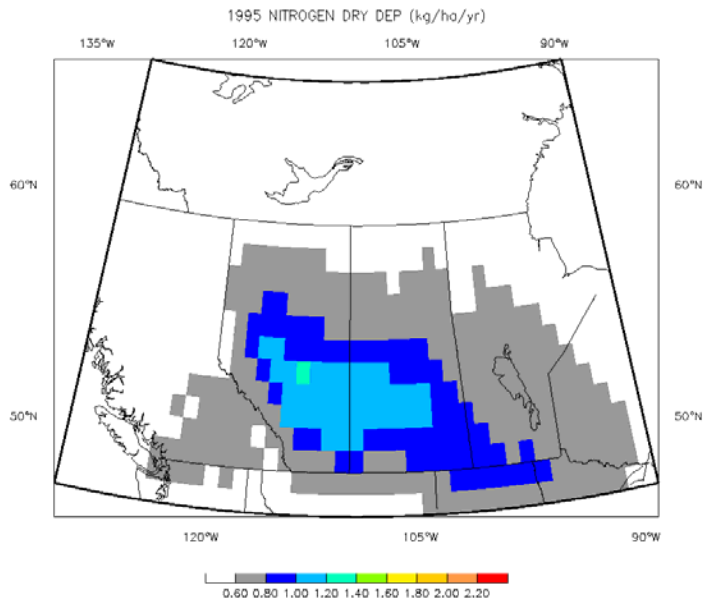
1971-2000

# Modeled Wet N Deposition



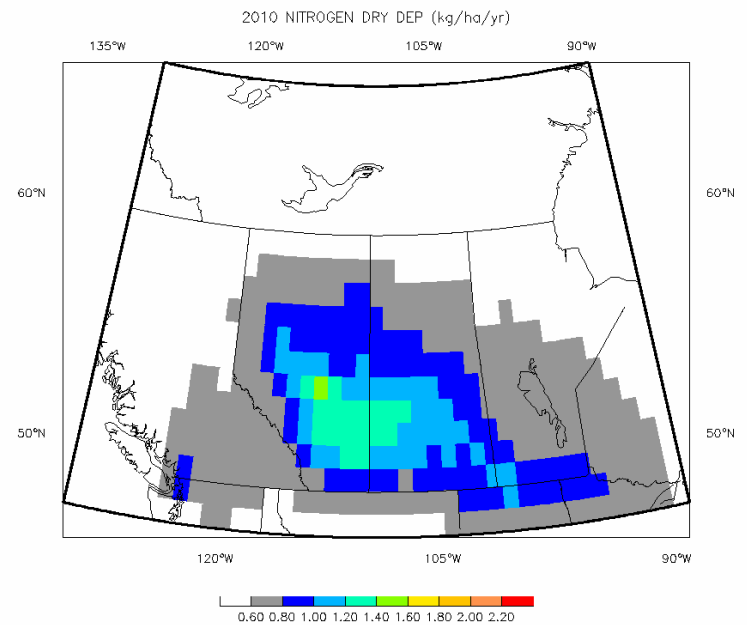
1971-2000

# Modeled Dry Deposition



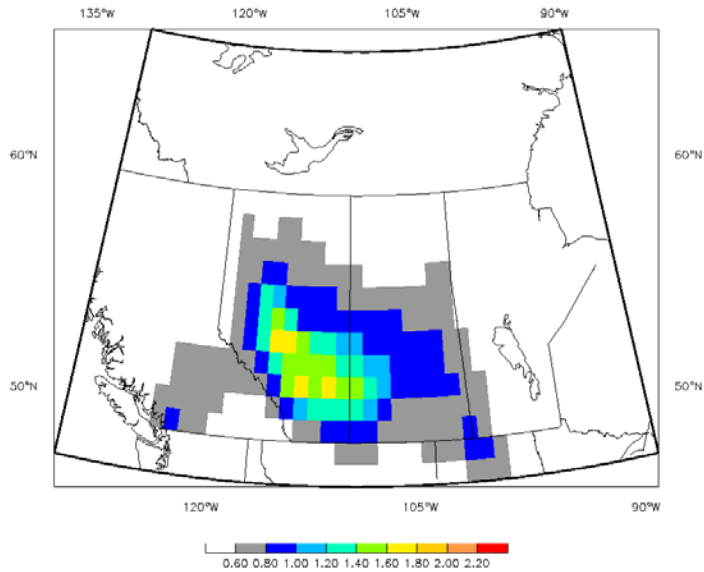
1995

2010



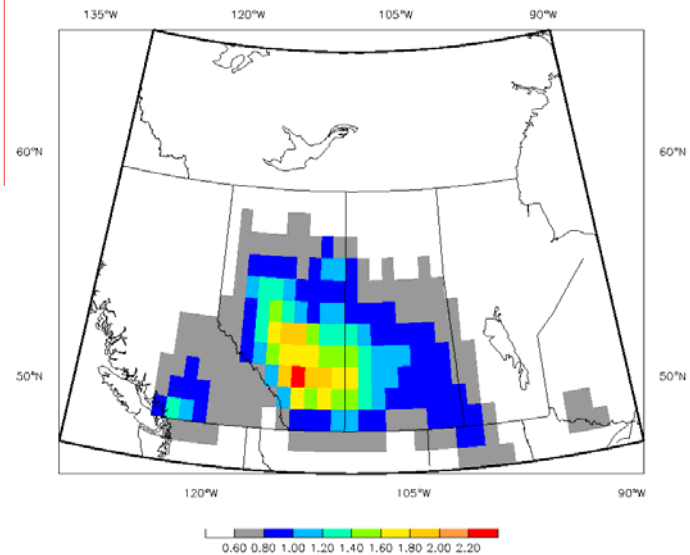
# Modeled Wet Deposition

1995 NITROGEN WET DEP (kg/ha/yr)



1995


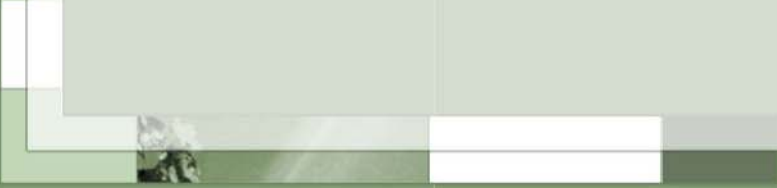
2010 NITROGEN WET DEP (kg/ha/yr)



2010

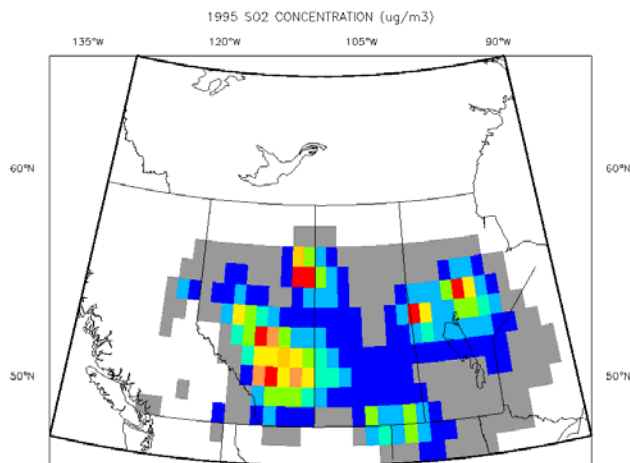


# Hotspots & Issues

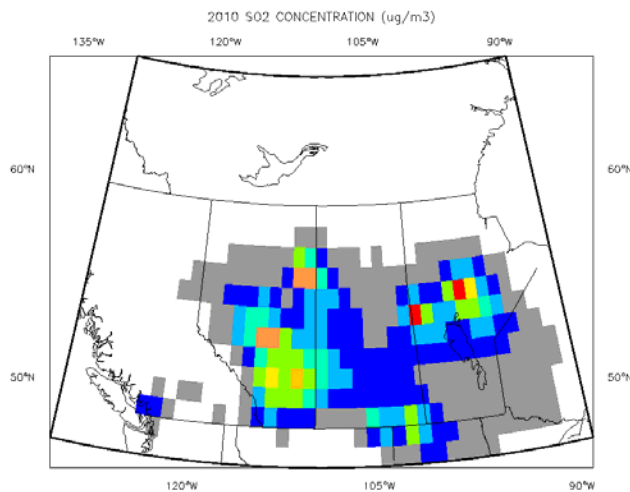
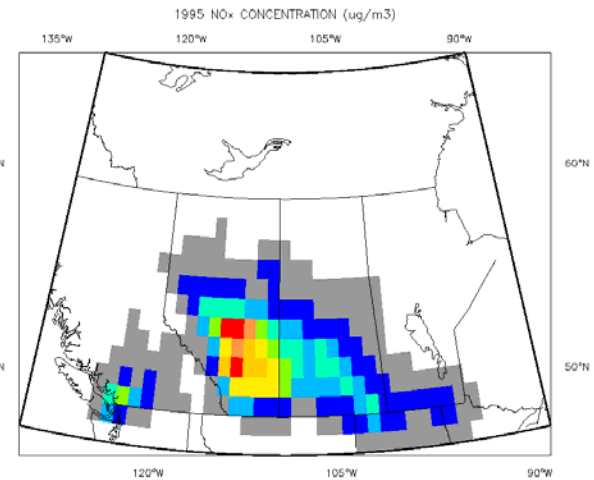
- Intensifying hotspots
    - Edmonton – Calgary corridor
    - Fort McMurray
  - Spread of deposition patterns into Saskatchewan and Manitoba
- 
- 



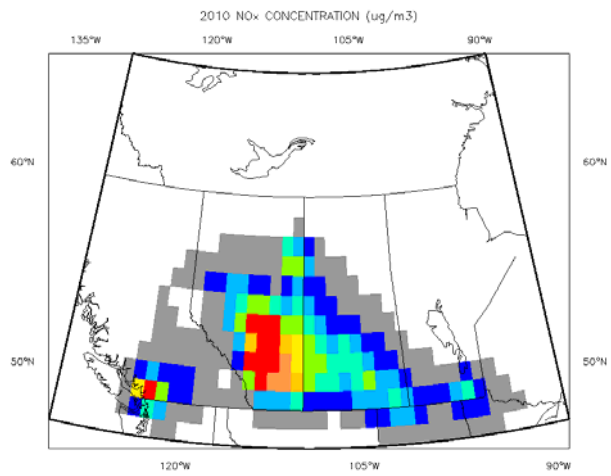
# Comparing the Change S and N



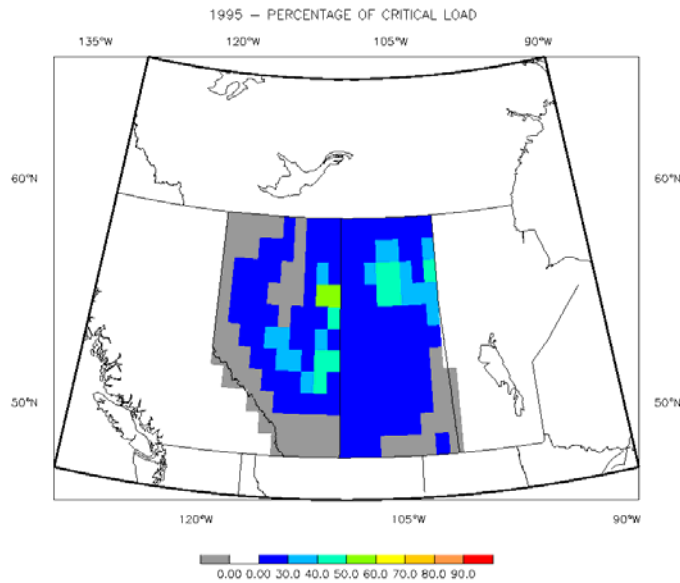
1995



2010

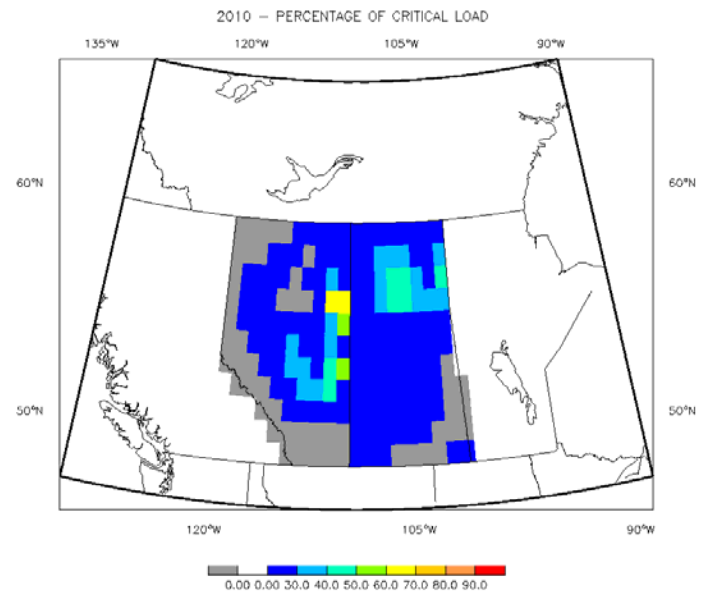


# Total Deposition (% of Critical Load)



1995

Primarily  
due to N  
changes



2010



# Summary

- ▶ Alberta cities have N concentrations comparable to other Canadian cities
  - ▶ N concentrations are increasing across the province
  - ▶ N deposition increases accordingly
  - ▶ N increases overwhelm any improvements by S decreases
- 
- 



# Nitrogen Concentrations and Deposition in Alberta

Questions?

Thank You

