

NCORE Site Characterization

Mayville – Dodge County, Wisconsin



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What is NCore?

Introduction

The U.S. Environmental Protection Agency (EPA) monitoring regulations (40 CFR, Part 58, Appendix D) require states to establish and operate a new monitoring network, called NCore, by January 1, 2011. NCore is a multi-pollutant monitoring program that will consist of about 55 urban and 20 rural stations. The sites will be equipped with several advanced measurement systems to monitor particulate matter (PM_{2.5} and PM_{10-2.5}), ozone, carbon monoxide (CO), sulfur dioxide (SO₂), total reactive nitrogen (NO_y), and meteorological parameters (temperature, wind speed, wind direction, and relative humidity). EPA is preparing a list of candidate site locations in cooperation with state, local, and tribal partners. The state submittal of annual monitoring network plans describing candidate NCore stations is due to EPA Regional Administrators by July 1, 2009. Final NCore station approvals will be made at the EPA Administrator level; the actual decision-making will be delegated to the Air Quality Assessment Division within the Office of Air Quality Planning and Standards (OAQPS).

To support the approval process within OAQPS, a consistent characterization of the proposed NCore stations is needed. This document includes maps and summary information about the area surrounding a potential NCore site location.

NCore Monitoring Objectives

The NCore Network addresses the following objectives:

- timely reporting of data to the public by supporting the AIRNow program, air quality forecasting, and other public reporting mechanisms;
- support for development of emission strategies through air quality model evaluation and other observational methods;
- accountability of emission strategy progress by tracking long-term trends of criteria and non-criteria pollutants and their precursors;
- support for long-term health assessments that contribute to ongoing reviews of the NAAQS;
- compliance by establishing nonattainment/attainment areas through comparison with the NAAQS; and
- support of scientific studies spanning multiple disciplines such as technology, health, and atmospheric processes.

About the Data

The data within the maps were collected at the US national level. Regional and local data may provide more accurate and/or current information.

Site Description

Dodge County, Wisconsin



Country view



State view

Site Description

Name: **Mayville**
AIRS ID: 550270007
State: Wisconsin
County: Dodge
City: Not in a city
EPA Region: 5
Latitude: 43.435; Longitude: -88.527778
Street Address: MAYVILLE, NEAR N6705 MADISON RD
Primary Operator: NA
Location Setting: RURAL
Land Use Type: AGRICULTURAL



City view



Image from EPA NCore web site

Aerial Site Views



Image from Google Earth

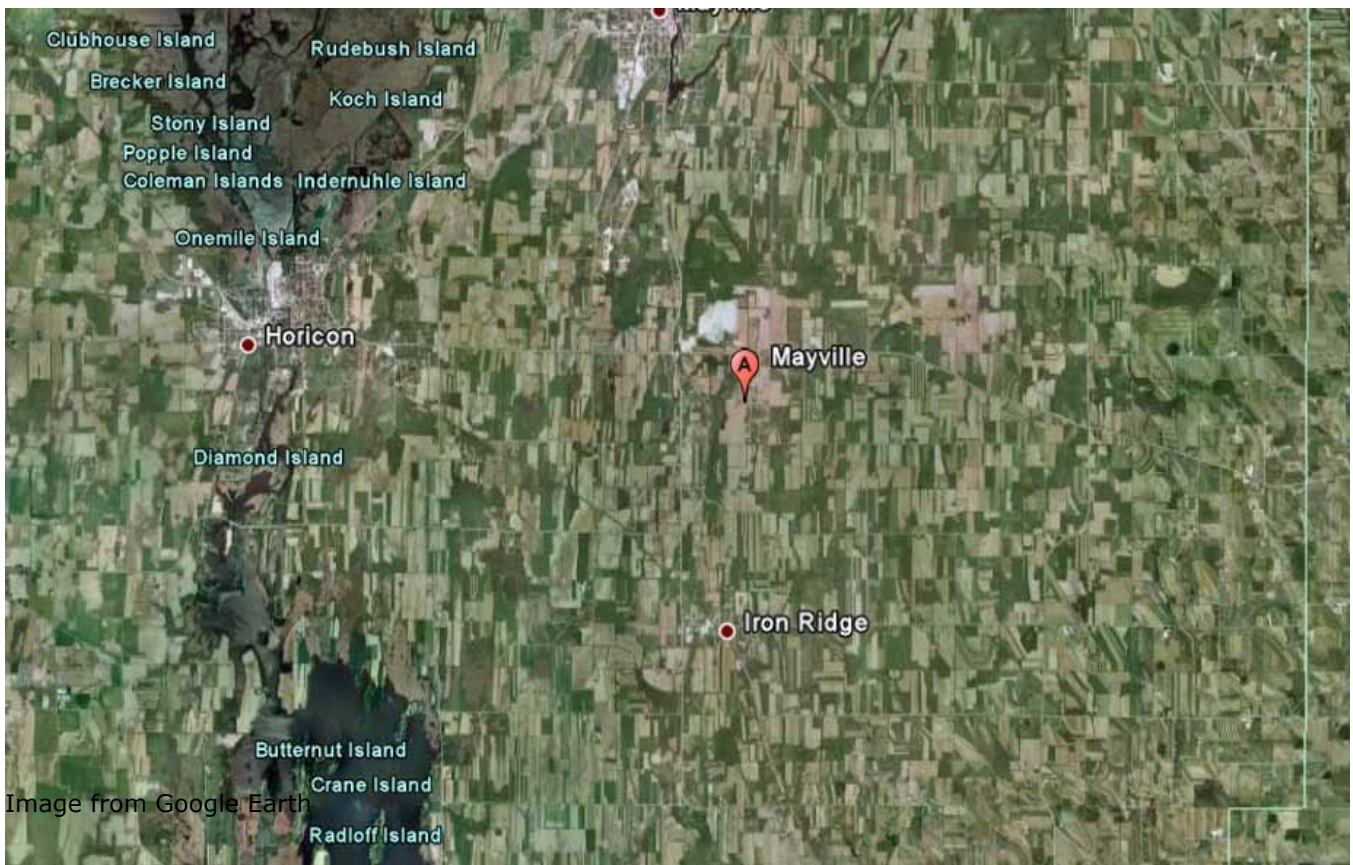
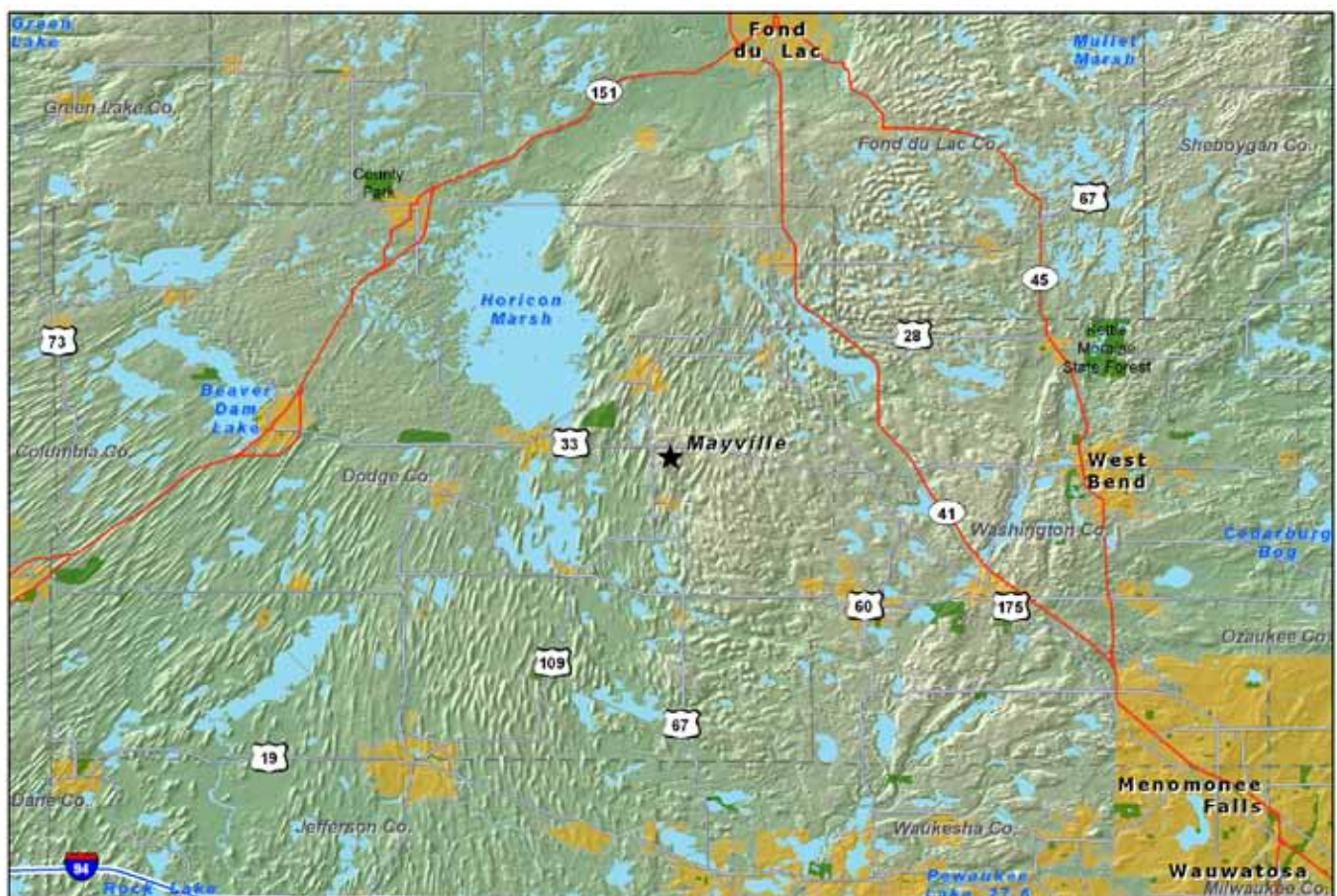


Image from Google Earth

Topography

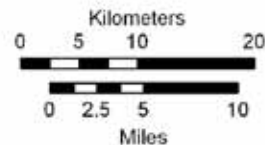
Topography data were collected from the U.S. Geological Survey (USGS). The topography data are 30-m grid resolution Digital Elevation Model (DEM) data. A hill-shade was calculated in a geographic information system (GIS) to give the map a three-dimensional appearance. The hill-shade function in the GIS uses a hypothetical light source to calculate the illumination values for the elevation data. Also included on the site/topography map are major roads, urban areas, major water boundaries, and park boundaries.



LEGEND

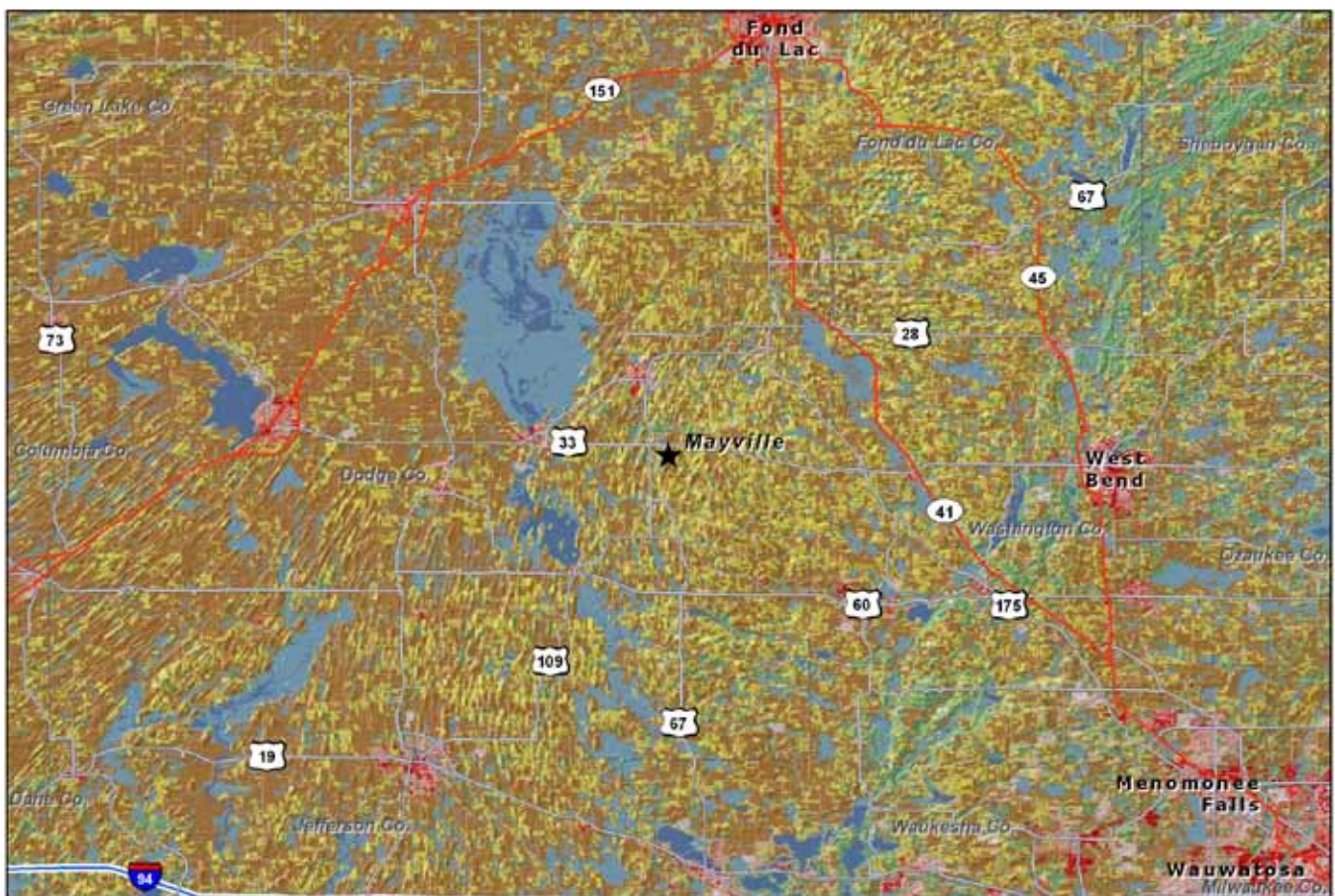
- ★ NCore Site Location
- Interstate
- State Highway
- Other Highway
- Park Areas
- County Boundary
- Lakes and Rivers
- Urban Areas

Elevation (meters)



Landcover

Land cover data were collected from the USGS 2001 National Land Cover Database (NLCD 2001), the most current national-level land cover data available. The NLCD 2001 data are grid-based land cover assignments at 30-m resolution and include 16 classes of land cover. For the purpose of this report, the 16 land cover classes were grouped into 12 categories (depicted in the map legend below). The land cover maps show areas of developed land, different types of agricultural lands, forests, wetlands, and grasslands.

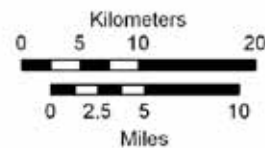


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- ★ NCore Site Location
- Interstate
- State Highway
- Other Highway
- Urban Areas

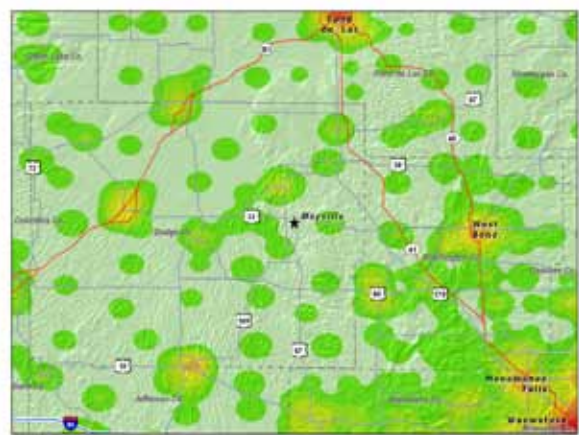
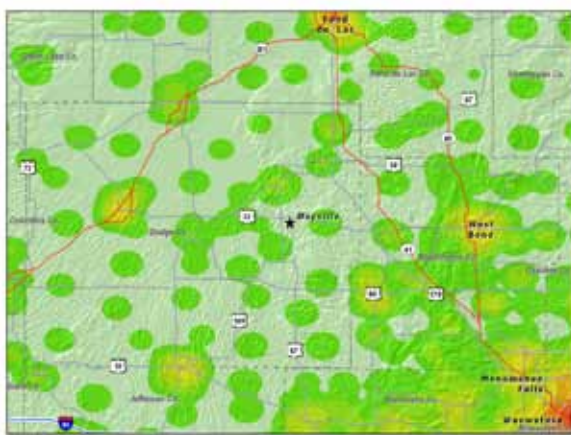
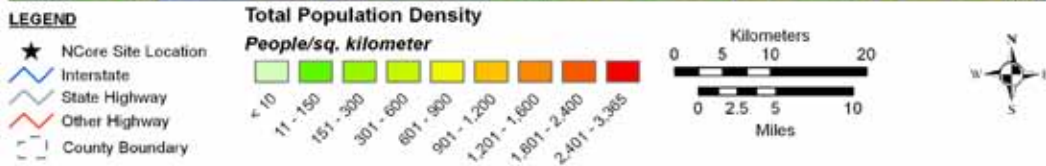
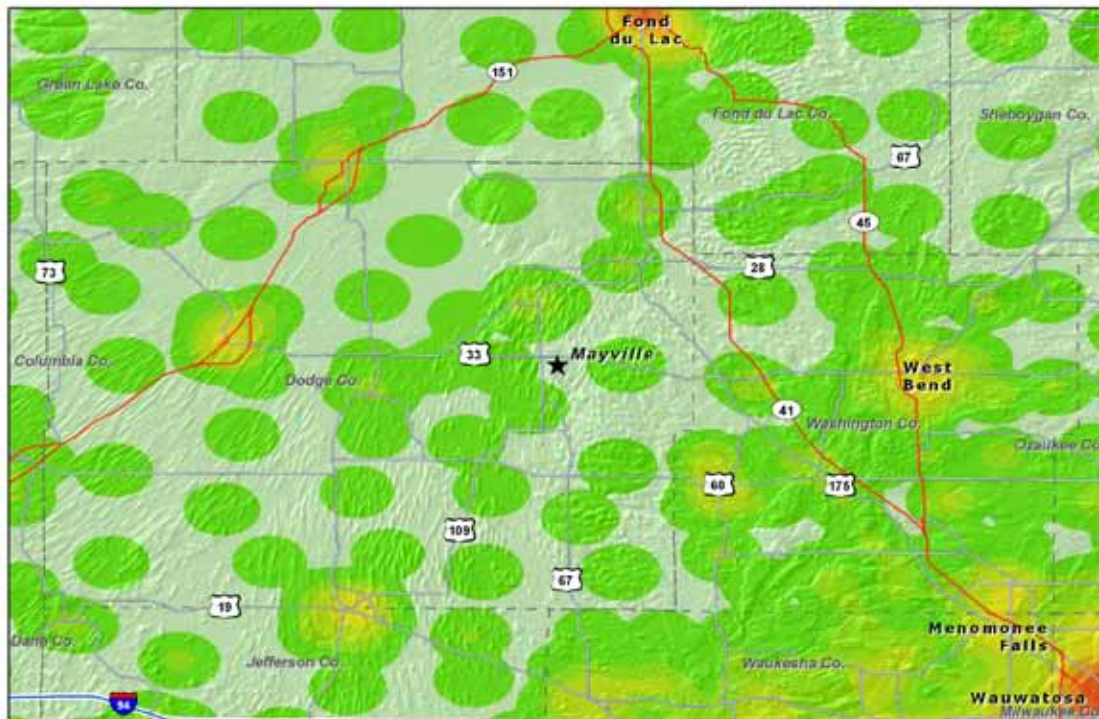
Landcover

- | | |
|------------------|-----------------------------|
| Wetlands | Hay/Pasture |
| Barren Land | Developed, High Intensity |
| Cultivated Crops | Developed, Low Intensity |
| Forest | Developed, Medium Intensity |
| Open Water | Developed, Open Space |
| Shrubs | Perennial Snow/Ice |



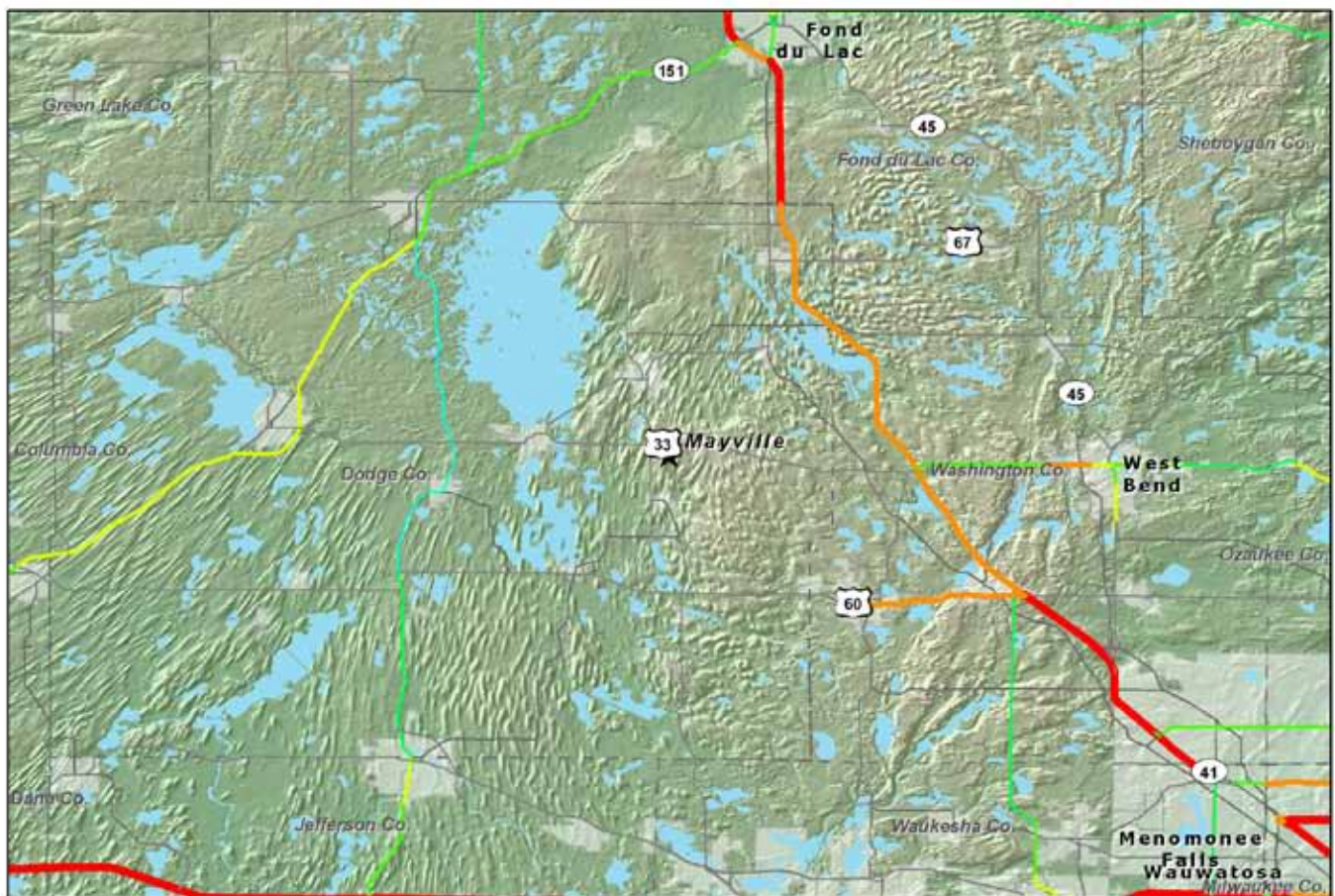
Population Density

Population data were collected at the block-group level from the 2007 Census population projection estimates. Population density was mapped for the following population/socioeconomic parameters: total population and sensitive population (under the age of 5 and over the age of 65).



Traffic Volume

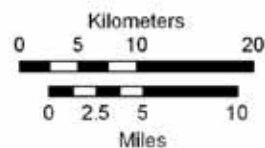
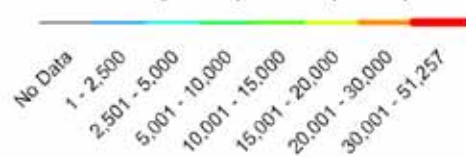
Annual average daily traffic (AADT) counts for nearby highways and arterials were collected from the Highway Performance Monitoring System (HPMS). The HPMS is a national-level highway information system that includes data on the extent, condition, performance, use, and operating characteristics of the nation's highways. In general, the HPMS contains information about all public roads, while information about other characteristics is represented in HPMS as sample data for arterial and collector road classes. Limited information about travel and paved miles is included in summary form for the lowest functional road classes, such as minor arterials, collectors, and surface streets.



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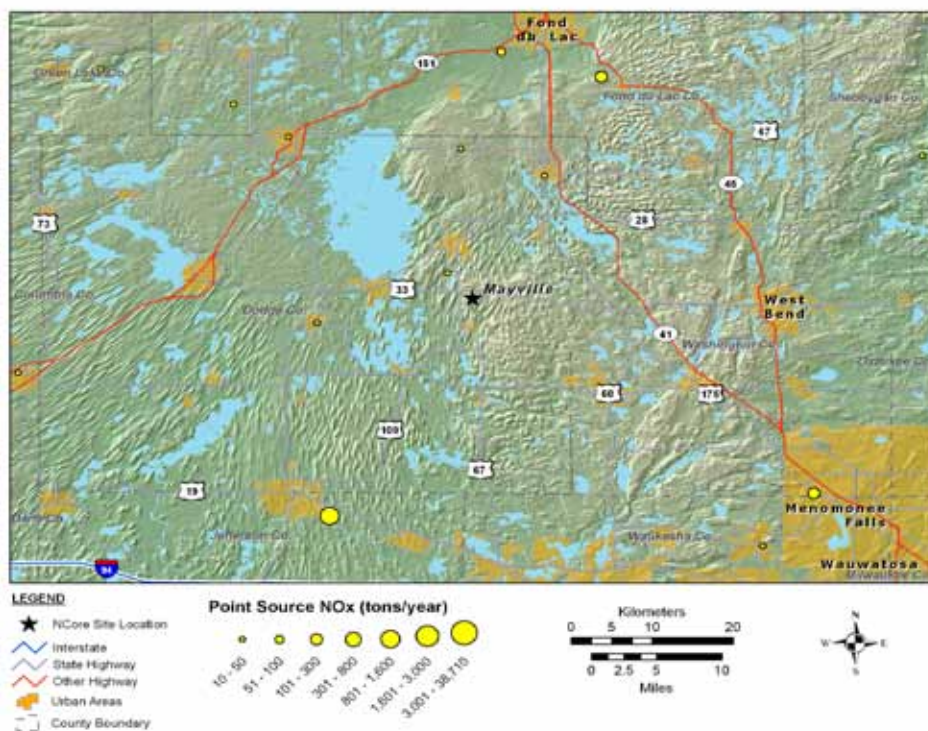
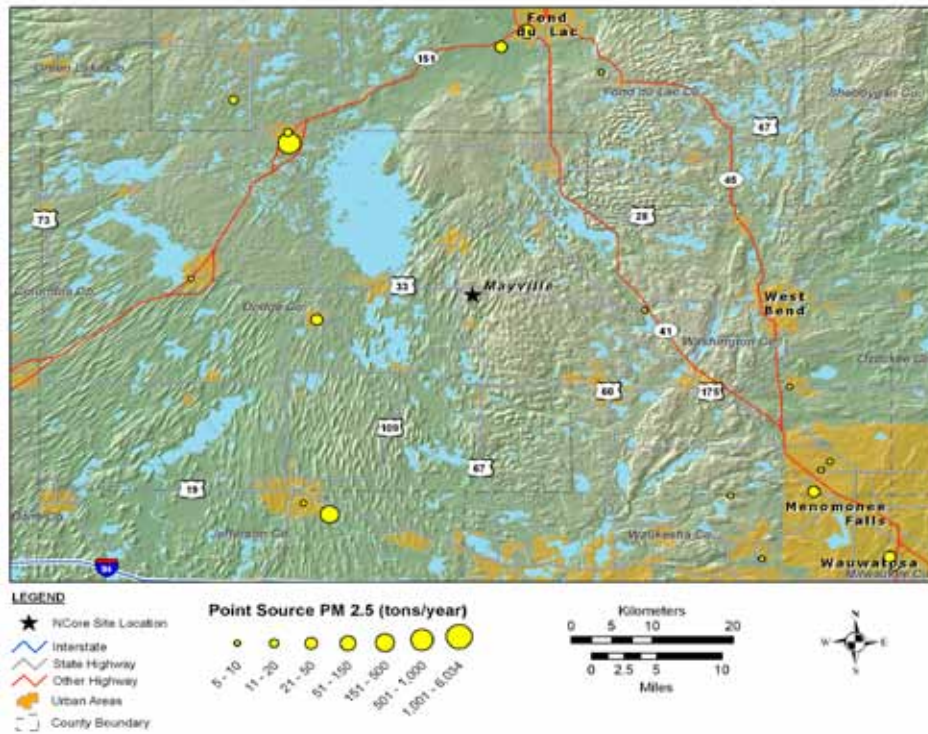
- ★ NCore Site Location
- Urban Areas
- County Boundary

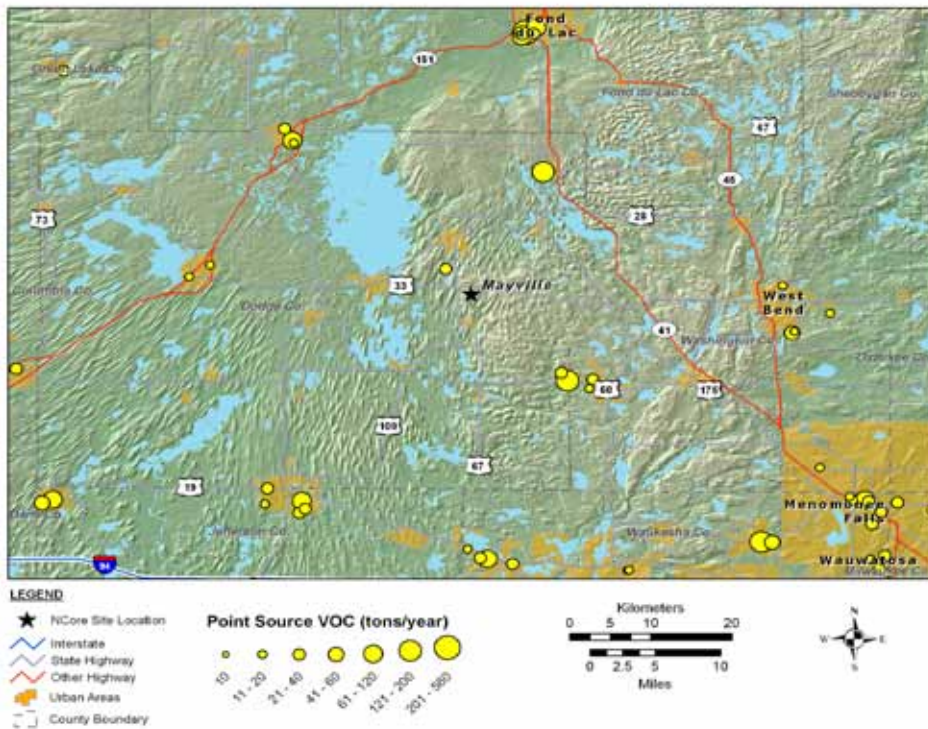
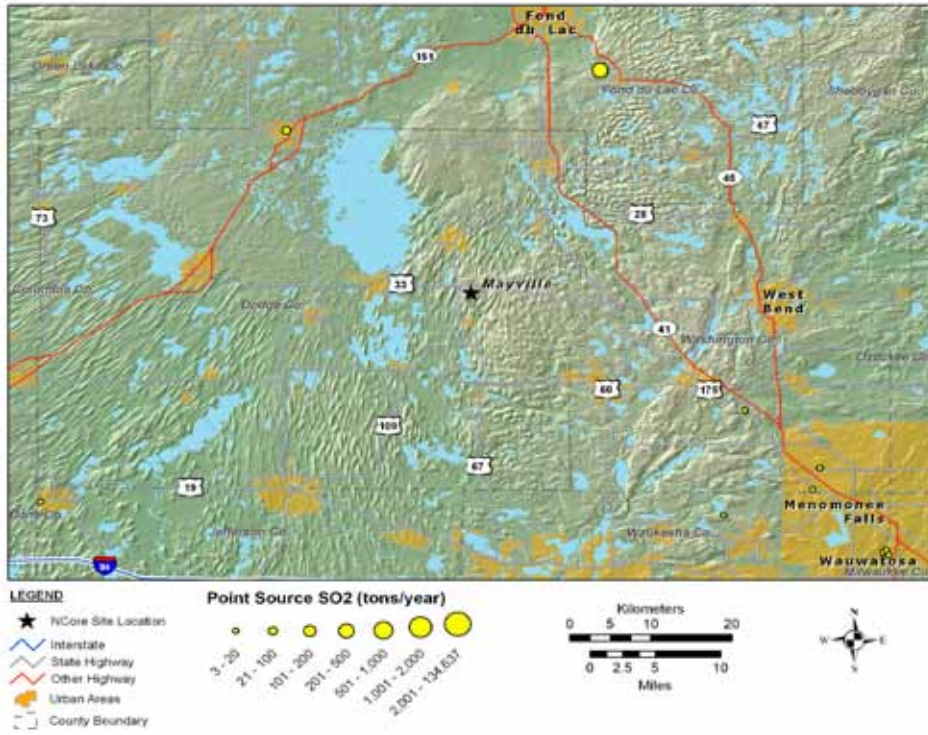
Annual Average Daily Traffic (AADT)



Facility Emissions

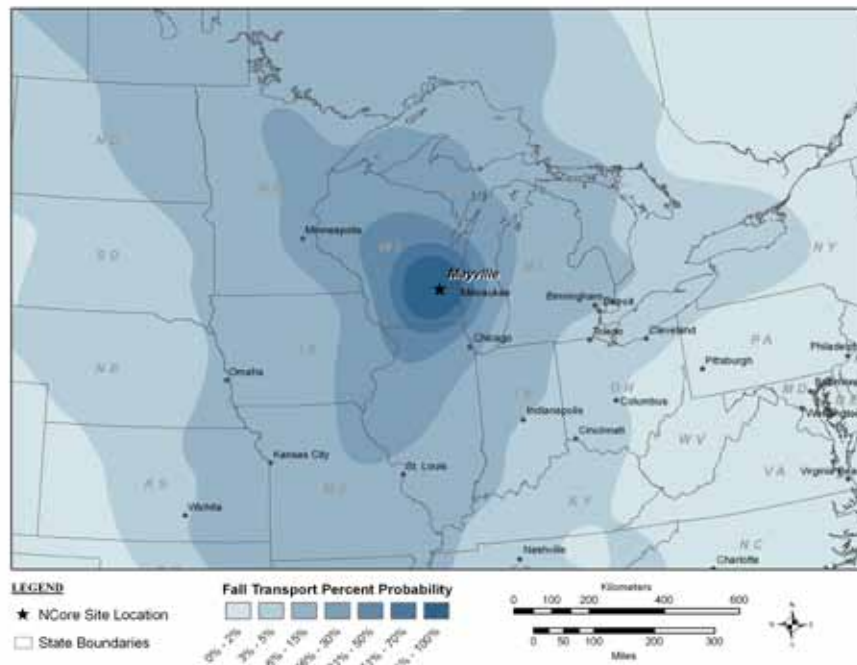
Major point source emissions data for VOCs, PM_{2.5}, NO_x, and SO₂ were collected from EPA's Air Quality System (AQS). Point source locations were mapped in graduated symbols depicting the 2005 annual emissions estimates. More information on facility emissions can be found at <http://www.epa.gov/air/emissions/where.htm>.



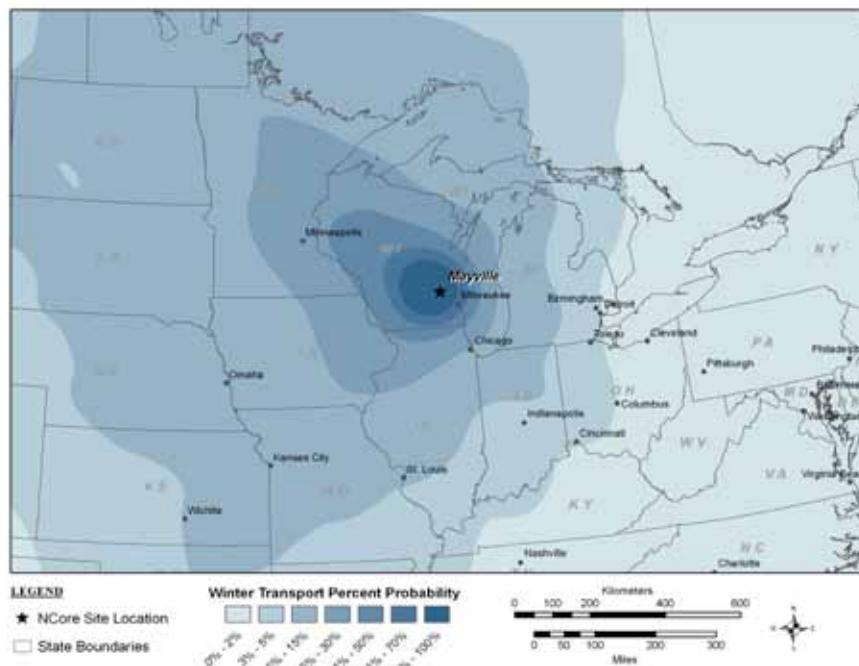


Transport

A custom design tool called Spatial Probability Density (SPD) was used to create pollution transport corridor maps. SPD aggregates an ensemble of 500-m, 48-hr backward trajectories created by the Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) Model, which gives an overall picture of transport under certain conditions or time periods. Data points for each hour back to the total run time (48 hours) are created for each trajectory and incorporated into a database.



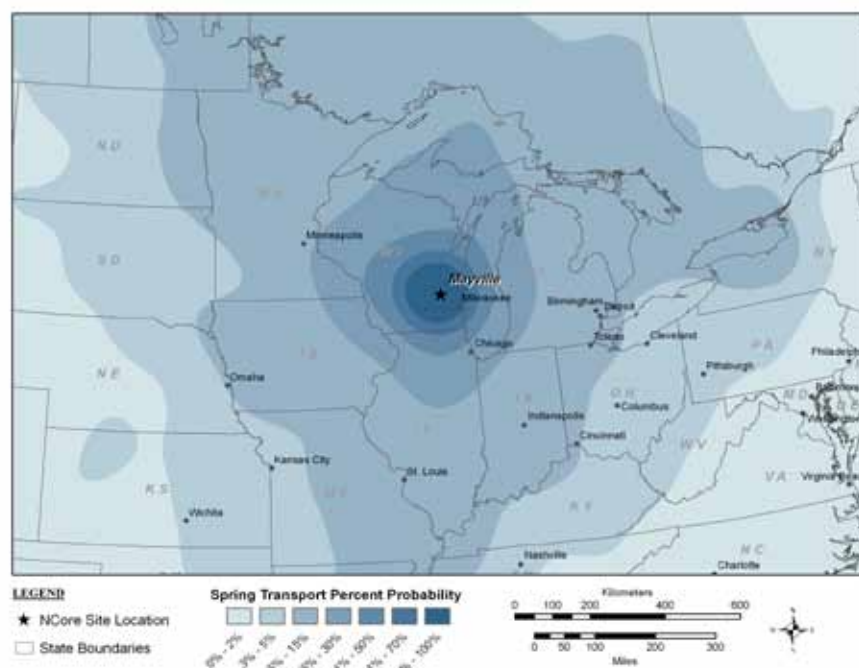
Fall — September, October, and November, 2005-2007



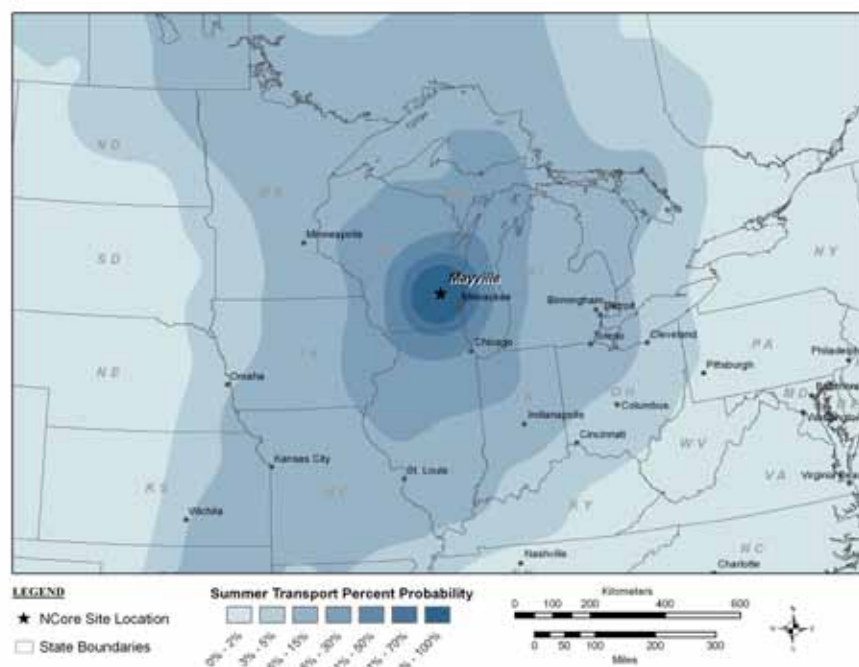
Winter — December, January, and February, 2005-2007

These data points are then mapped within a GIS as spatial probability density. Pollution transport corridors were run quarterly (seasonally) with 2005-2007 trajectory data.

Each map represents the probability that pollution will be transported from one area or region to a given site during a selected time period. Pollution transport is greatest near the site because of the impact of emissions from local and regional sources. Transport from areas farther away depends on the overall weather pattern (e.g., location of jet stream).



Spring — March, April, and May, 2005-2007

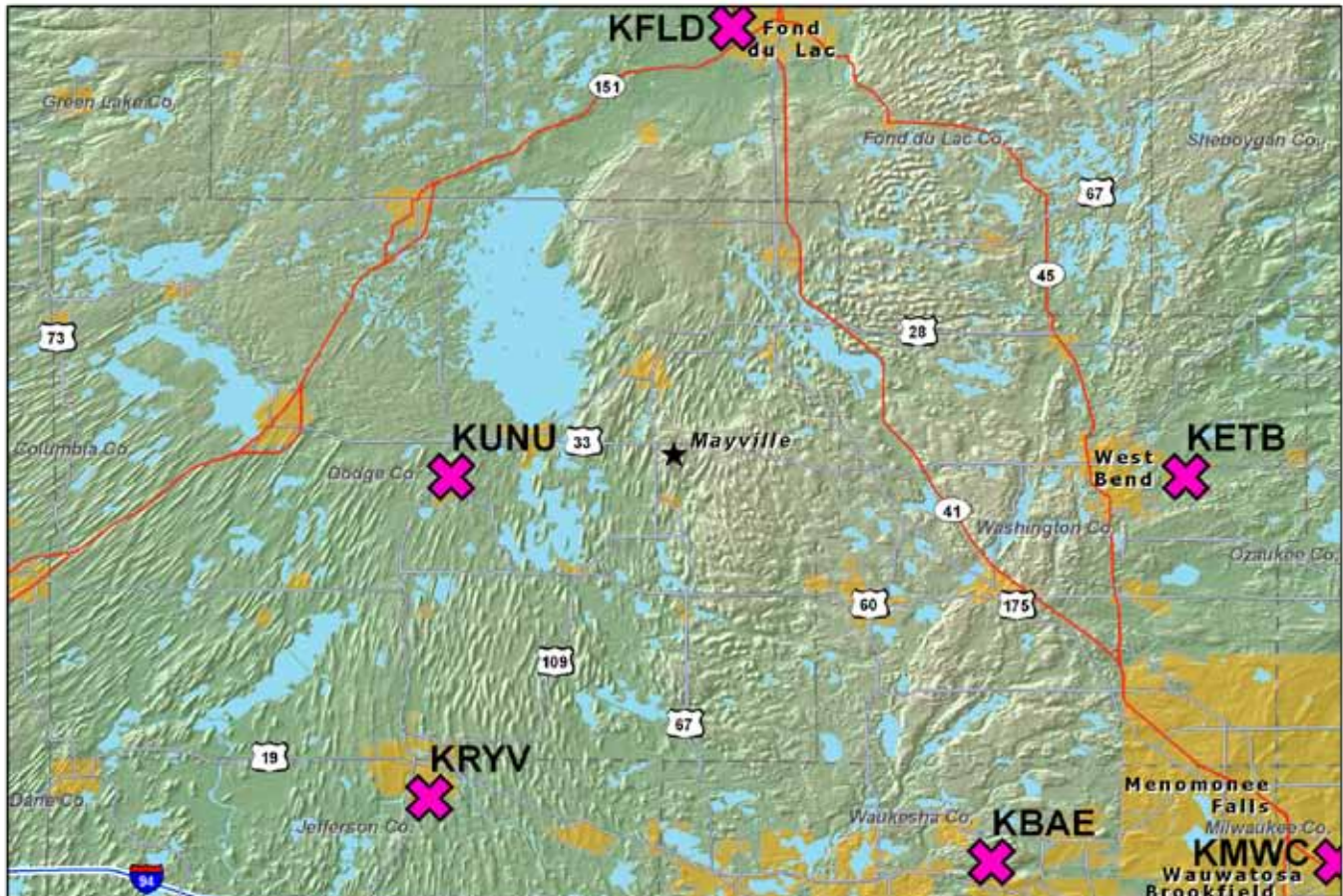


Summer — June, July, and August, 2005-2007

Wind Patterns

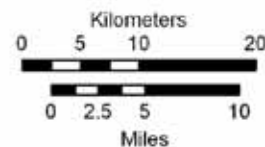
Wind roses were created from METAR data from the National Weather Service (NWS). Wind speed and wind direction data were collected from the NWS site closest and most representative to the NCore site. Quarterly averages and an annual average wind roses were developed for the years 2005 through 2007.

NWS site used to create the wind roses: KUNU



LEGEND

- ★ NCore Site Location
- Urban Areas
- County Boundary
- ✕ Metar Locations
- Interstate
- State Highway
- Other Highway

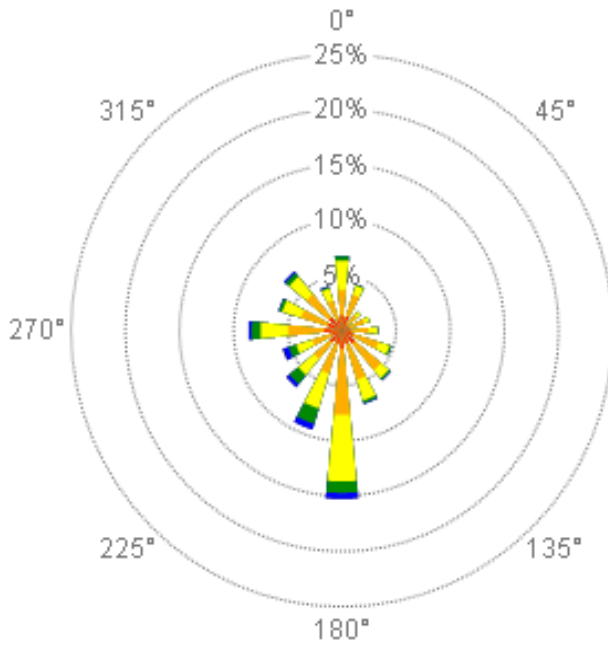


Interpreting a wind rose

A wind rose summarizes wind patterns for a specific time period at a surface meteorological site. The size of the triangle emanating from the center of a wind rose indicates the percentage of time that winds are from a specific direction (position on axes) and the wind speed time percentages are indicated with color bins along the length of the triangle.

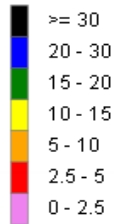
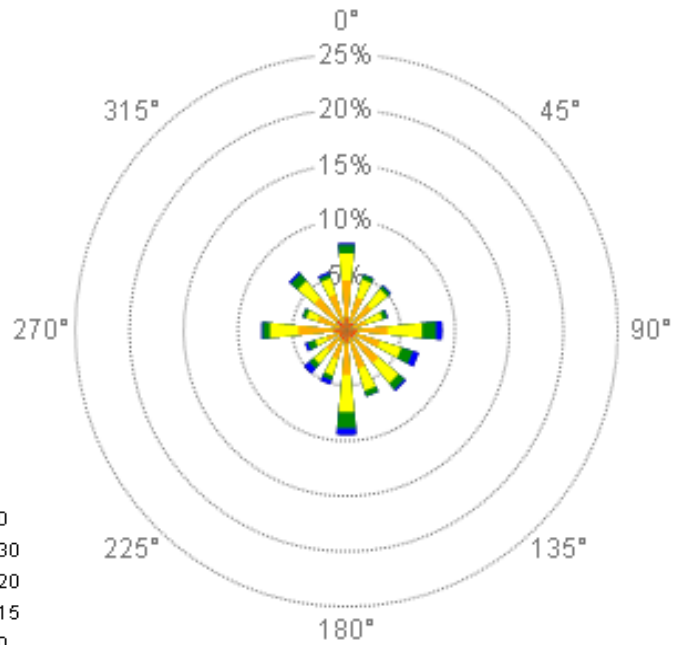
FALL

September, October, and November, 2005-2007



SPRING

March, April, and May, 2005-2007

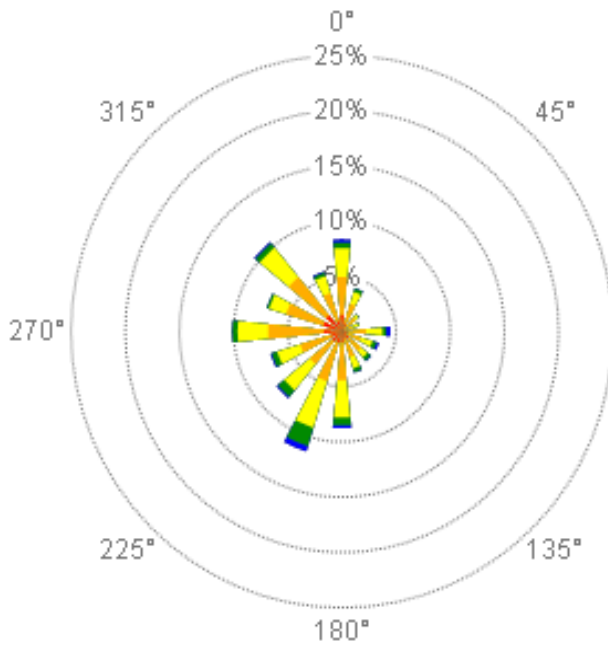


Wind Rose Legend

Wind Speed Units: miles per hour

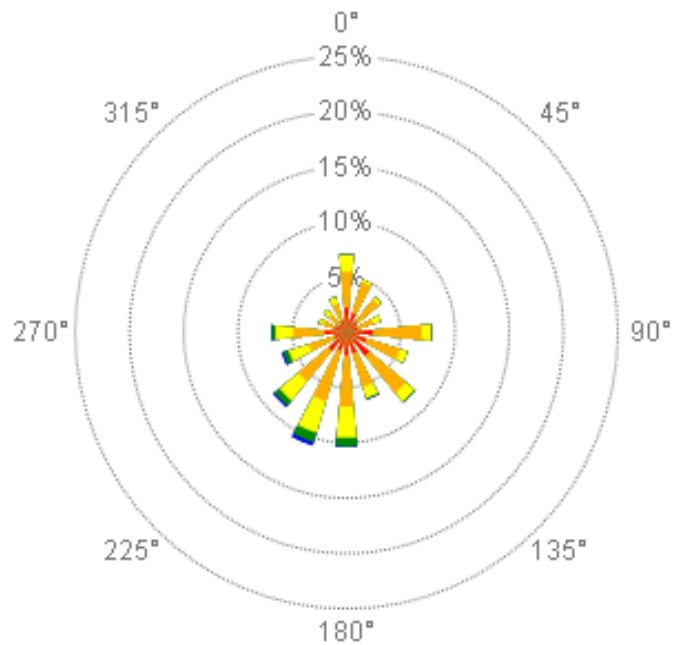
WINTER

December, January, and February, 2005-2007



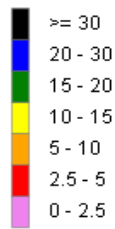
SUMMER

June, July, and August, 2005-2007



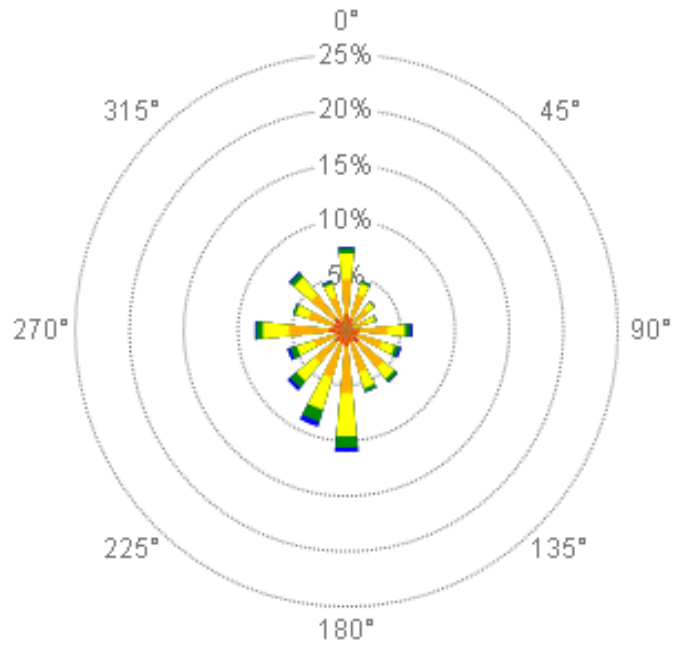
Wind Patterns

Annual
2005-2007



Wind Rose Legend

Wind Speed Units: miles per hour



Climate Summary

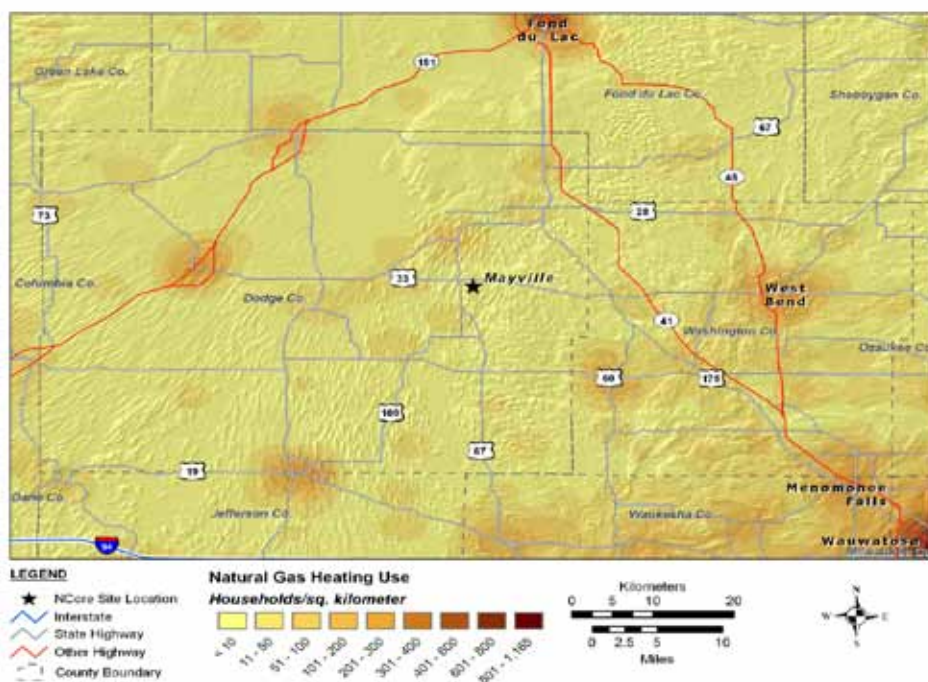
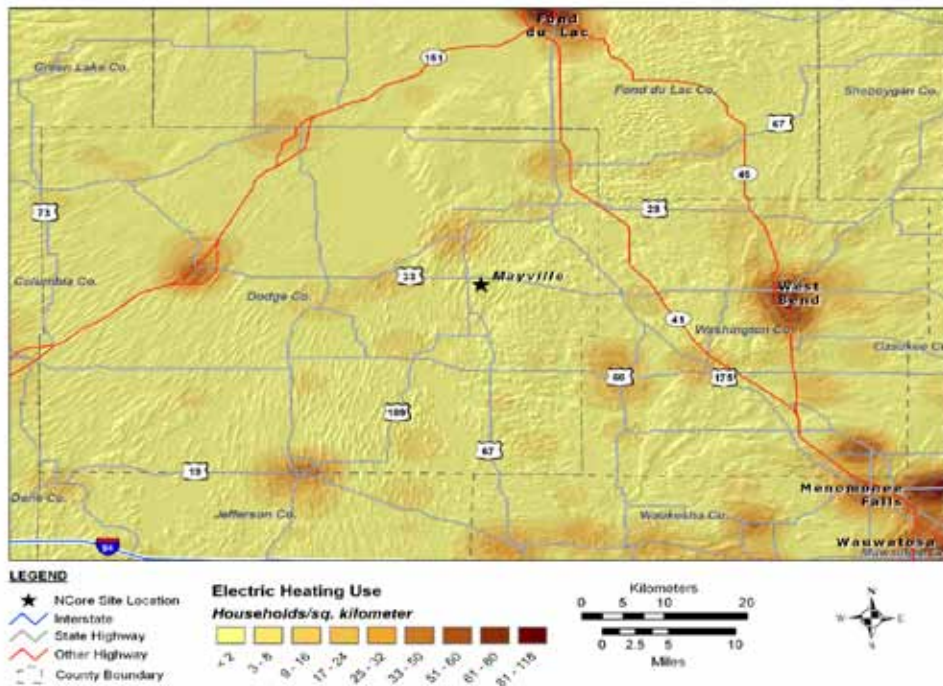
The table contains climatological summaries of monthly high and low temperatures, precipitation, and relative humidity from each NCore site area. These data were obtained from the National Oceanic and Atmospheric Administration (NOAA) compilations of monthly precipitation and temperature for 1971-2000. The data collection for each NCore site area was based on proximity to the NCore site location and climatological data completeness (closest NOAA site with complete data records).

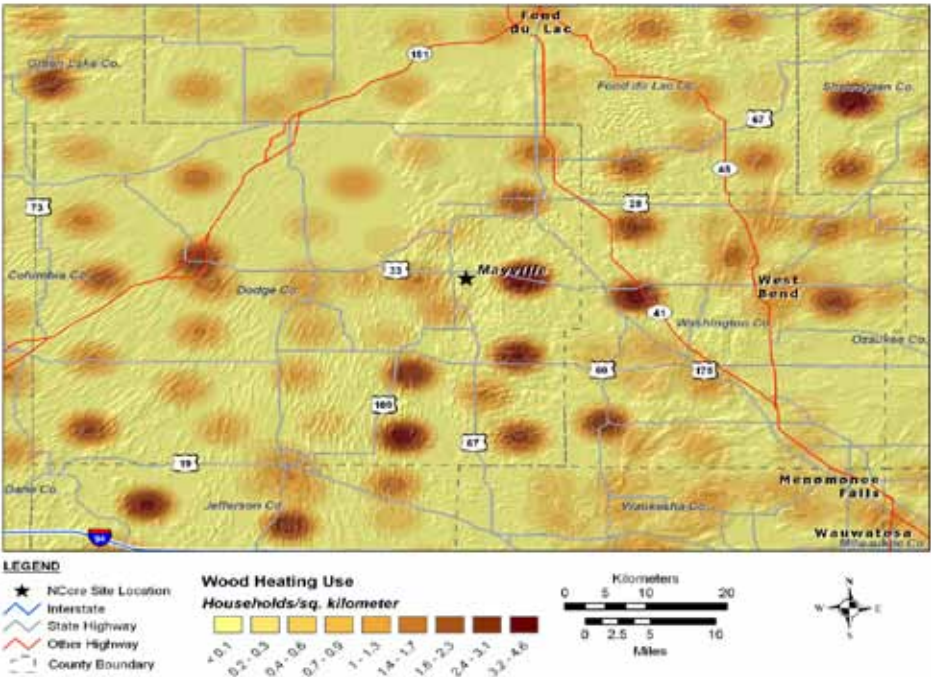
Month	High (°F)	Low (°F)	Precipitation (inches)
January	25.4	6.6	1.15
February	30	11.2	1.1
March	41.6	23	2.07
April	55.5	35.1	3.33
May	68.6	46.9	3.13
June	77.8	56.6	3.91
July	81.8	61.4	4.33
August	79.4	58.8	4.05
September	71.6	49.6	3.76
October	59.9	38.5	2.64
November	43.9	26.8	2.11
December	30.6	13.9	1.47
<i>Annual</i>	<i>55.5</i>	<i>35.7</i>	<i>33.05</i>



Fuel Use Characteristics

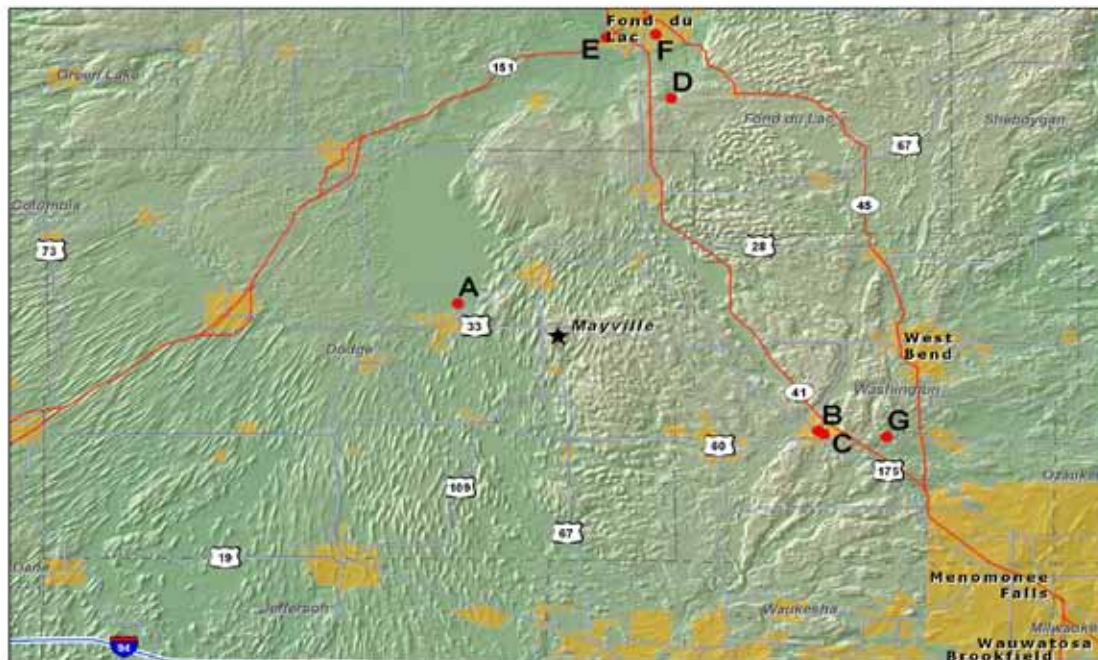
Fuel use characteristics were obtained from the 2000 Census detailed summary tables (e.g., electric, natural gas, or wood for household heating at the block-group level). Similar to population density maps, fuel use data were mapped as a spatial density plot (e.g., households per square kilometer).





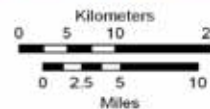
Other Measurements

The EPA AQS database was accessed for summary information about other air quality measurements (e.g., criteria pollutants, IMPROVE, toxics, etc.) in a 100-km radius of the NCore site for the years 2003-2008. The map shows the location of nearby sites and the table summarizes available air quality measurements.



LEGEND

- ★ NCore Site Location
- Interstate
- State Highway
- Other Highway
- Urban Areas
- County Boundary
- Air Quality Monitors



Letter	AQS	CO	Lead	NO ₂	Ozone	PM ₁₀	PM ₂₅	SO ₂	TSP	VOC	HAPs	CSN or IMPROVE
A	550270001				X							
B	551310007				X							
C	551310003				X							
D	550390006				X							
E	550390004				X							
F	550390005				X							
G	551310009				X							

TSP = total suspended particulate; VOC = volatile organic compounds; HAPs = hazardous air pollutants; CSN = Chemical Speciation Network

Software Used to Produce This Document

Google Earth

ESRI ArcGIS

ESRI ArcGIS-ArcMap customized tool for creating pollution corridor maps. Tool developed by Sonoma Technology, Inc.

Air Resources Laboratory (ARL) HYSPLIT – Hybrid Single Particle Lagrangian Integrated Trajectory Model

Data References

US Census block-level population, 2007

<http://www.census.gov/popest/estimates.php>

US Census block-level summary tables on household fuel use characteristics, 2000

http://factfinder.census.gov/home/saff/main.html?_lang=en

USGS National Land Cover Database (NLCD), 2001

http://www.mrlc.gov/nlcd_multizone_map.php

USGS Digital Elevation Model (DEM)

<http://seamless.usgs.gov/index.php>

Highway Performance Monitoring System (HPMS) road link-based Annual Average Daily Traffic (AADT), 2007

http://hepgis.fhwa.dot.gov/hepgis_v2/Highway/Map.aspx

EPA Air Quality System (AQS) point source emissions estimates, 2002

<http://www.epa.gov/air/data/geosel.html>

EPA Air Quality System (AQS) site measurement summary information, 2007

<http://www.epa.gov/ttn/airs/airsaqs/detaildata/>

National Weather Service (NWS) METAR wind speed and direction data, 2005-2007

<http://weather.noaa.gov/weather/metar.shtml>

National Oceanic and Atmospheric Administration (NOAA) monthly temperature and precipitation data, 2005-2007

<http://lwf.ncdc.noaa.gov/oa/climate/research/cag3/cag3.html>

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Petaluma, CA

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