

Oklahoma Public Health Environmental Tracking System (OK-PHETS)

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Linking Oral/Facial Clefts and Environmental Contaminants in Oklahoma (1994-2002)

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Data

◆ OSDH data

- Birth Defect Registry, 1994-2002
- Vital Statistics, 1994-2002

◆ DEQ data

- Toxic Release Inventory
- Air Emission Inventory
- Superfund
- Mining



Methods

- ◆ Data were gathered from Oklahoma Birth Defects Registry (OBDR) database and various Department of Environmental Quality (DEQ) environmental databases
- ◆ Environmental contaminants of interest were previously selected by OK-PHETS Coordinating Committee based on literature review and data availability
- ◆ Data were organized/analyzed using Microsoft Access, Excel, ArcView GIS and SAS
- ◆ Binomial confidence interval and Chi-Square tests were used to determine statistical differences between oral/facial cleft rates for selected characteristics



Methods (continuation)

- ◆ SaTScan software was utilized to identify areas of Oral/Facial Clefts clustering
- ◆ Cases were geocoded based on physical street address using ArcView GIS
- ◆ Many rural route addresses in suspected clusters were geocoded in the field using a GPS unit
- ◆ County data were statistically analyzed using linear regression with SAS



Methods (continuation)

- ◆ **County sums for number of Coal mines, Toxic Release Inventory (TRI) in tons and Air Emissions Inventory (AEI) in tons were used as independent variables in regression analysis**
- ◆ **Oral/facial cleft rate by county was used as the dependent variable in regression analysis**



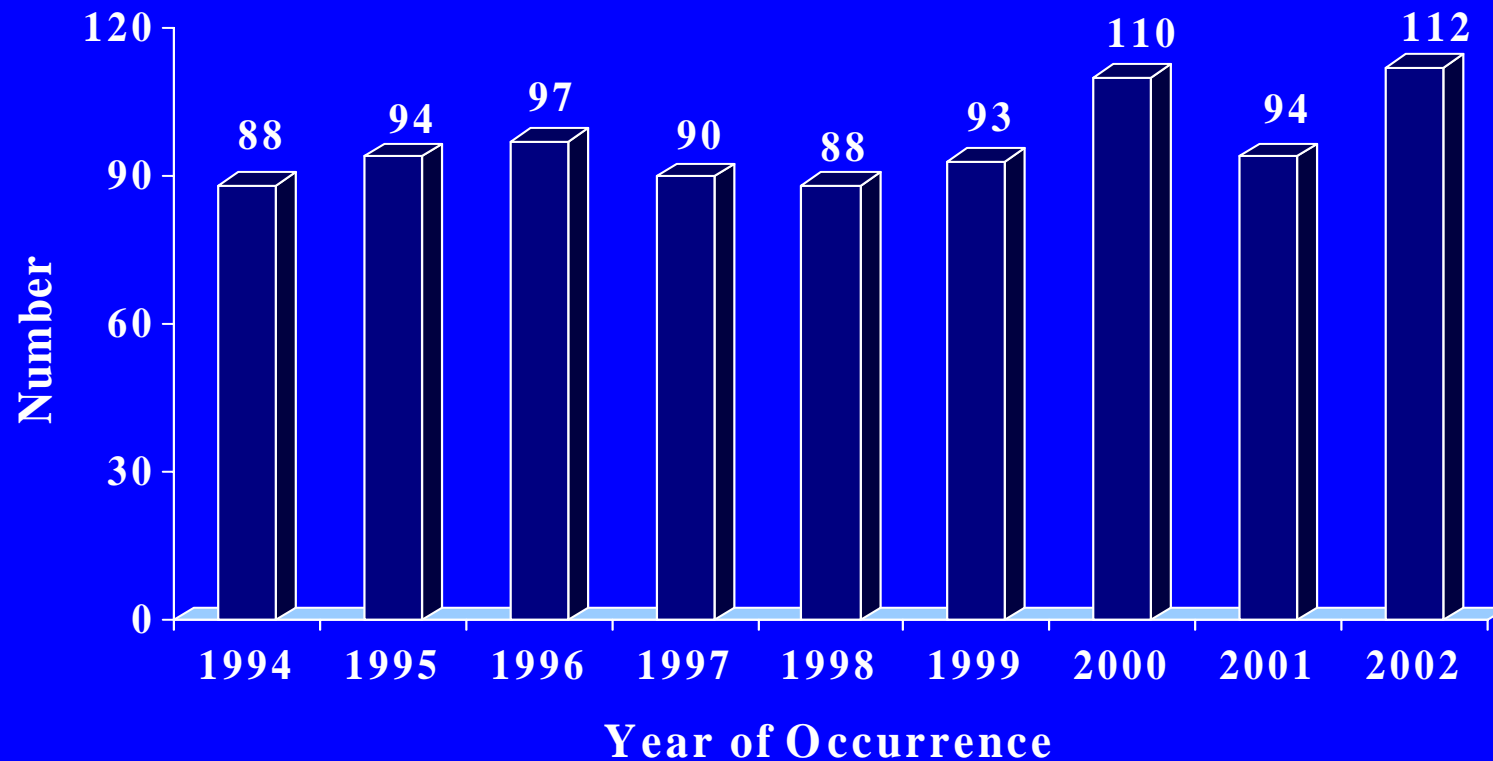
Oral/Facial Clefts

- ◆ **A total of 866 oral facial cleft occurrences from 1994-2002**
 - **Range: 88 cases in 1998 to 112 cases in 2002**
 - **Average: 96 cases per year**

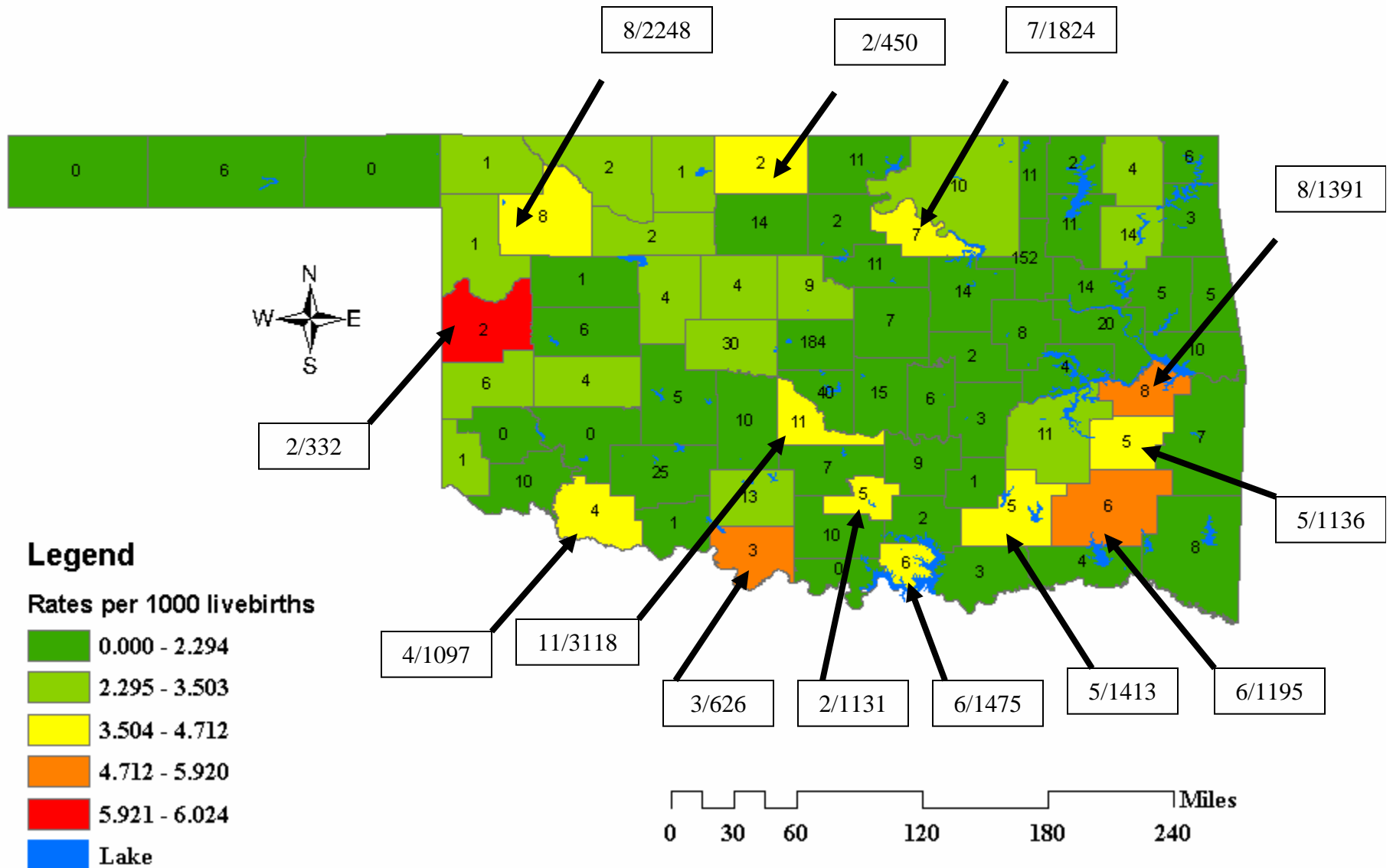




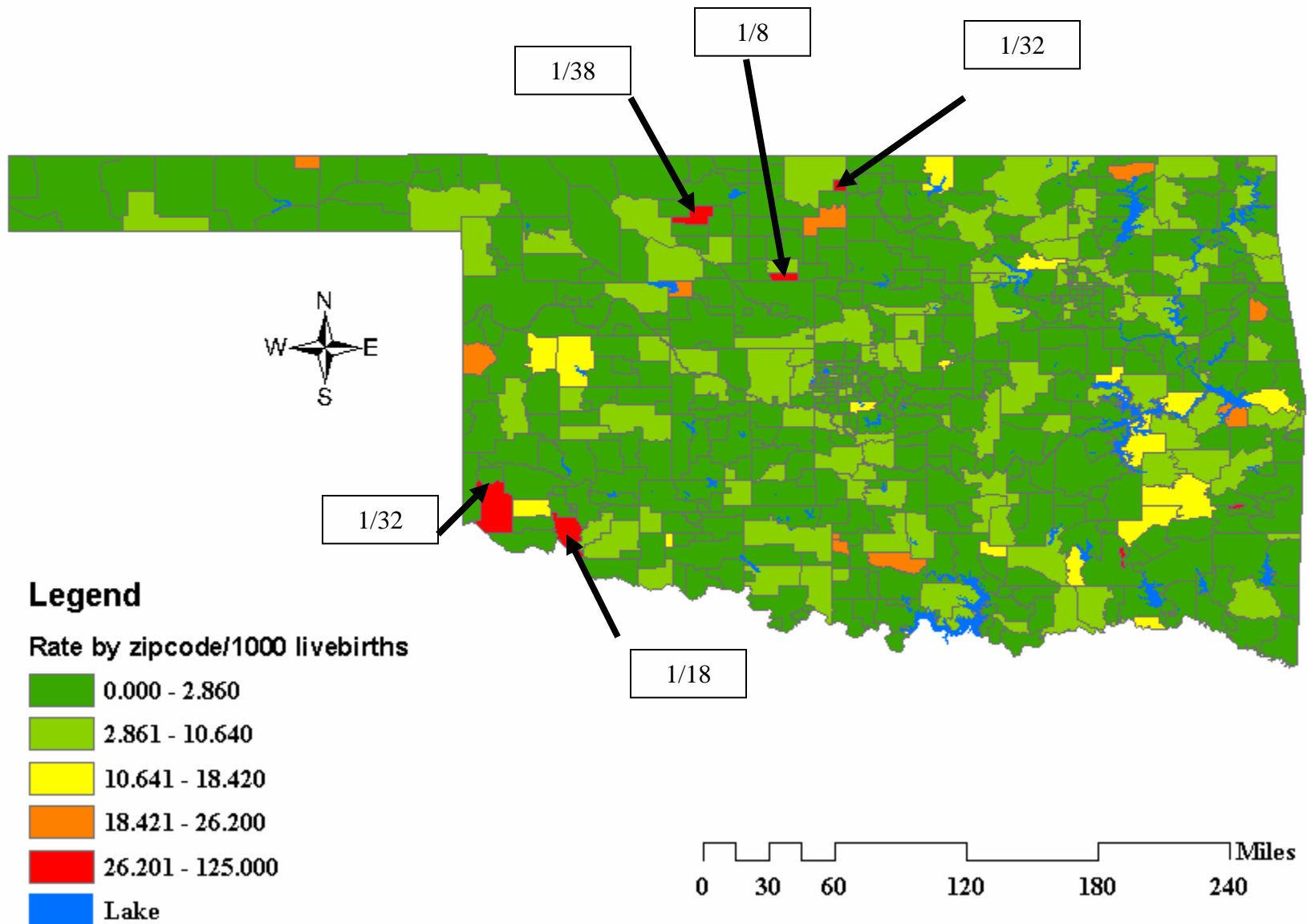
Number of All Oral/Facial Clefts (N=866), by Year of Occurrence, Oklahoma, 1994-2004



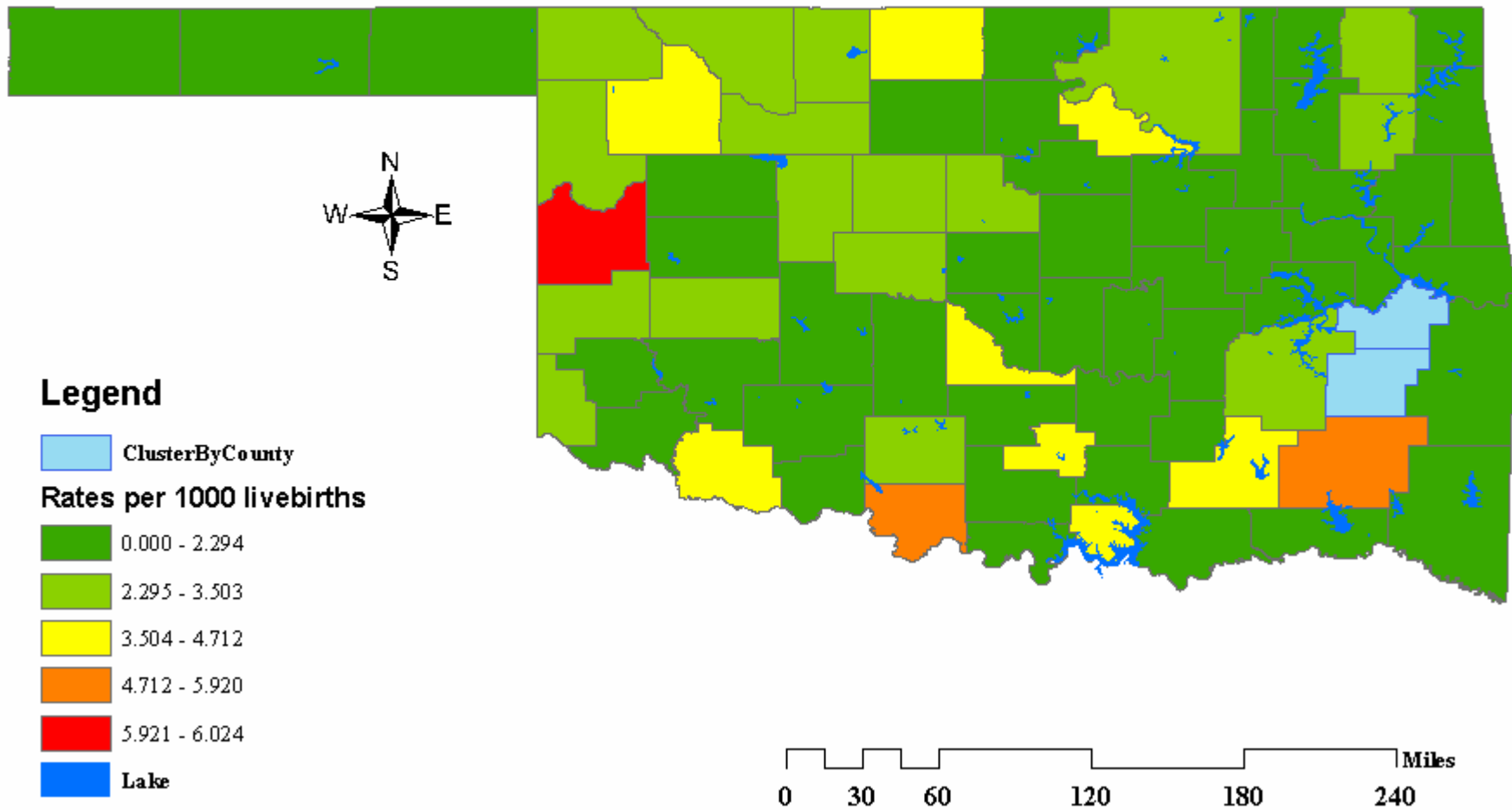
Number and Rates of Oral/Facial Clefts, by County of Residence, Oklahoma, 1994-2002



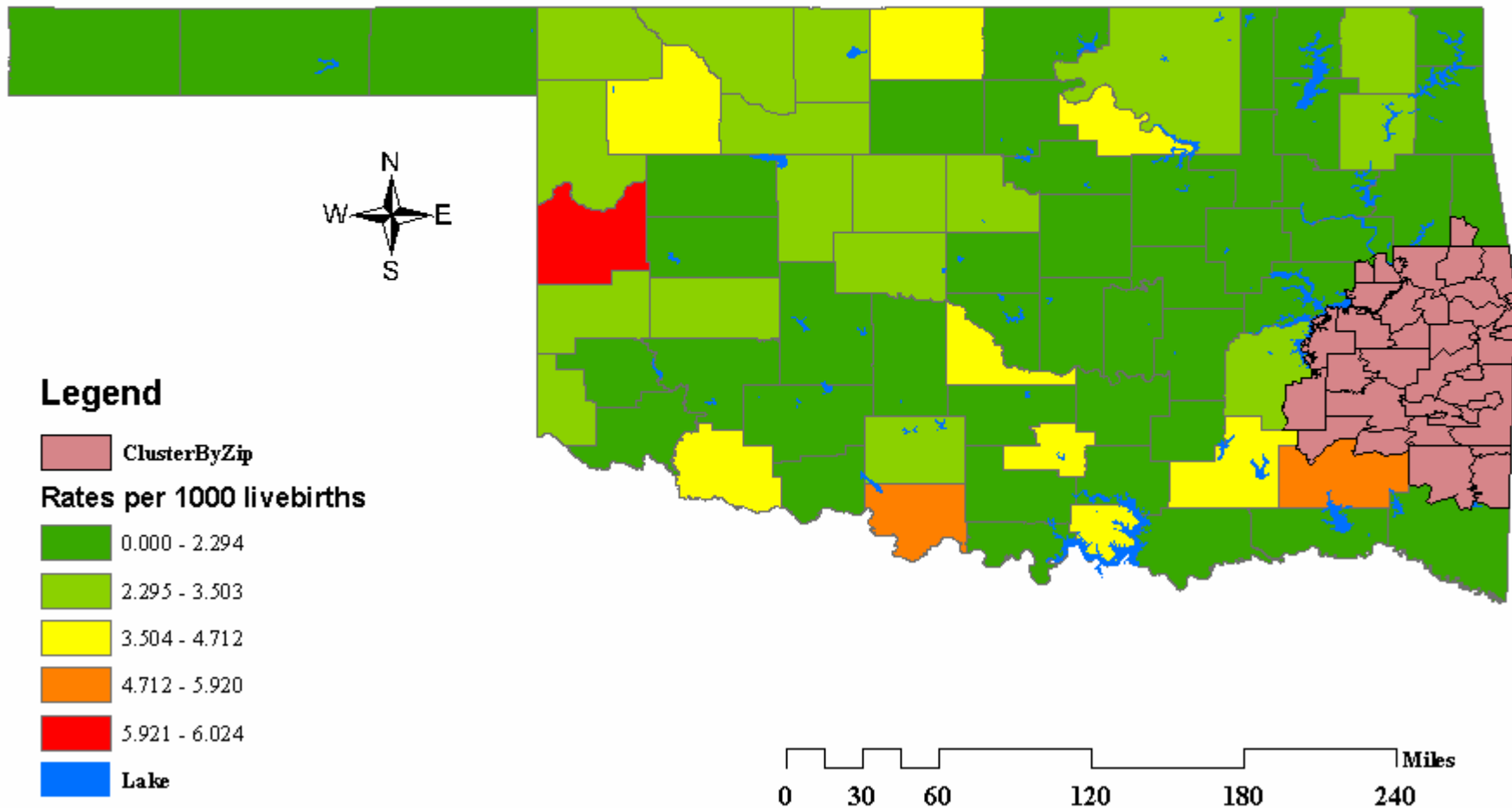
Oral/Facial Cleft Rates by Zipcode of Residence, Oklahoma, 1994-2002



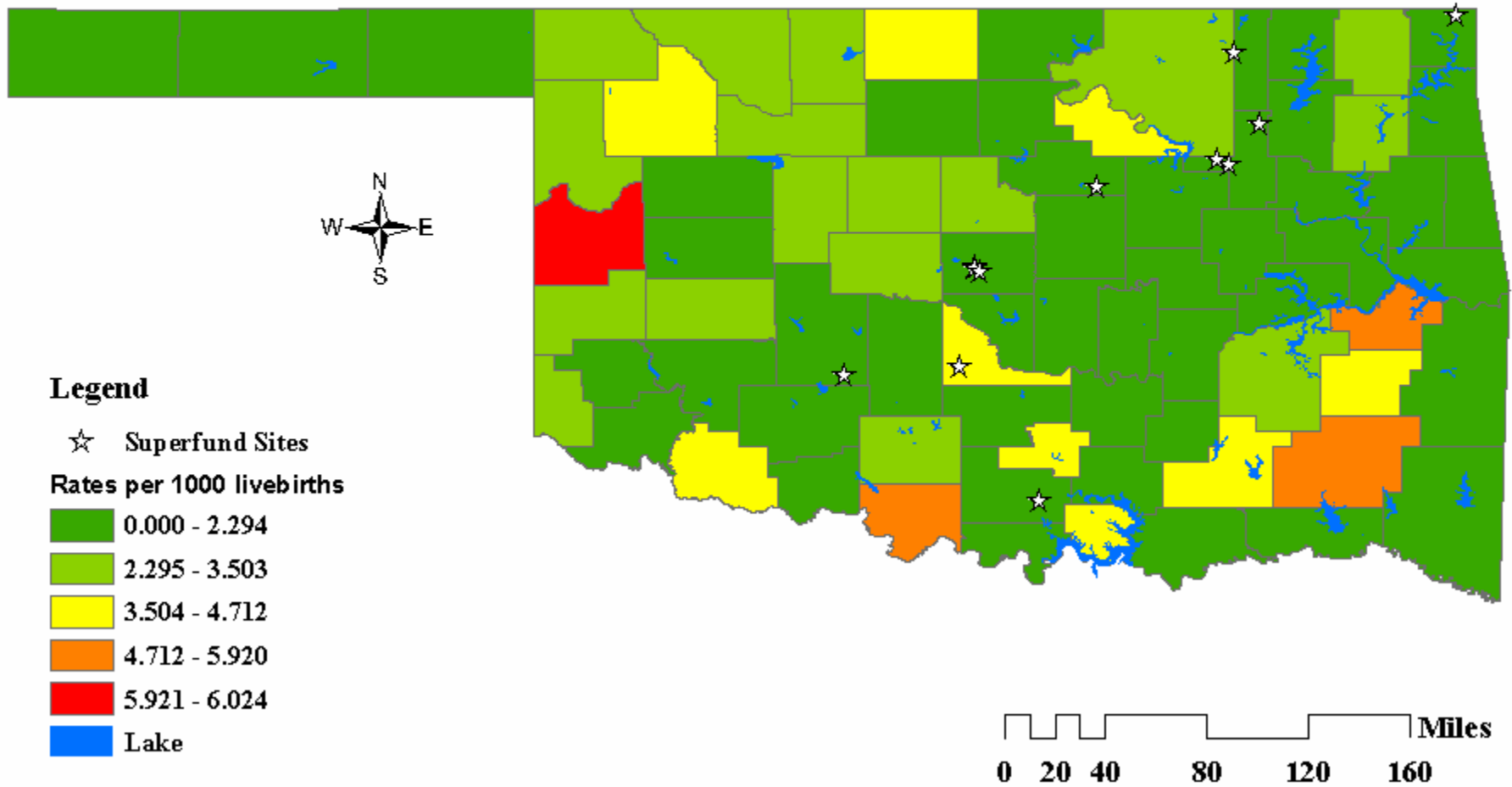
Clustering of Oral/Facial Cleft Rates, by County of Residence, Oklahoma, 1994-2002



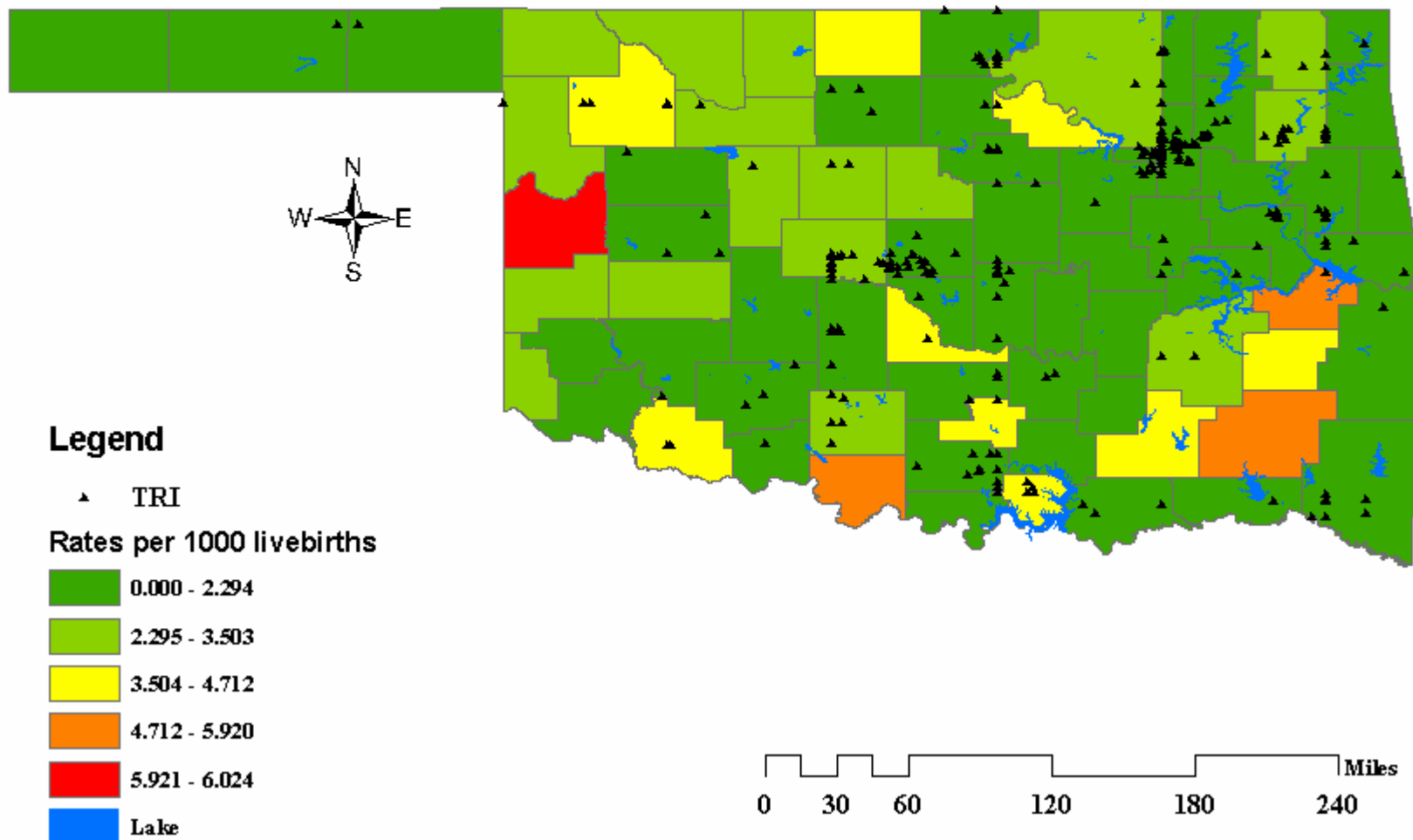
Clustering of Oral/Facial Cleft Rates, by Zipcode of Residence, Oklahoma, 1994-2002



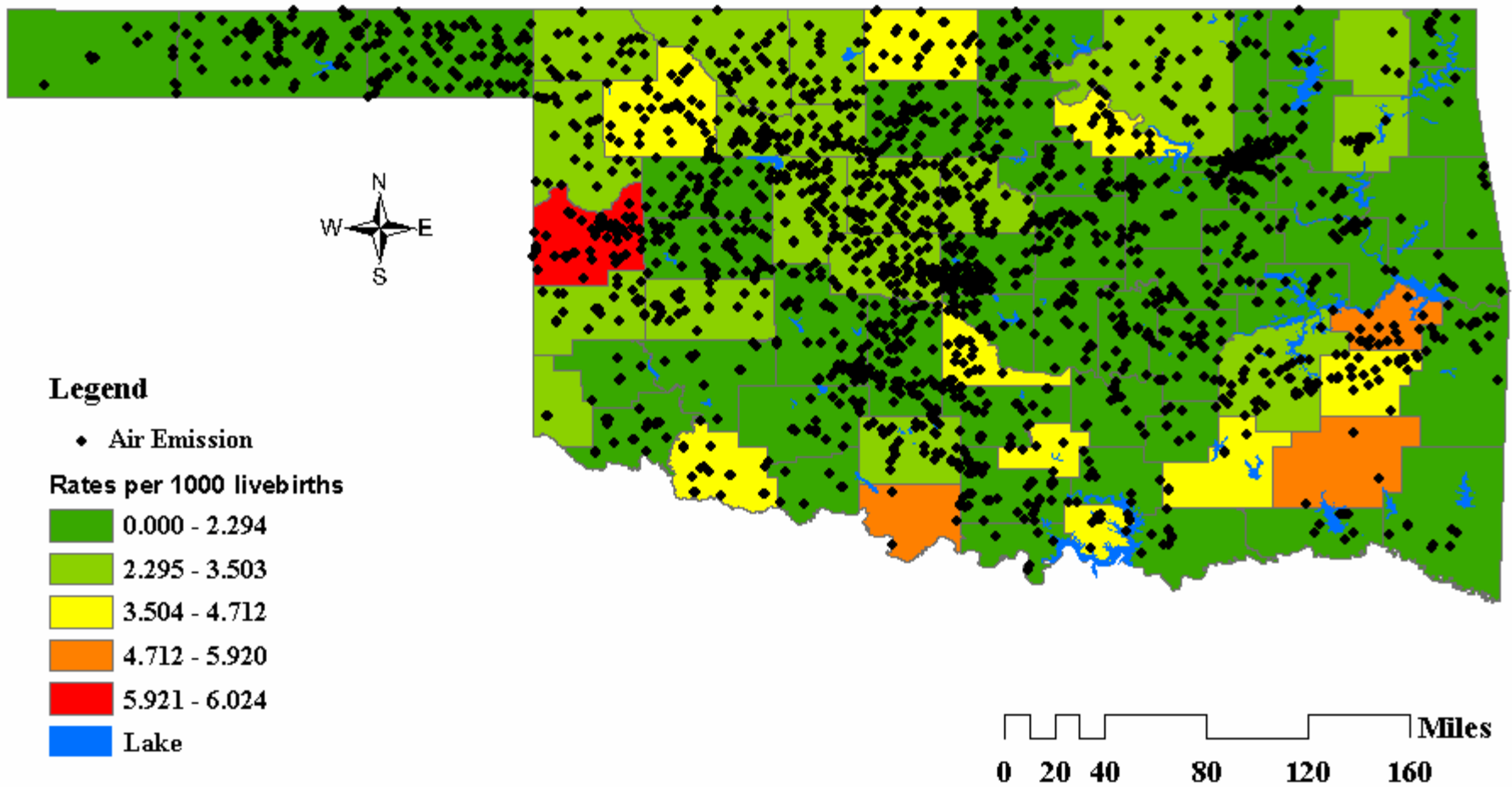
Oral/Facial Clefts (1994-2002) and Superfund Sites



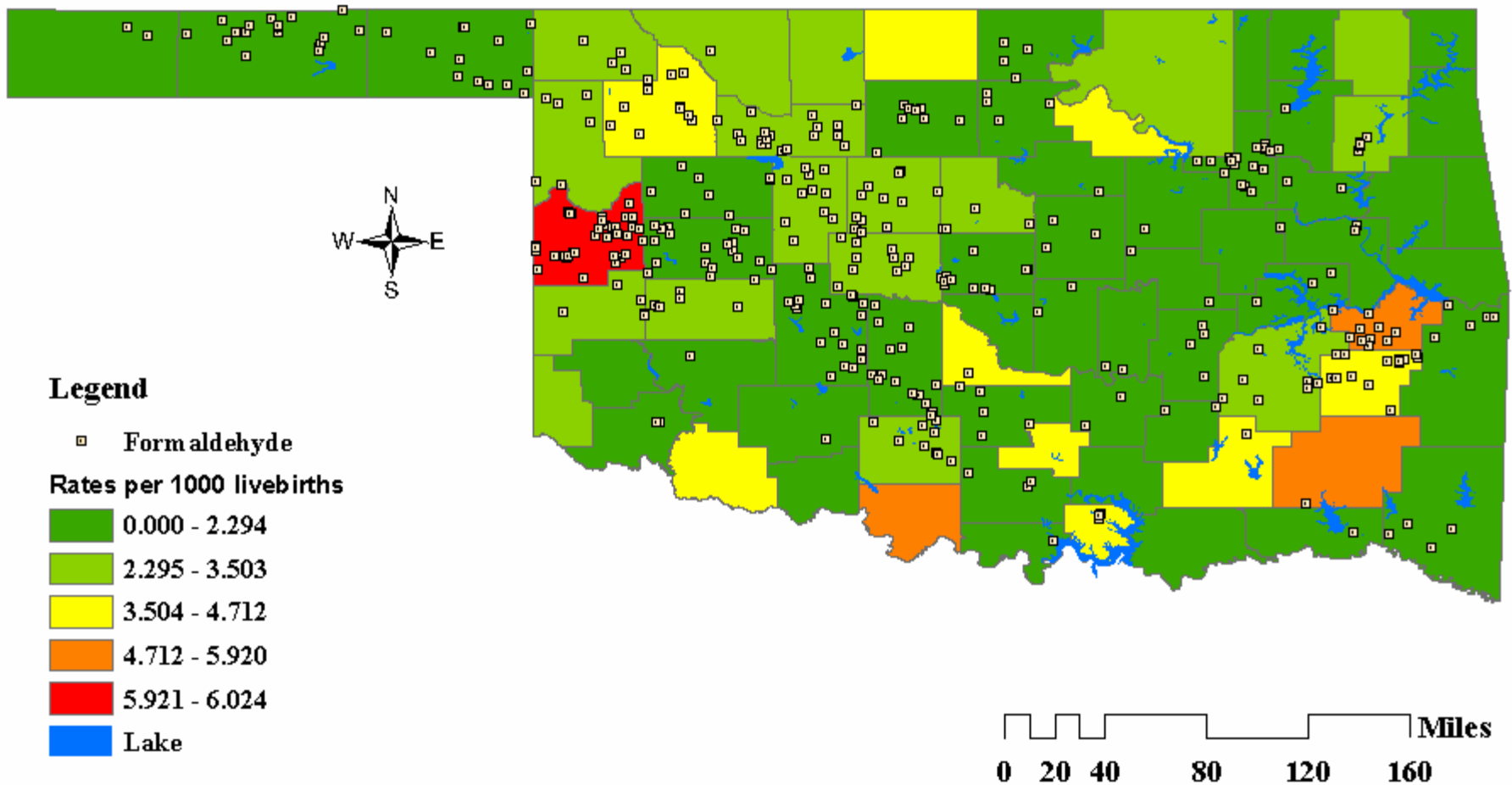
Oral/Facial Cleft Rates (1994-2002) and Toxic Release Inventory Emission Sites (2000-2002)



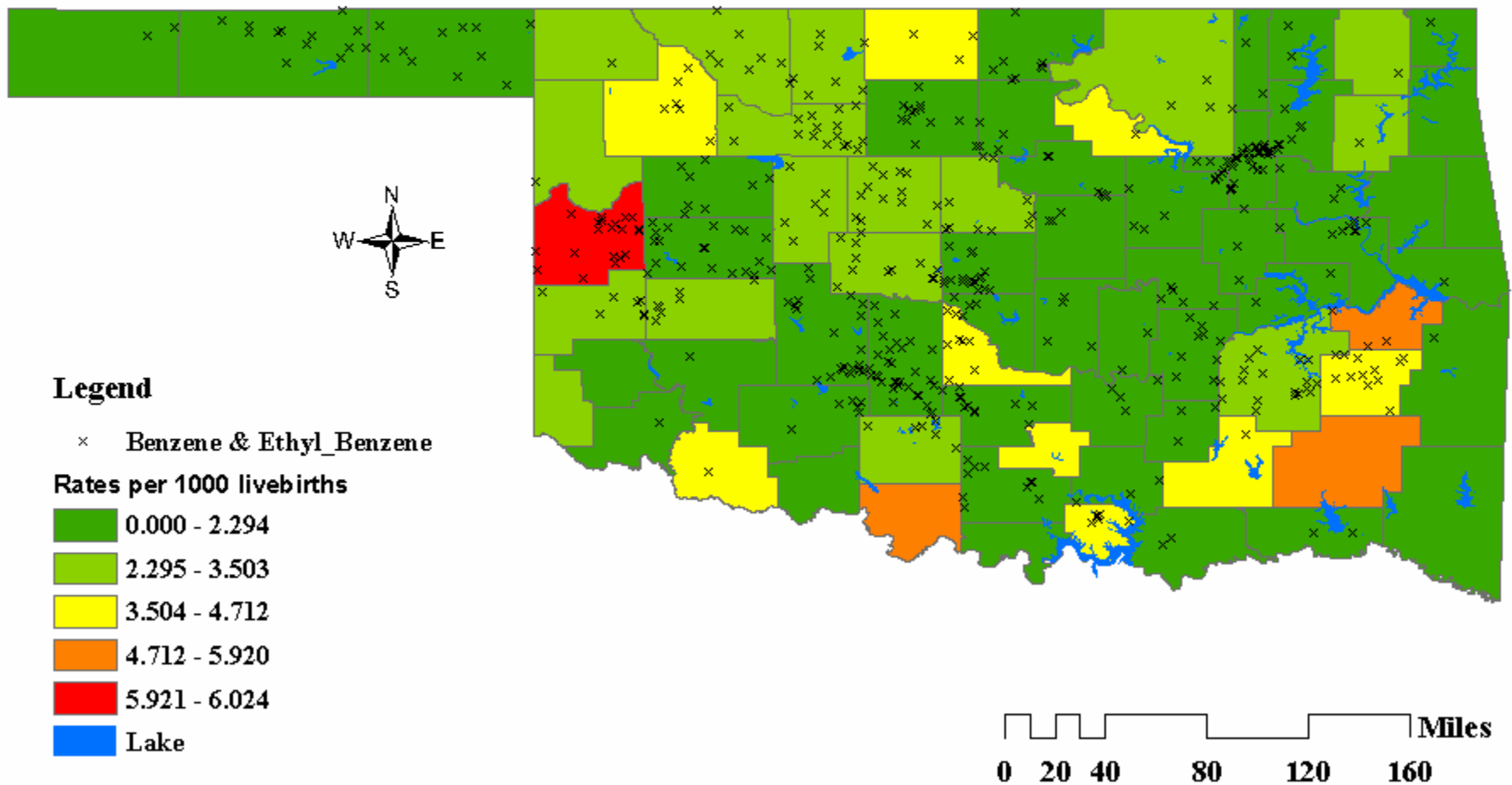
Oral/Facial Clefts (1994-2002) and Air Emission Inventory Sites (1995-2002)



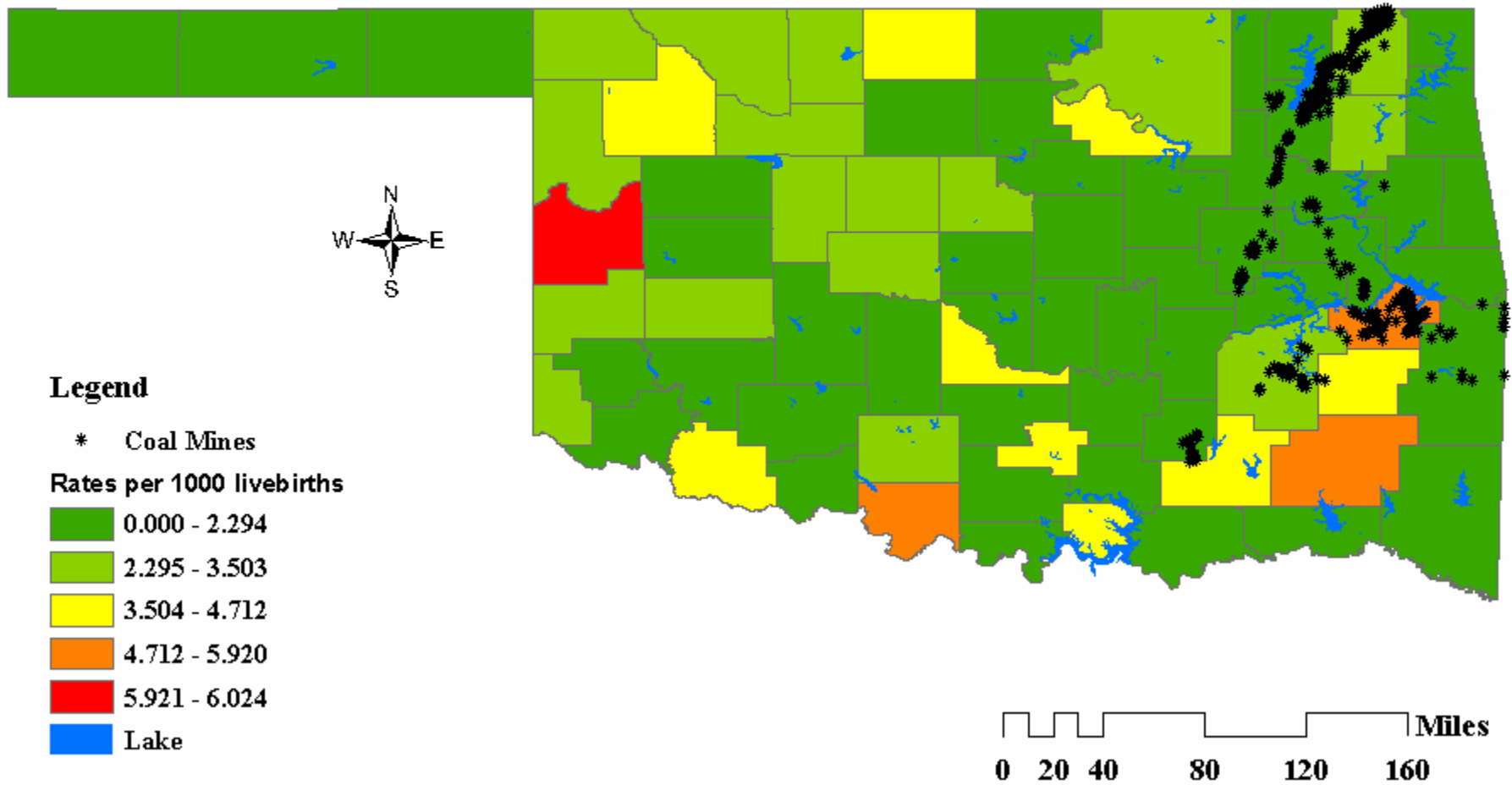
Oral/Facial Clefts (1994-2002) and Formaldehyde Air Emission Sites (1995-2002)



Oral/Facial Clefts (1994-2002) and Benzene & Ethyl Benzene Air Emission Sites (1995-2002)



Oral/Facial Clefts (1994-2002) and Coal Mining Sites



Results

- ◆ **Demographic statistics are similar to previous studies**
- ◆ **Visual analysis of county and zip rates showed clustering in SE Oklahoma**
- ◆ **Statistical analysis using SaTScan revealed significant clustering in SE Oklahoma**
- ◆ **There are very few environmental hazard sites in SE Oklahoma**
- ◆ **Regression analysis on county and zip code oral cleft rates revealed no significant relationships between oral cleft rates and TRI and Air Emission Inventory sites in Oklahoma**



Things Should be Done

- ◆ **Water quality and other environmental data should be used**
- ◆ **Genetic factors should be controlled**
- ◆ **More analysis should be done at the case level**
- ◆ **Better handling of geographic data (i.e. rural routes)**
- ◆ **Statistical analysis needs to be fine tuned**



OBDR - Plans

◆ Birth Defects Registry:

- ◆ Will geocode all birth defects cases from 1994 to present
- ◆ Will physically geocode all rural routes by using county personnel and hand-held GPS units



OK-PHETS Lessons Learned

- ◆ **Databases should not have null values**
 - ◆ **Clean up the database thoroughly before geocoding**
 - ◆ **Include numeric 0 or type “unknown” for blank addresses**
 - ◆ **Data should be entered correctly**
 - ◆ **For Example, 1000 NW 16th Street is different than 1000 16th NW Street**



Lessons Learned (Continuation)

- ◆ **Problems with geocoding:**
 - ◆ **Cannot geocode PO Boxes and Rural Routes**
 - ◆ **Cannot geocode incomplete addresses**
Example: 2nd without Street
 - ◆ **If zip codes are entered incorrectly, cases may be geocoded in different cities**

- ◆ **Need to use queries for selecting records to be geocoded**



Lessons Learned (Continuation)

- ◆ **Know what to do for next linking project**
 - ◆ **Need to conduct a thorough literature search on environmental hazards and health effects prior to linkage**
 - ◆ **Developed “Data Integration and Linking Policy” Manual**
 - ◆ **Developed a project proposal specifying environmental chemicals, data analysis methods, and confounding genetic defects**

