



# INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS (ARCGIS)

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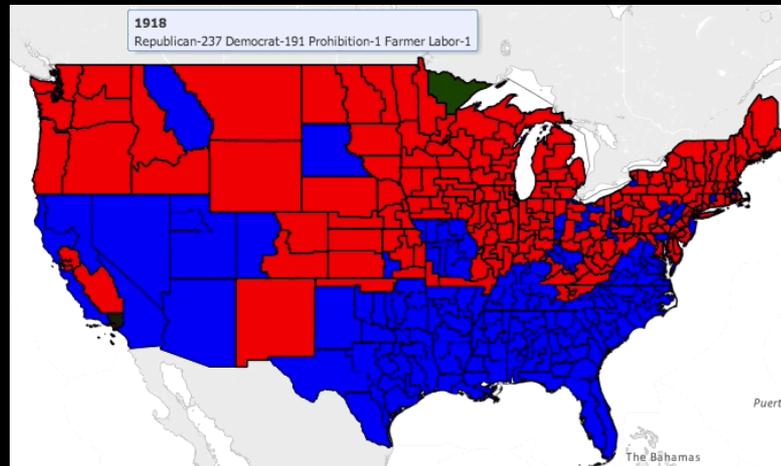
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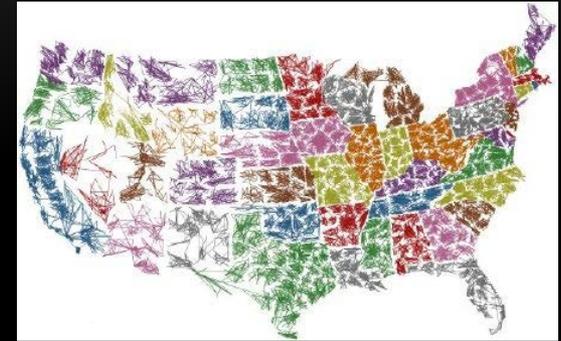
# WHAT IS A GEOGRAPHIC INFORMATION SYSTEM

- A GIS is at its core a map making software
  - Merges several specialty fields to synthesize information

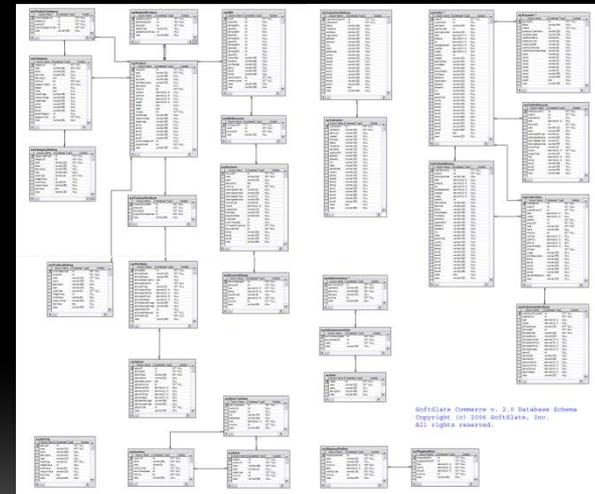


# SYNTHESIZE INFORMATION: DECISION SUPPORT

- Cartography to visualize data
- Statistics to Analyze Data
- Database Structure to manage Data



$$\frac{\partial}{\partial \mu} \ln(L(\mu, \sigma)) = \frac{\partial}{\partial \mu} \left( \ln(2\pi\sigma^2) - \frac{1}{2\sigma^2} \sum_{i=1}^n (x_i - \mu)^2 \right) = 0$$
$$\frac{\partial}{\partial \mu} \left( \ln(2\pi\sigma^2) - \frac{1}{2\sigma^2} \sum_{i=1}^n (x_i - \mu)^2 \right) = \frac{1}{\sigma^2} \sum_{i=1}^n (x_i - \mu) = 0$$
$$\sum_{i=1}^n (x_i - \mu) = 0 \Rightarrow \sum_{i=1}^n x_i - n\mu = 0 \Rightarrow \mu = \frac{\sum_{i=1}^n x_i}{n}$$
$$\frac{\partial}{\partial \sigma} \ln(L(\mu, \sigma)) = \frac{\partial}{\partial \sigma} \left( \ln(2\pi\sigma^2) - \frac{1}{2\sigma^2} \sum_{i=1}^n (x_i - \mu)^2 \right) = 0$$
$$\frac{\partial}{\partial \sigma} \left( \ln(2\pi\sigma^2) - \frac{1}{2\sigma^2} \sum_{i=1}^n (x_i - \mu)^2 \right) = \frac{1}{\sigma} - \frac{1}{\sigma^3} \sum_{i=1}^n (x_i - \mu)^2 = 0$$
$$\frac{1}{\sigma} = \frac{1}{\sigma^3} \sum_{i=1}^n (x_i - \mu)^2 \Rightarrow \sigma^2 = \frac{1}{n} \sum_{i=1}^n (x_i - \mu)^2$$



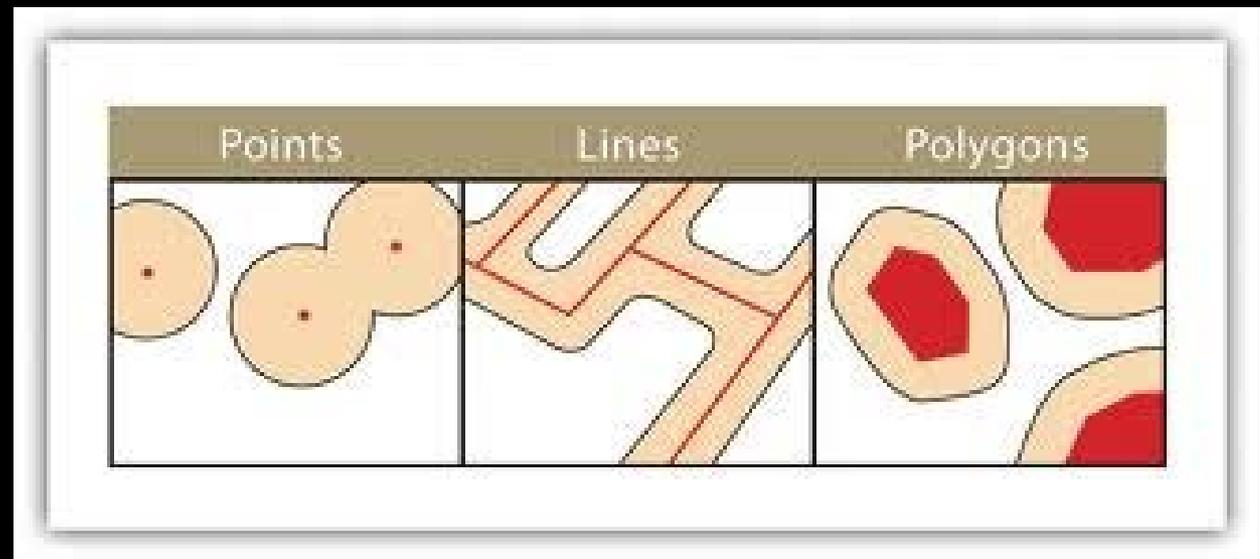
# DECISION SUPPORT

- Data collection and management
  - Scholarly Research
  - To help solve community problems spatially and analytically
  - Powerful Visual Aides for Education
-

# WHAT IS A SHAPEFILE

- A vector shapefile is a point, line, or polygon that is assigned a specific spatial position which contains significant data attributes.

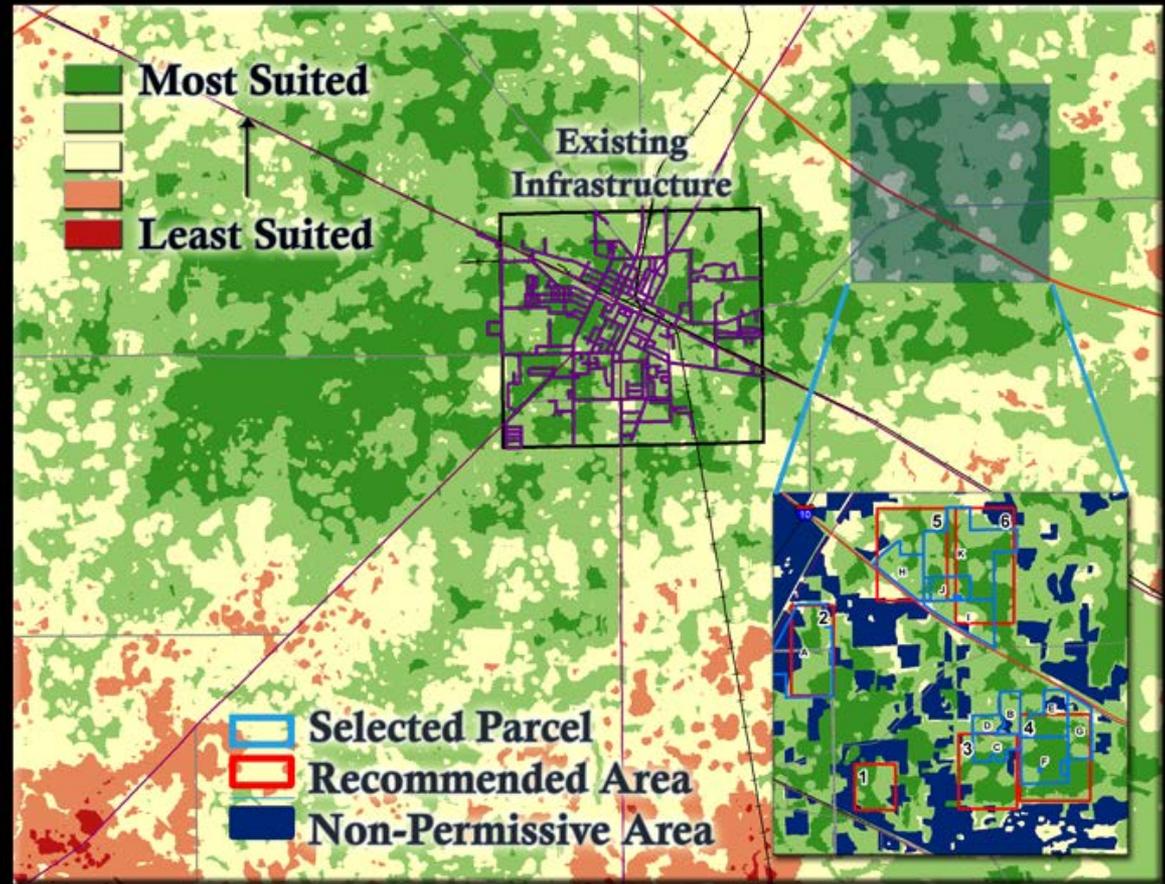
- Point
- Line
- Polygon



2	Polygon	48	92	93	92	1918	66	California	006063072001	1	D
4	Polygon	227	523	524	523	1920	67	California	006063072001	1	D
6	Polygon	371	950	951	950	1922	68	California	006063072001	1	D
8	Polygon	577	1384	1385	1384	1924	69	California	006063072001	1	D
10	Polygon	762	1818	1819	1818	1926	70	California	006063072001	1	D
11	Polygon	951	2252	2253	2252	1928	71	California	006063072001	1	D
12	Polygon	1126	2687	2688	2687	1930	72	California	006063072001	1	D

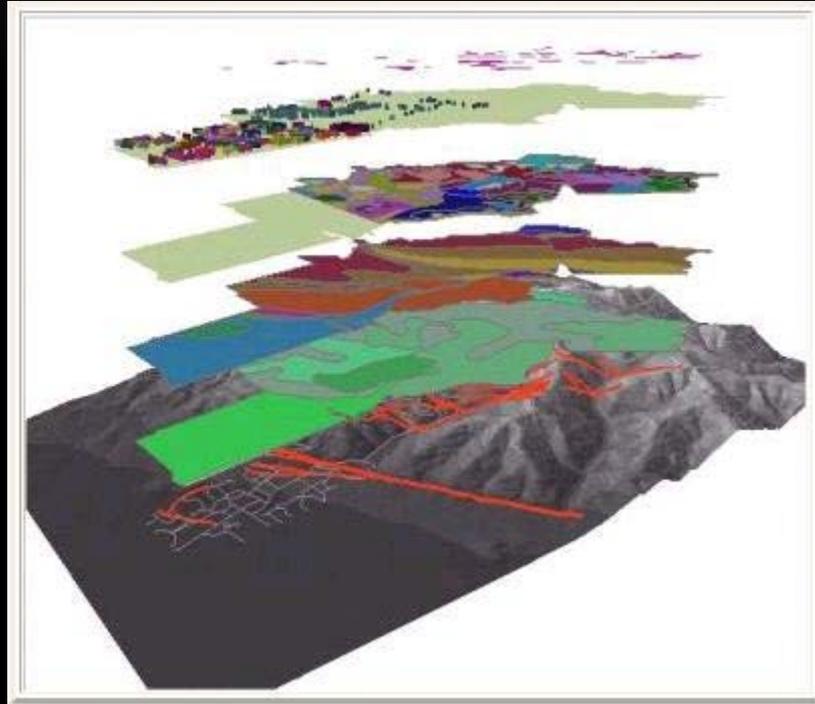
# SITE SUITABILITY ANALYSIS

- Proximity
  - Roads
  - Water
  - Electricity
- Elevation
- Distance
- Slope



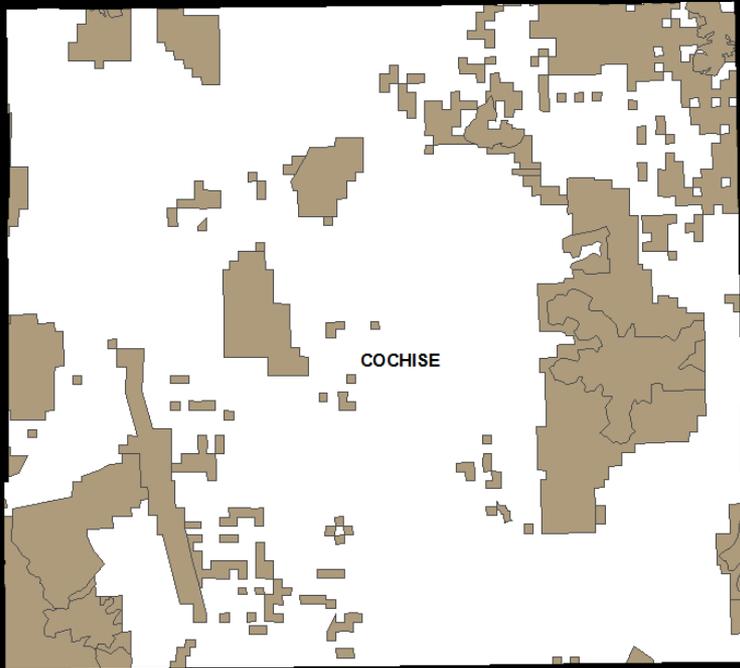
# SPATIAL REFERENCE

- Added Detail to known Resources
- Increase local Infrastructure
  - Roads
  - Sewer
  - Powerlines

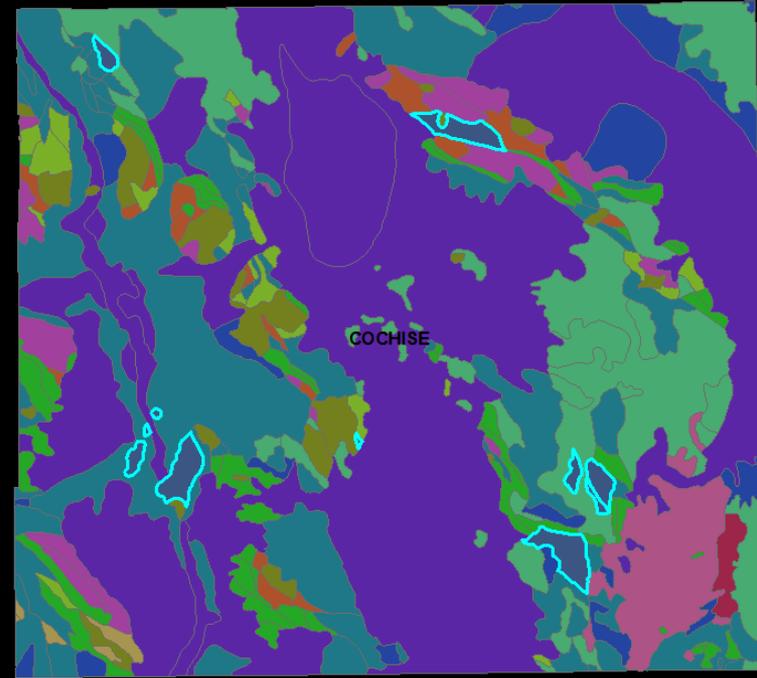


# RESOURCE MANAGEMENT

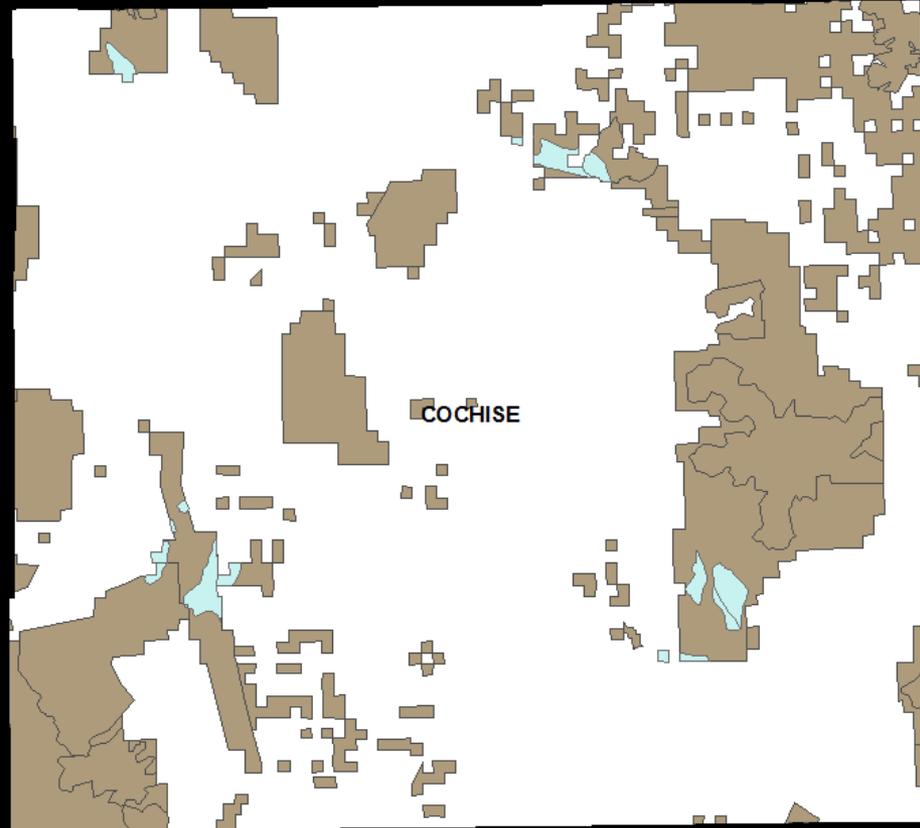
Federal Land



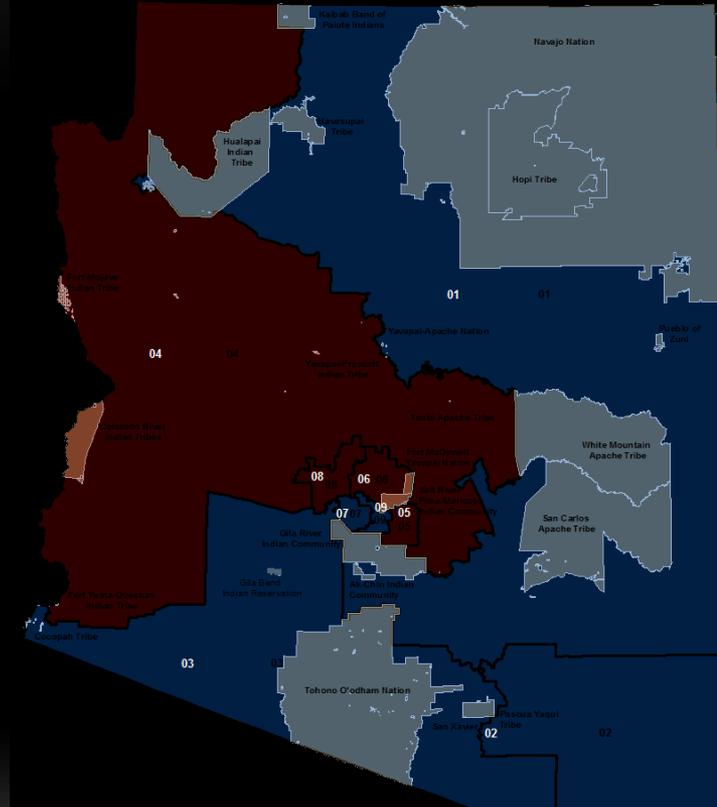
Geological Features



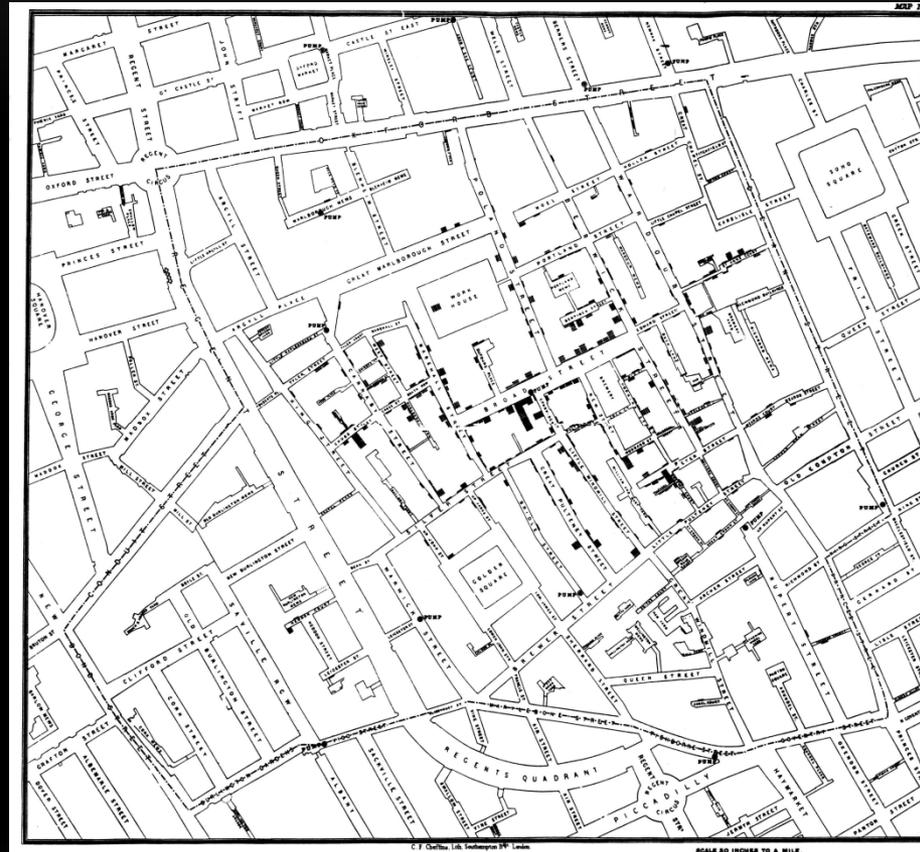
# RESOURCE MANAGEMENT



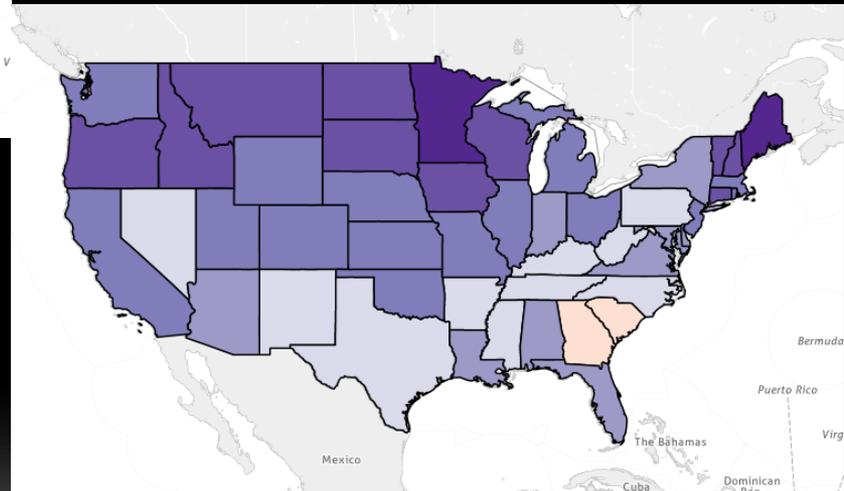
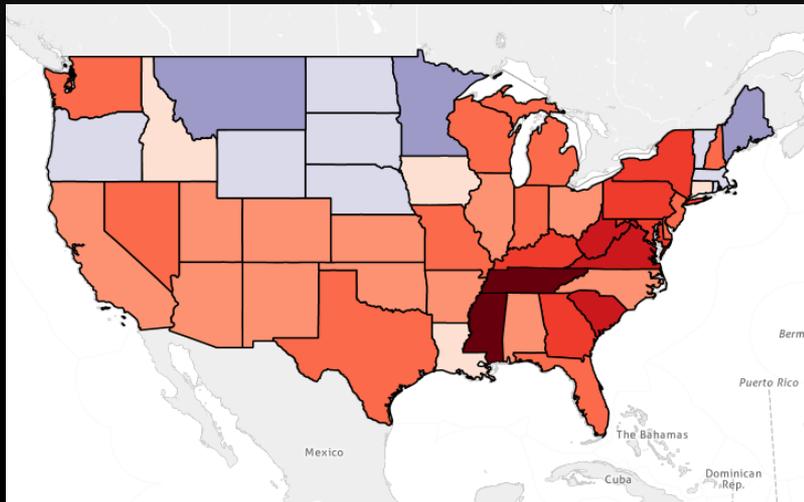
# EDUCATIONAL PURPOSES



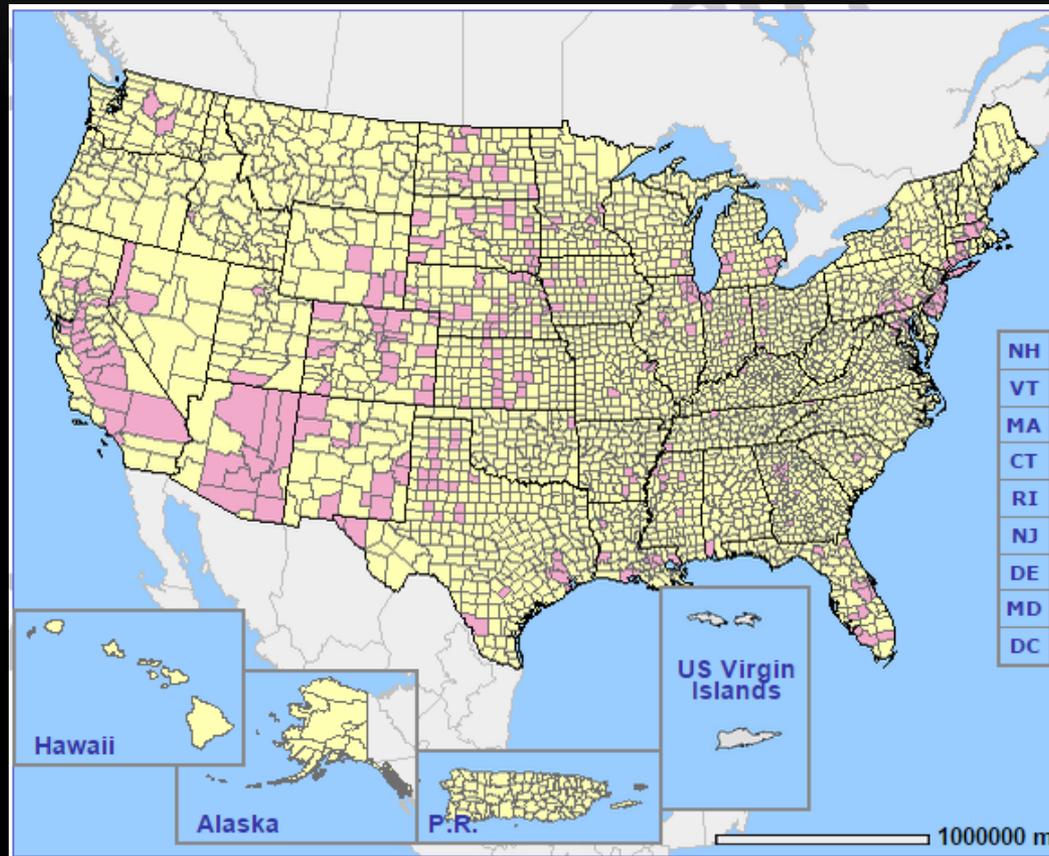
# GIS & EPIDEMIOLOGY



# RESEARCH & TREND ANALYSIS



# RESEARCH & TREND ANALYSIS: WEST NILE



1,019 Cases in 2010



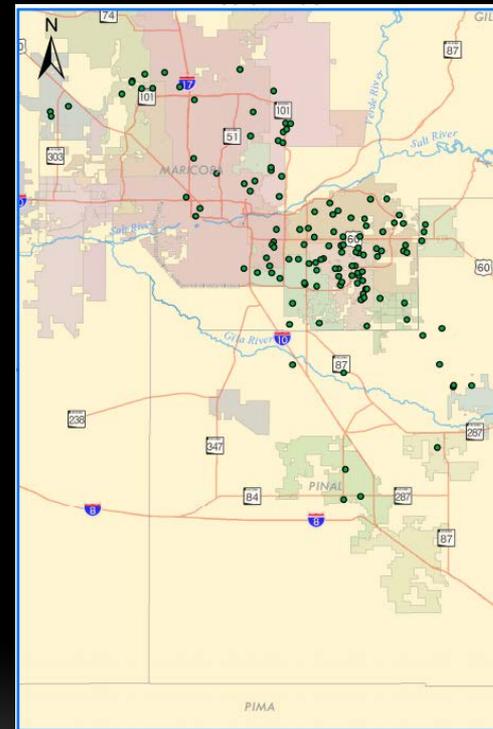


# RESEARCH & TREND ANALYSIS: WEST NILE

Mosquito

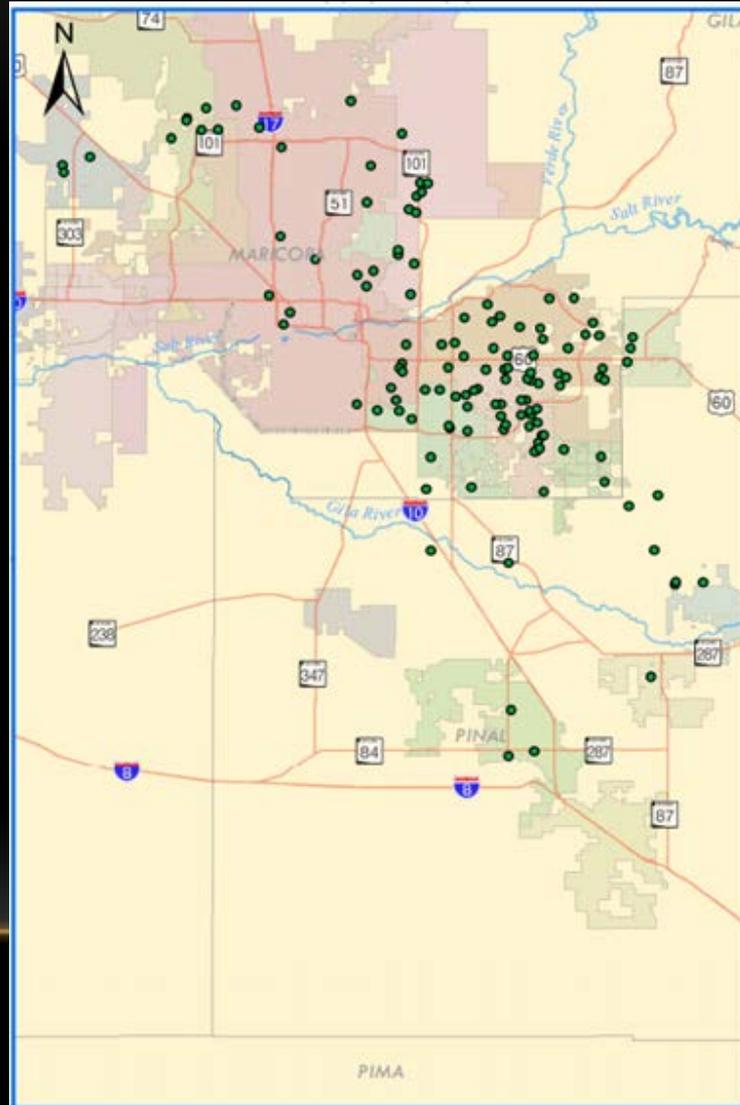


Human



Maps courtesy ADHS

# RESEARCH & TREND ANALYSIS: WEST NILE 2010



# SERVICES

- GIS Training
- Technical Assistance
  - Build Internal Capacity
- Customized Mapping
- Data Creation

