



Integrating GIS into the El Dorado County Public Health Department

A practical guide, lessons learned and current projects in a small local health department

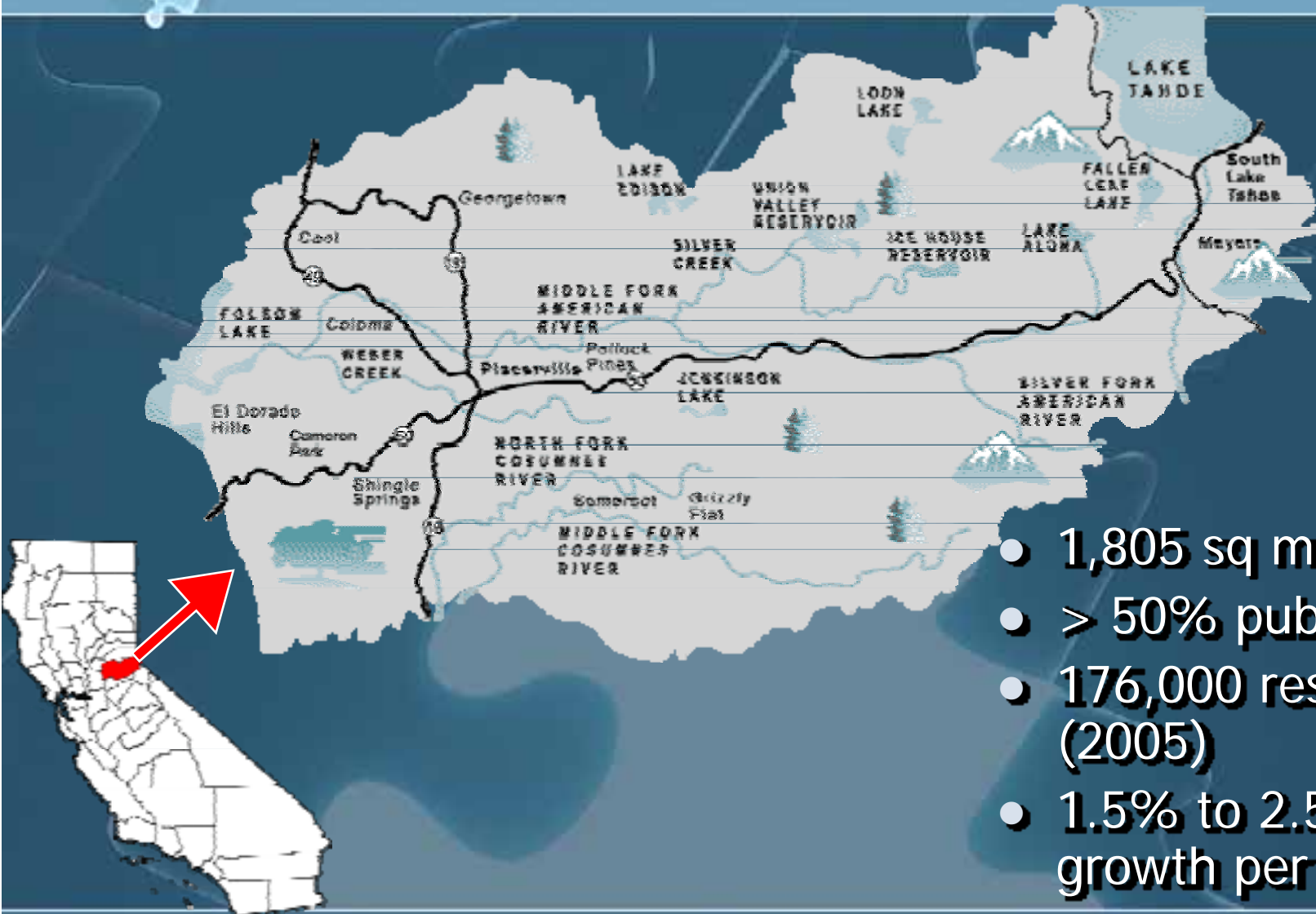


Presentation Overview

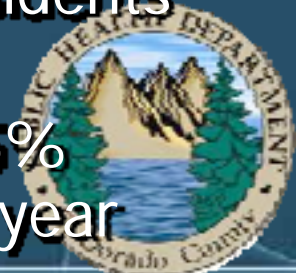
- How we got GIS off the ground in a small local health department
- Ahhh Acceptance: Current GIS projects in El Dorado County
- Final thoughts



El Dorado County



- 1,805 sq miles
- > 50% public land
- 176,000 residents (2005)
- 1.5% to 2.5% growth per year





Me

- EDC employee for 5 months.
- After Masters -> Excited about neural networks, spatial analysis, E Bayes and other fancy tools.
- Local Health Department (LHD) -> Have practical needs that require simple solutions
 - Exploratory Spatial Data Analysis
 - Spatial Modeling (although many applications)
- Applied GIS for LHD's is fundamentally different than academic research.





GIS in a small health dept?

- Yes -> Public Health starts at the County
- Person, Place and Time
- Supports Core Public Health Functions
 - Understand the community
 - Understand distribution of disease
 - Better prepare for emergencies
- GIS forces geographic thought



GIS as a concept in a LHD

- LHD are not plastic -> change is resisted
- Advocates are required to create change. Knowledge is key...education
- GIS is:
 - Expensive
 - Technical (personnel and hard/software)
 - Time Consuming
- GIS requires justification





STEP 1: Justify!

- **Communicable Diseases/Epidemiology**
 - Understanding the current and historical distribution of disease
- **Environmental Health**
 - Vector Control & Air/Water
- **Disaster Preparedness**
 - Plume Analysis, Emergency organization and transportation
- **Healthcare Planning and Policy**





Step 2: GIS costs \$\$

- Since we are all customers of ESRI, we know GIS costs mucho \$\$\$
- Disaster Preparedness
 - Easy to justify (many applications)
 - Available funds
- Health Information: Challenge Grant (NACCHO)
- Multi-year grants
- Once GIS is approved it can be adapted to other applications





Step 3: Education

- GIS is not 길버트
- Presentations for Directors & Managers to understand the capabilities and limitations of GIS...
- GIS is a tool
- Overcome boundaries by directly addressing concerns:
 - Limits: Ecological fallacy/ Gee Whiz effect
 - Privacy/Political
 - Applicability to various departments
- Follow up presentations with individual meetings to facilitate dialogue





Demonstrate GIS Capabilities:

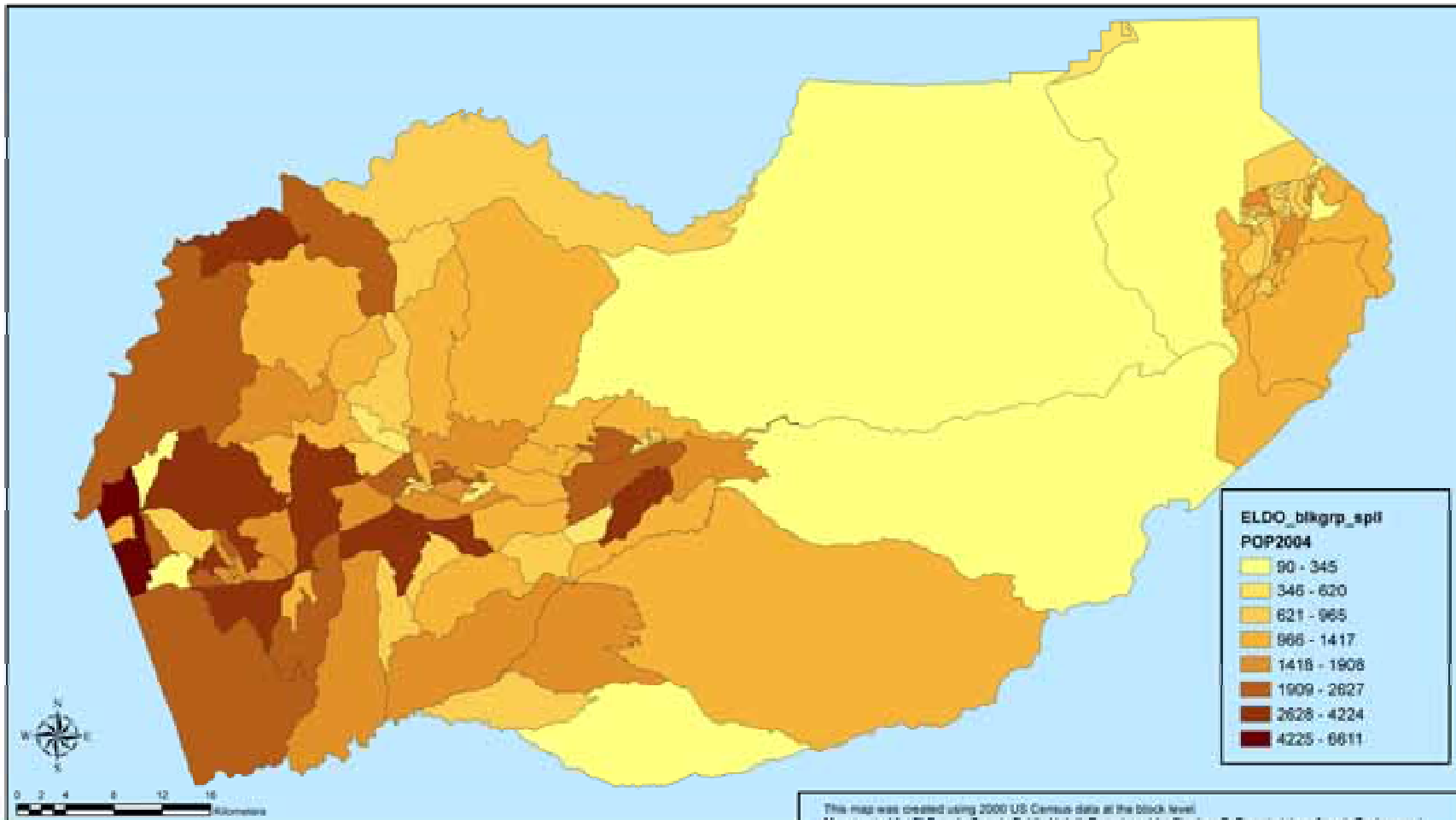
- Low hanging fruit
- Prime opportunity to illustrate the benefits of GIS
- Keep it simple
- Make it look good





Where are the people?

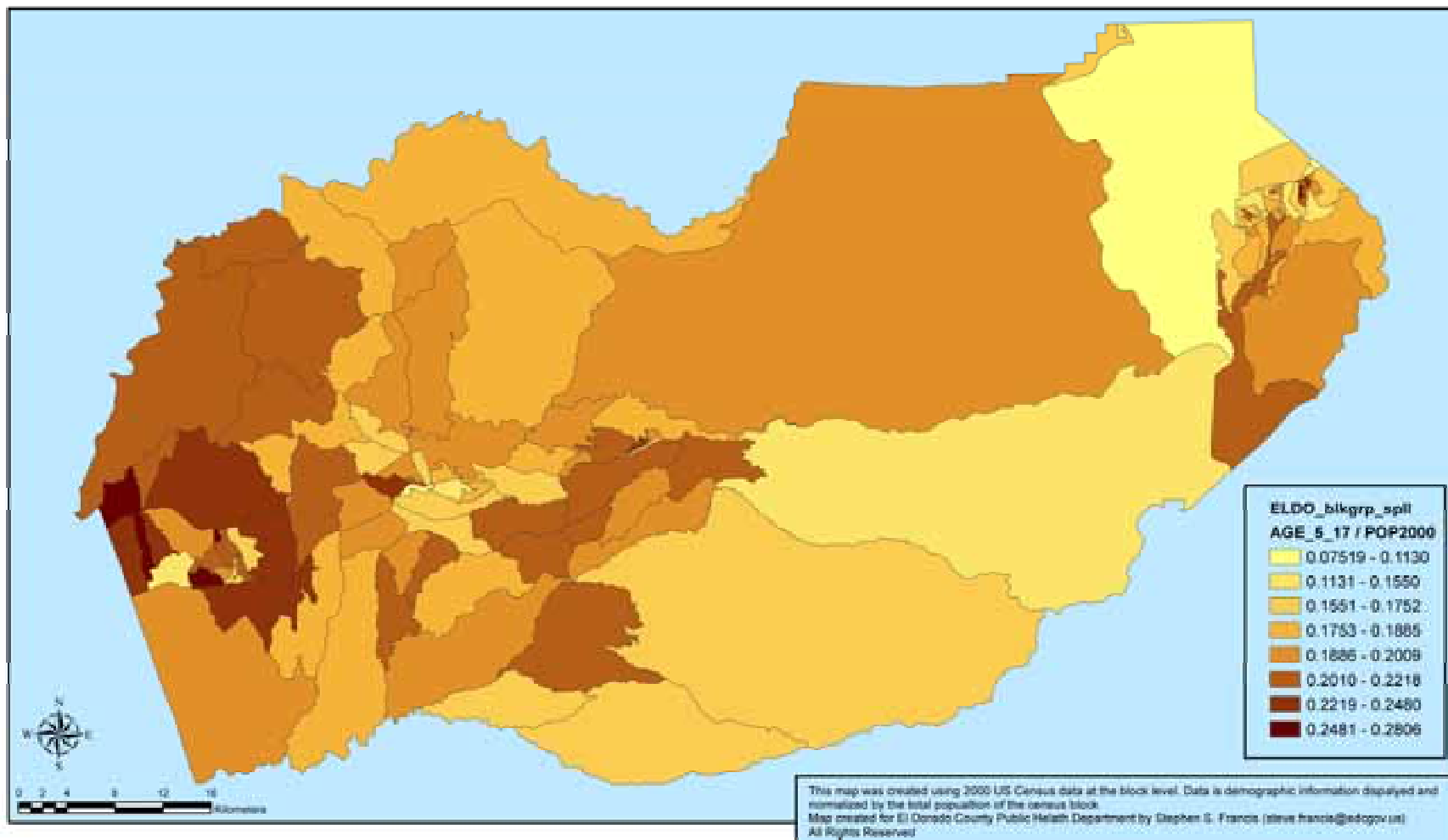
El Dorado County Census Demographics: Population 2004



This map was created using 2000 US Census data at the block level.
Map created for El Dorado County Public Health Department by Stephen S. Francis (steve.franco@edocps.net)
All Rights Reserved

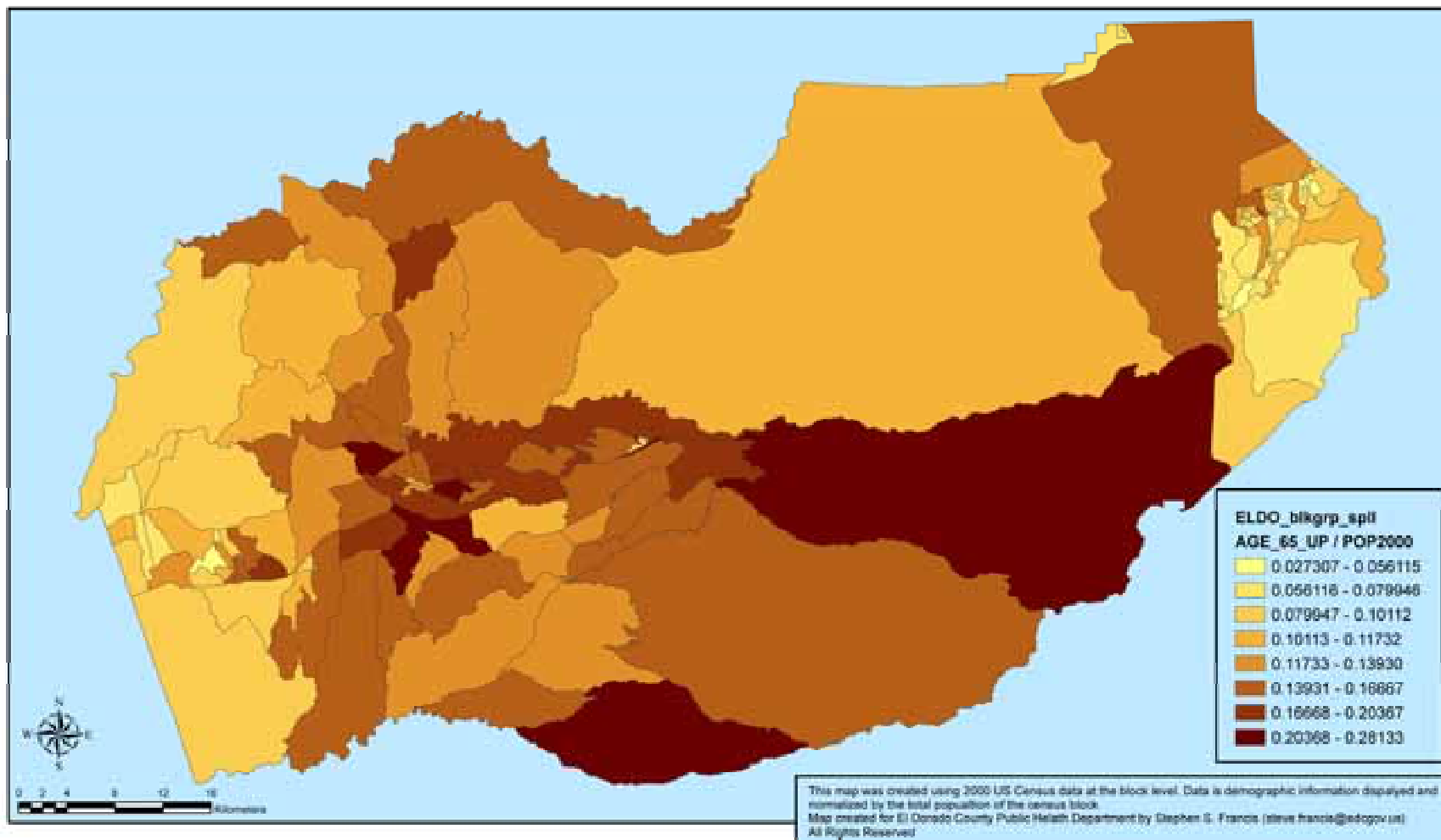
Where are the young people?

El Dorado County Census Demographics: AGE 15-17/Population 2000



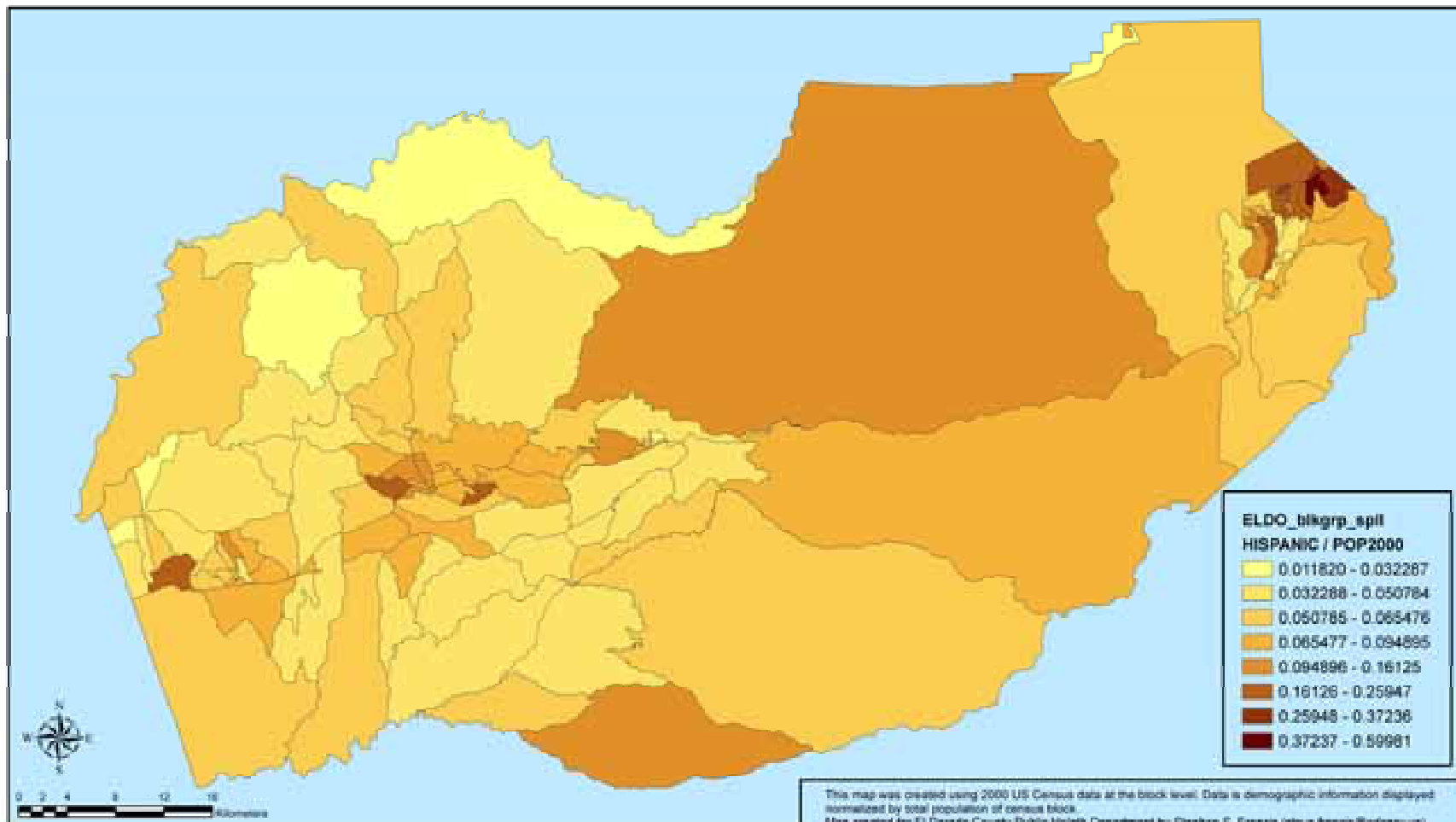
Where are the old people?

El Dorado County Census Demographics: AGE 65_UP/Population 2000



Where are different Races?

El Dorado County Census Demographics: Hispanic/Population 2000





Low Hanging Fruit: Demographics

- Understand population distribution
- Target at risk populations
- Organize health education efforts effectively
- Plan better plan outreach targets





Where is Disease?





Low Hanging Fruit: Disease Rates

- Simple disease rates with census based denominator are powerful tools for understanding the community
- Simple projects help others to understand the analytical power
- Caution: Be aware and make others aware of data limitations





GIS Analyst Must Be:

- Informed
- Accurate
- Responsible
- Honest
- Ethical
- Marketer as well as Producer

CAUTION

Maps Can Lie





Step 4: Data, Data and More Data

- County System = Loads of data
- High spatial resolution=
 - Geocoding (parcels, street ranges)
 - # of toilets are in El Dorado County
- Local Sources: County Surveyor, DOT, Planning Commission, Tax Assessor, Irrigation District (water), etc.
- Free Data!! But offer return product
- Metadata!





Step 5: Training

- Expand GIS knowledge to other staff
- Organize county specific exercises
 - Using real county data
 - Addressing real county problems
 - Based on studies
- Train Staff/Students in GPS-> great field data collectors!





Changing Gears: Current Projects

- Almost too many projects
- After presentations and individual meetings GIS has been welcomed with open arms
- Project prioritization has become key
- Collaborations have opened dialogue between agencies





Current Projects: CMR

- Geocoding all CMR's for past 5 years
- 30-35% are P.O. boxes!
- Zip codes capture near 100%
- Created Health Districts around local structure and census blockgroups
- Geographic thought in data collection





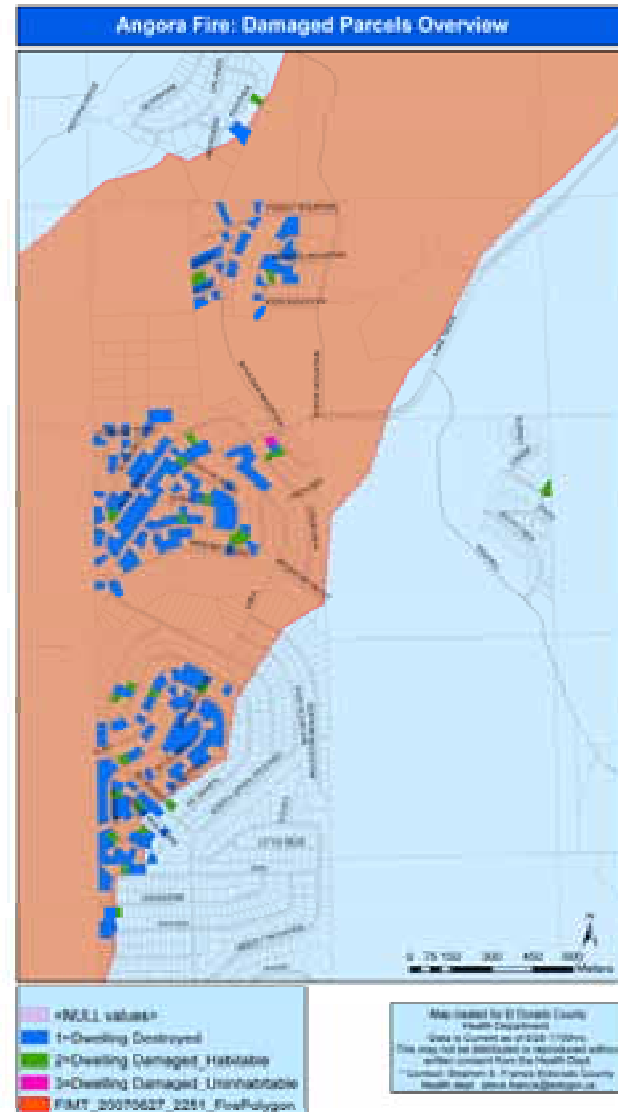
Current Projects: CMR

- 70-75% is usable data
- SatScan space/time cluster
- Density based incidence identified Chlamydia concentration in one Hispanic community's
- Race info is rarely accurate
- Simply looking at association then examining raw data (place matters)



Current Projects: Disaster Response

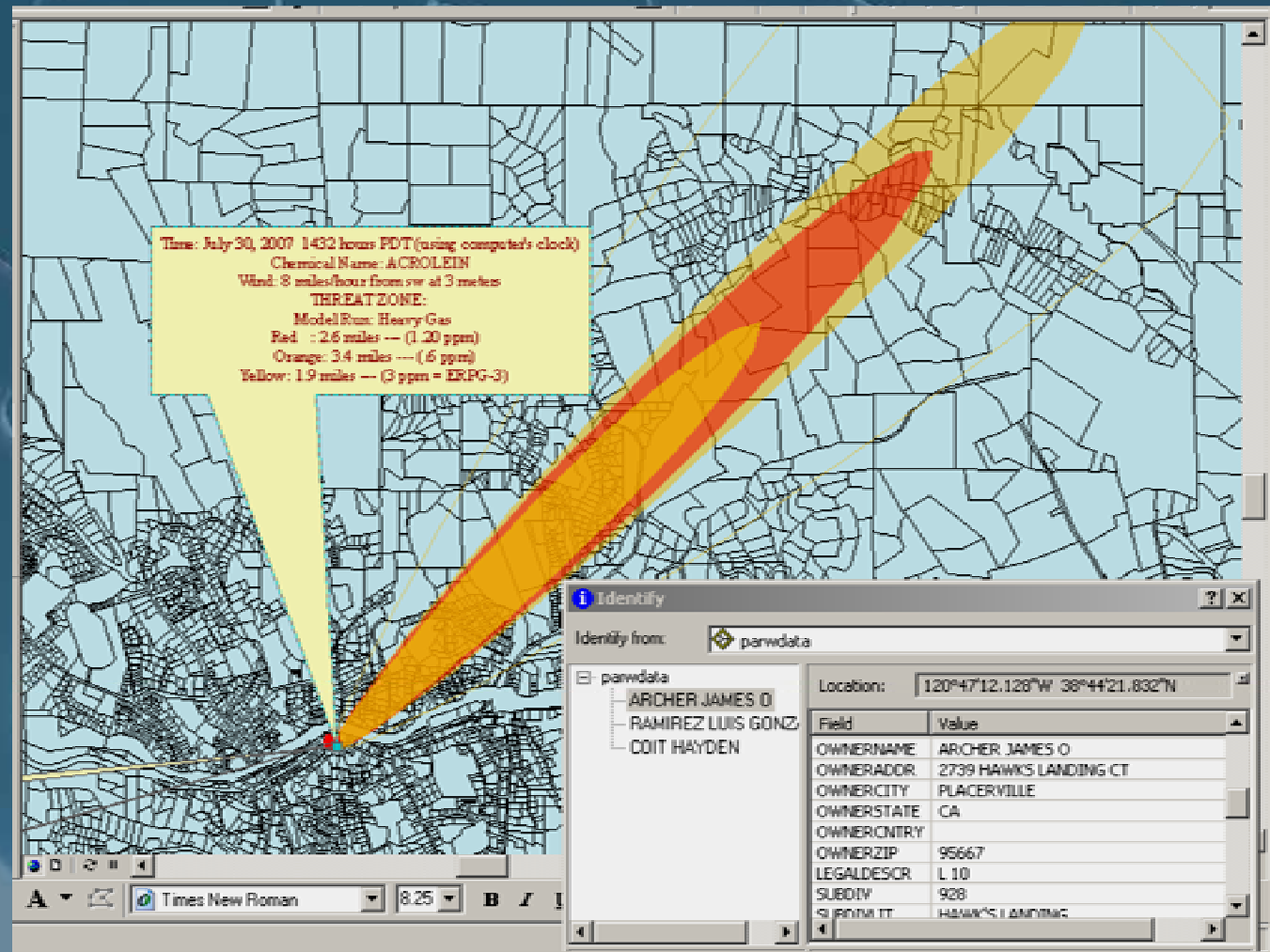
- Preparation for disaster is key
- Data "ready to go"
- Angora Fire:
 - Aided in designating damaged parcels
 - Facilitated contacting owners
 - Cleanup





Current Projects: Disaster Response

- Plume Analysis:
- Aloha (EPA) +
- Mobile weather station +
- Parcel and other data =
- Damn good plume analysis

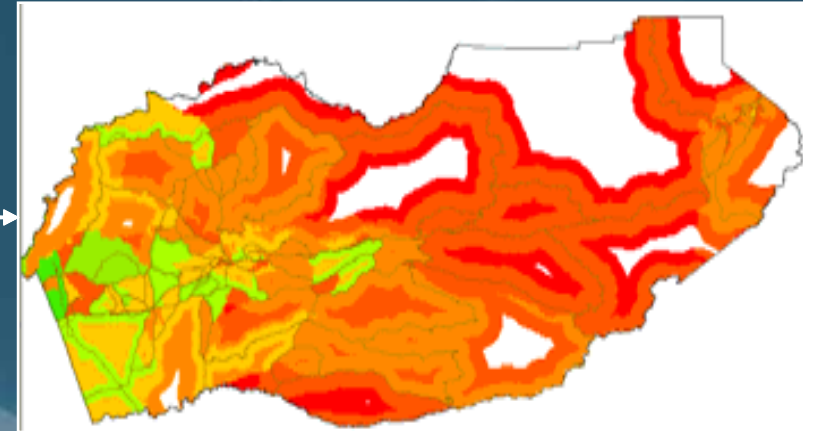
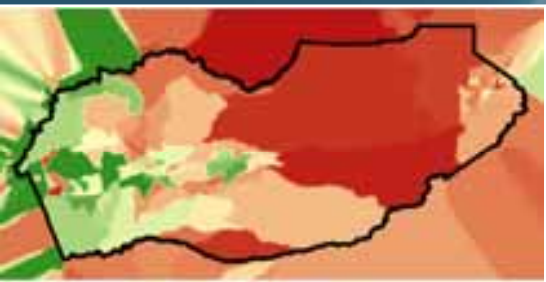
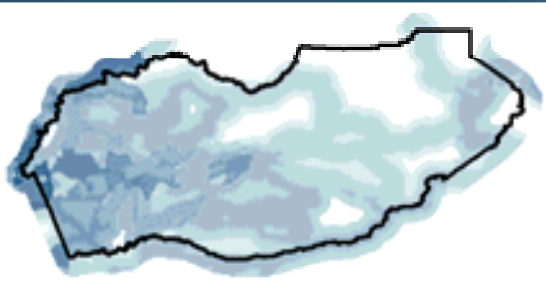
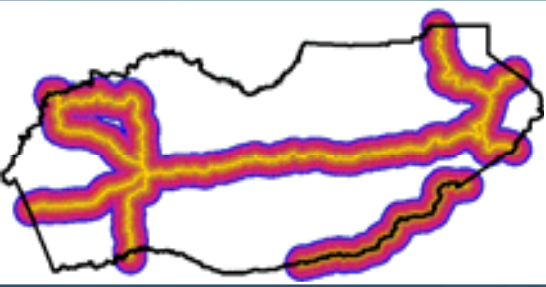
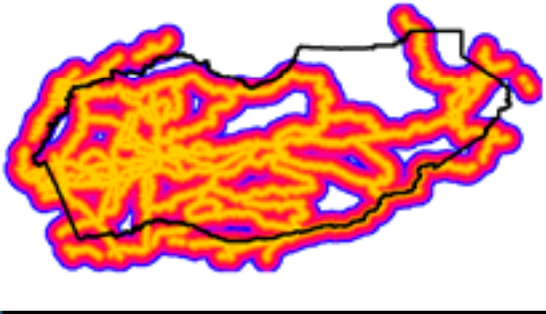




Current Projects: Disaster Response



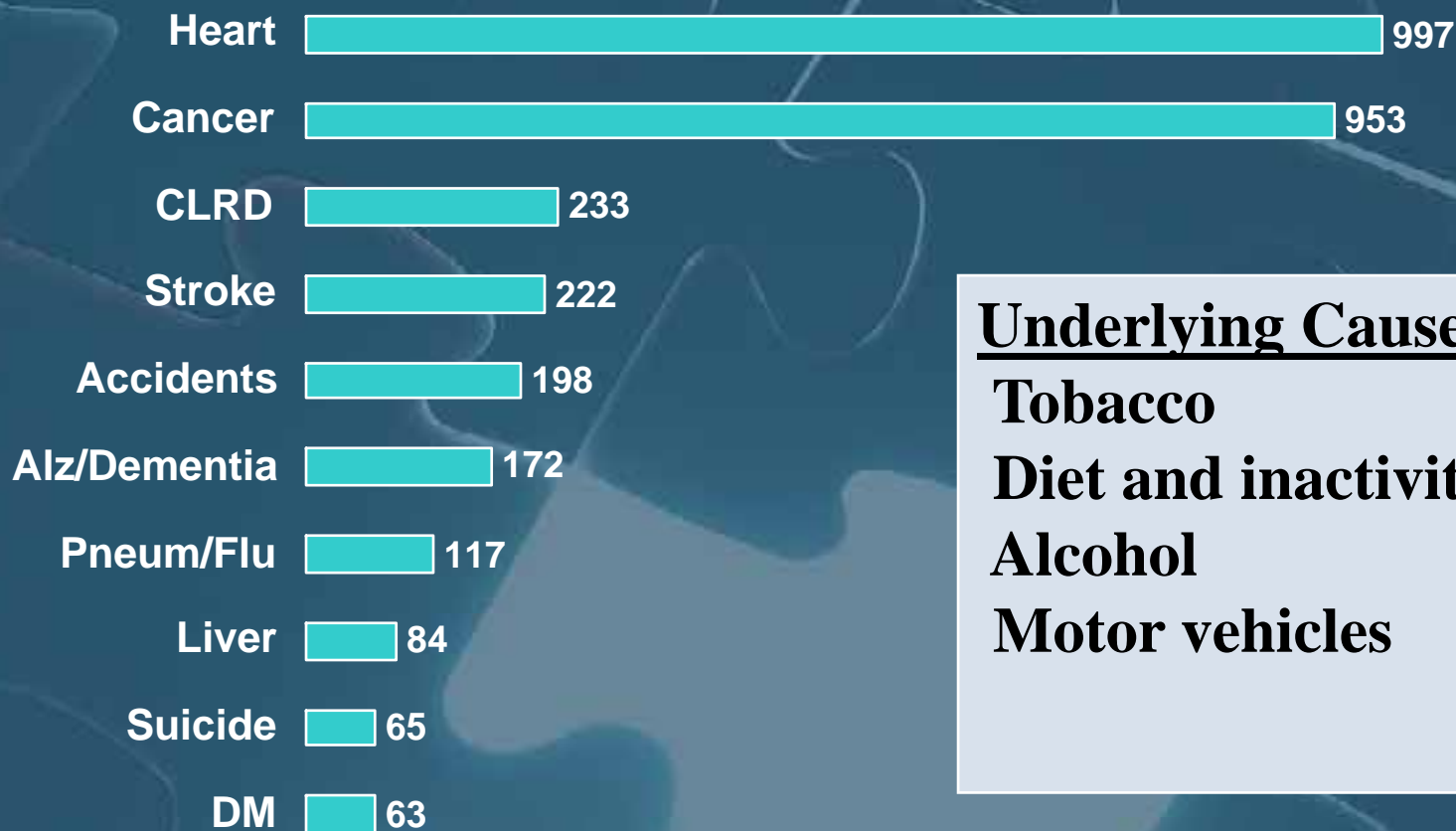
Current Projects: Disaster POD



Simple weighted
overlay = most suitable
areas for POD
placement



Top 10 Underlying Causes of Death in El Dorado County Residents 2002-2004



Underlying Causes:

Tobacco

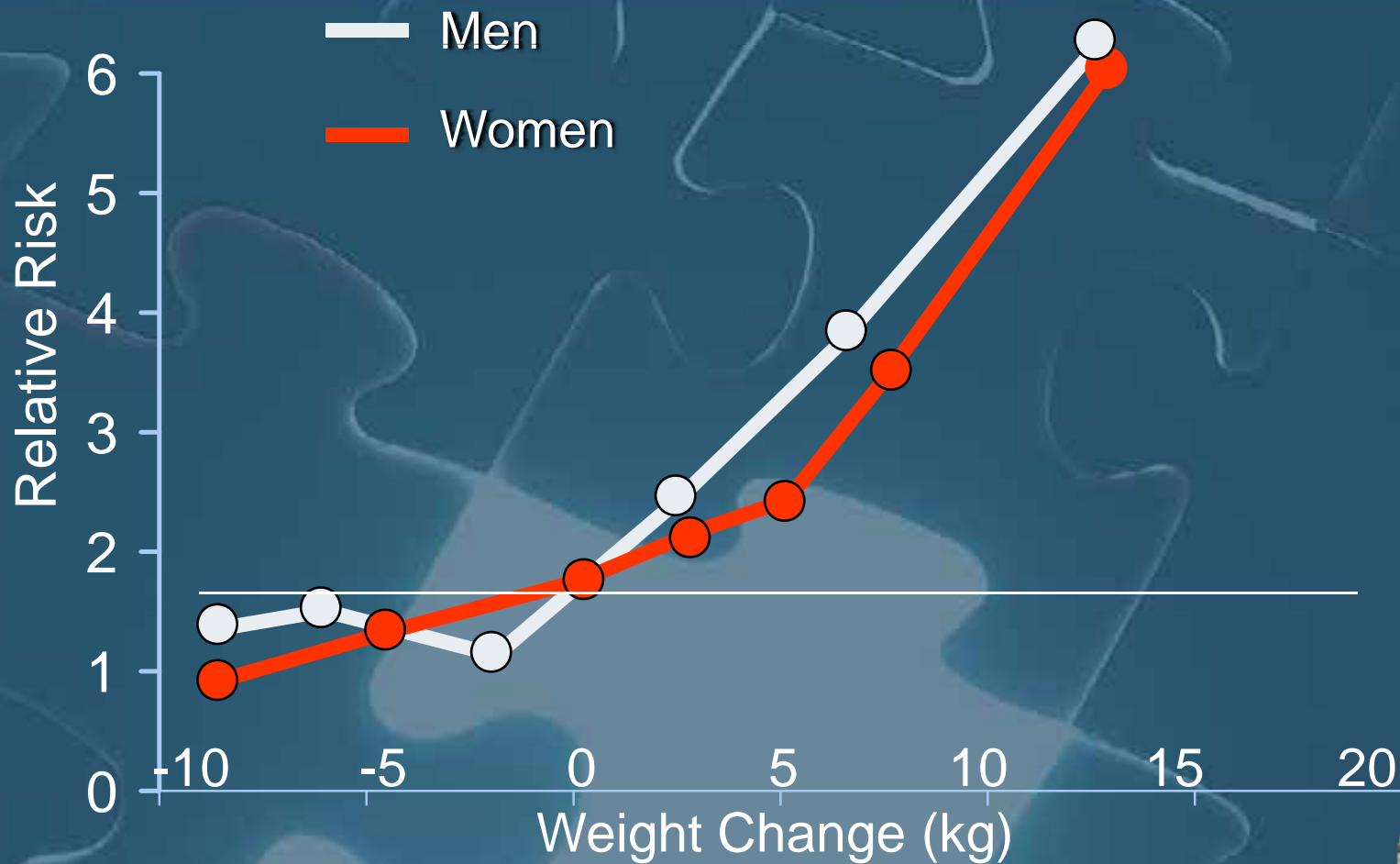
Diet and inactivity

Alcohol

Motor vehicles



Weight Gain in Adulthood and Risk of Type 2 Diabetes Mellitus



Willett et al. *N Engl J Med* 1999;341:427.





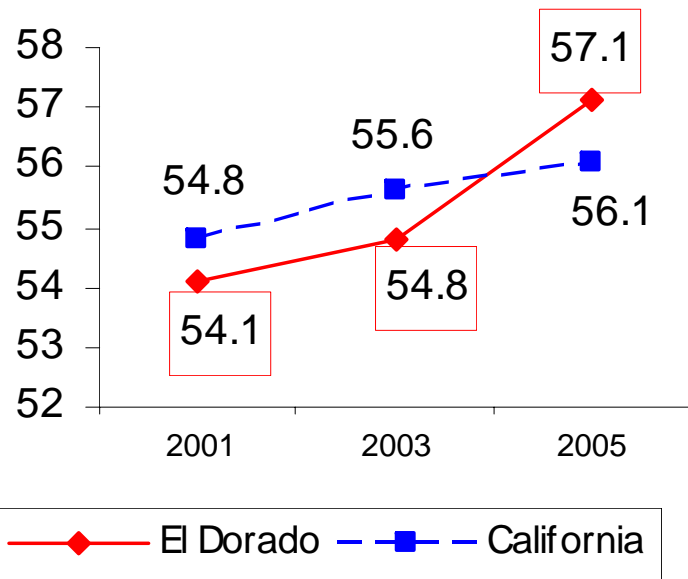
Gastric Bypass

- 14,089 in 1998 (7/100,000)
- 82,636 1992 (38.6/100,000)
- Treatment, surgeries, care and other services add up to ~\$75 billion in costs to our Medicare/Medicaid programs (Source: Finkelstein, Fiebelkorn, and Wang, 2004).



Obesity in El Dorado

2001 - 2005 Percent of Overweight/Obese Adults (BMI over 24.9)



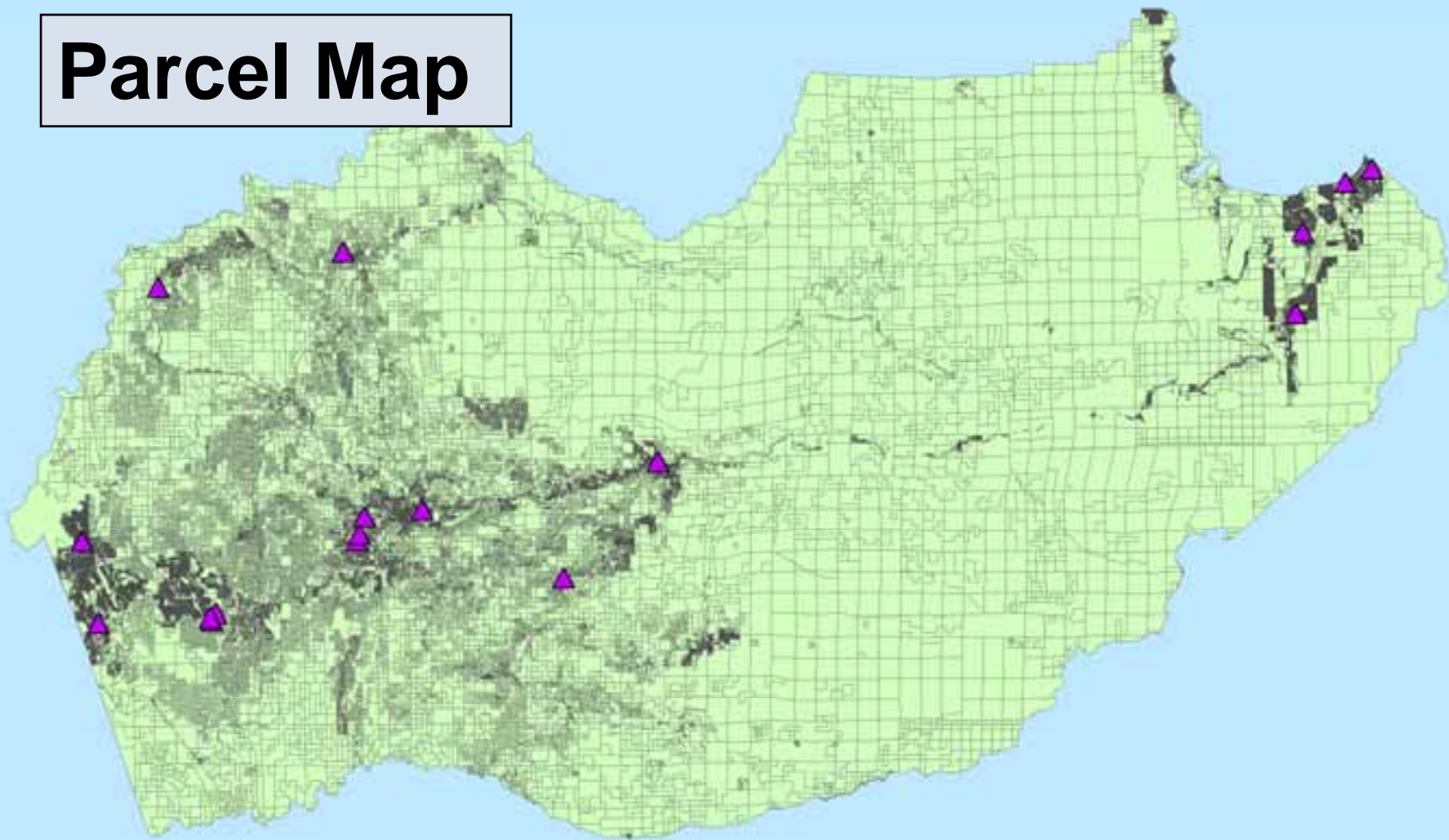


Study: Access food

- How many households in El Dorado County can walk from their homes to:
 - Supermarkets/markets? (+/- healthy food sources)
 - Fast food outlets? (+/- less than healthy food sources)
- Using Network Distance
- Assuming prefect sidewalk network ;)
- Preliminary= Parcels (currently cleaning residence data)



Parcel Map



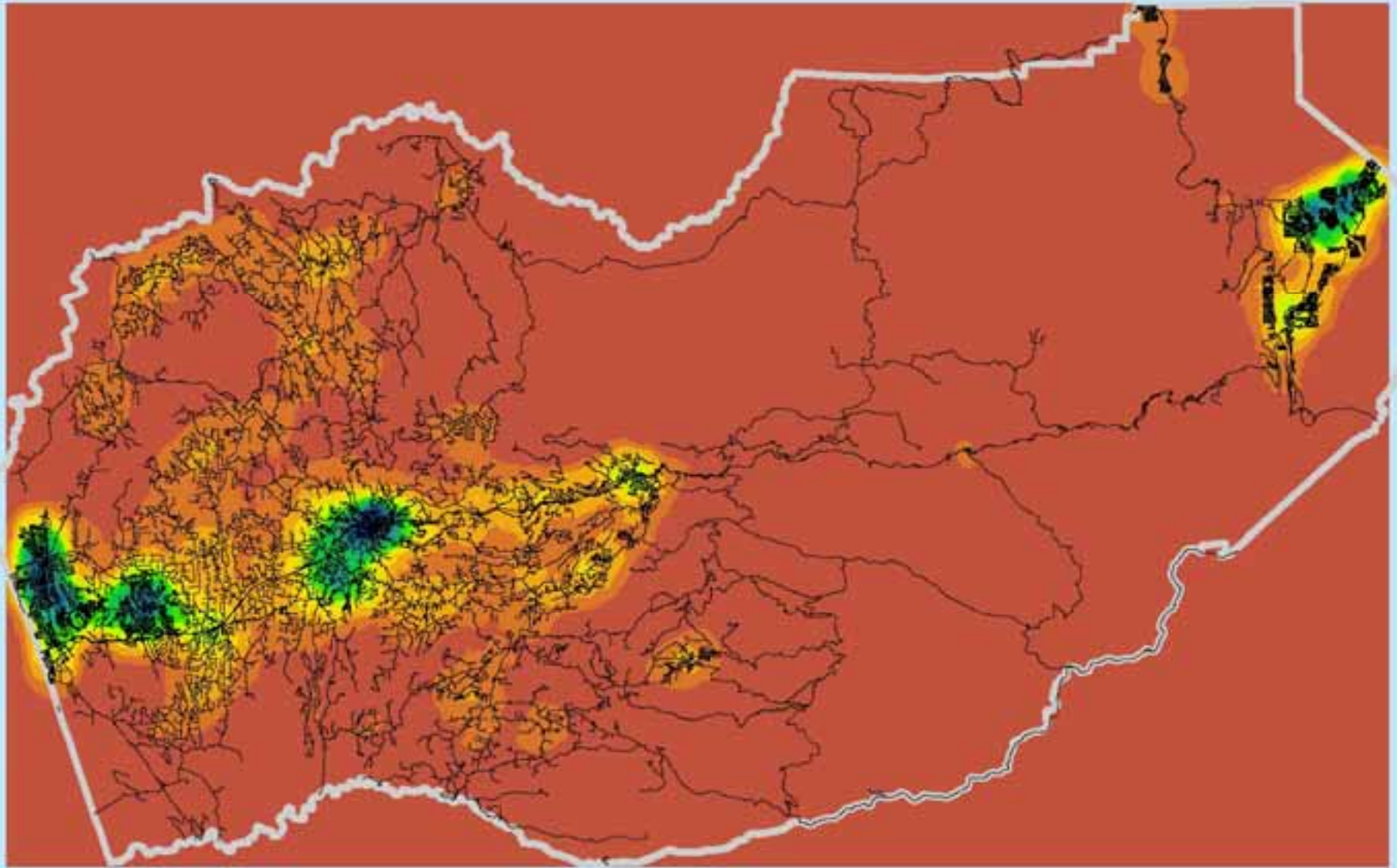
Supermarket Locations N=17

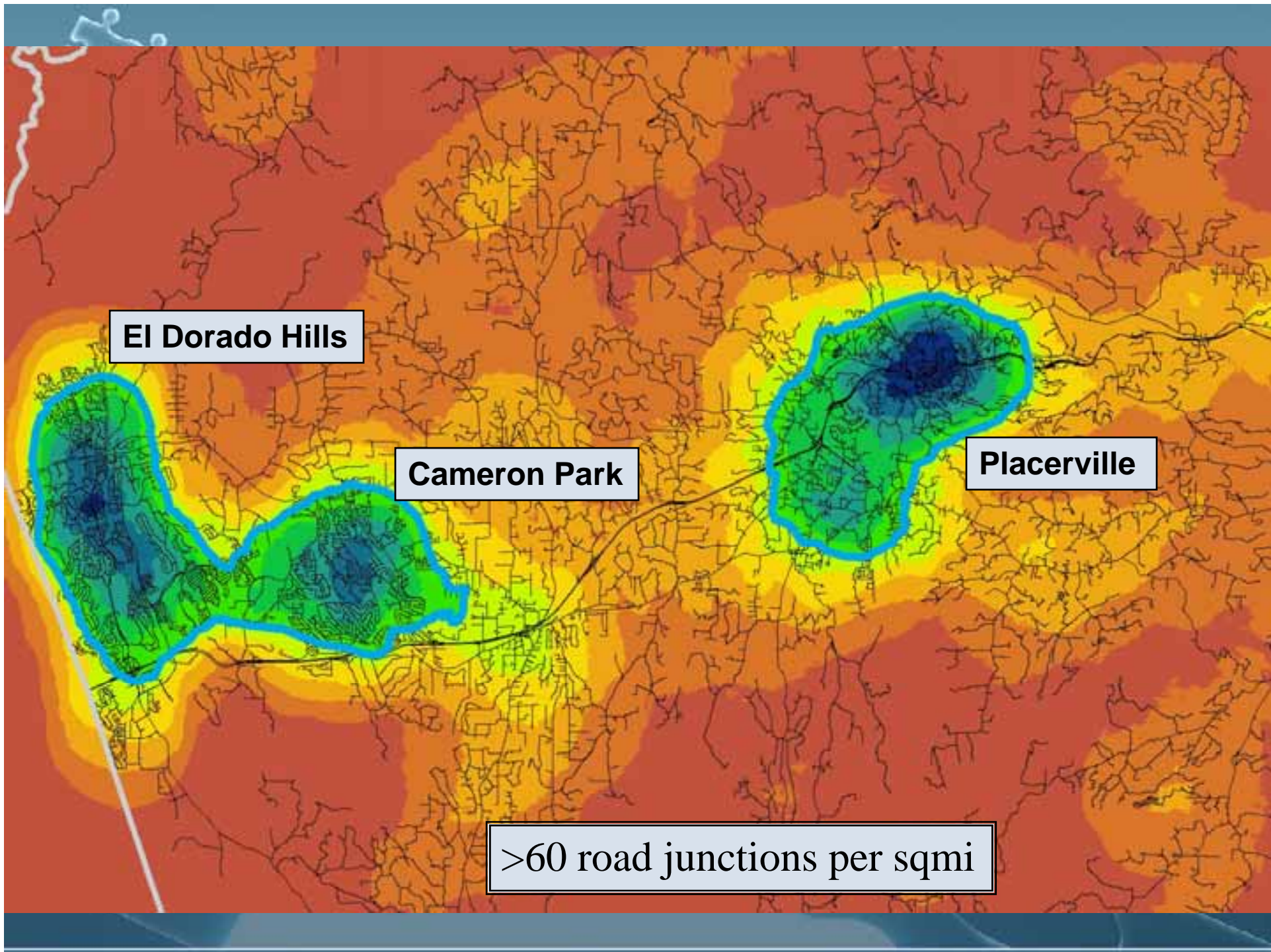
Walking Isn't an Option

- Of 73,387 residential parcels in the county
 - 0.6% are within $\frac{1}{4}$ mile
 - 3.6% are within $\frac{1}{2}$ mile
 - 14.1% are within 1 mile
- About 86% of potential residences are >1 mile from any supermarket
- But aren't they all rural?



Density Interpolation





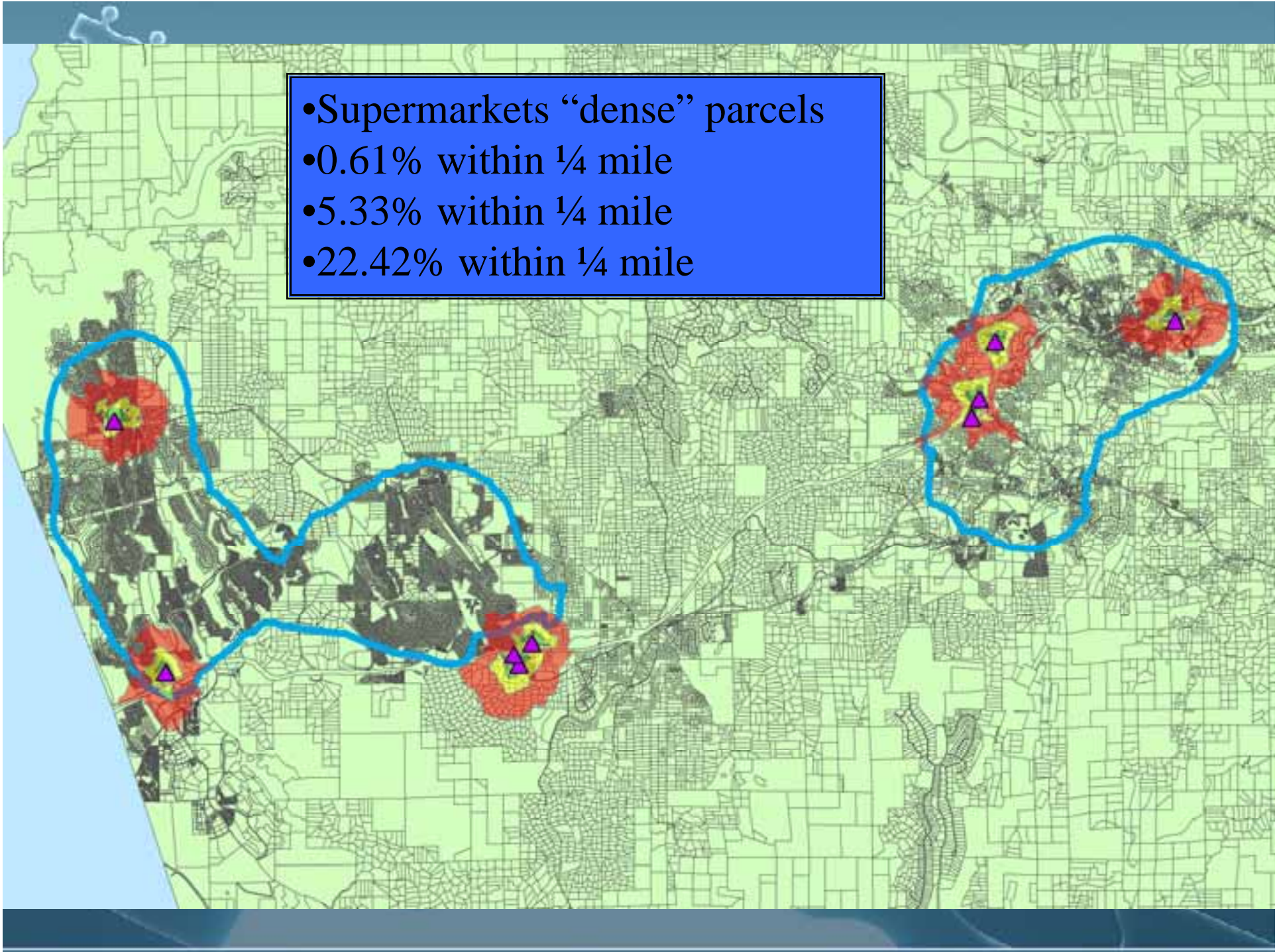
El Dorado Hills

Cameron Park

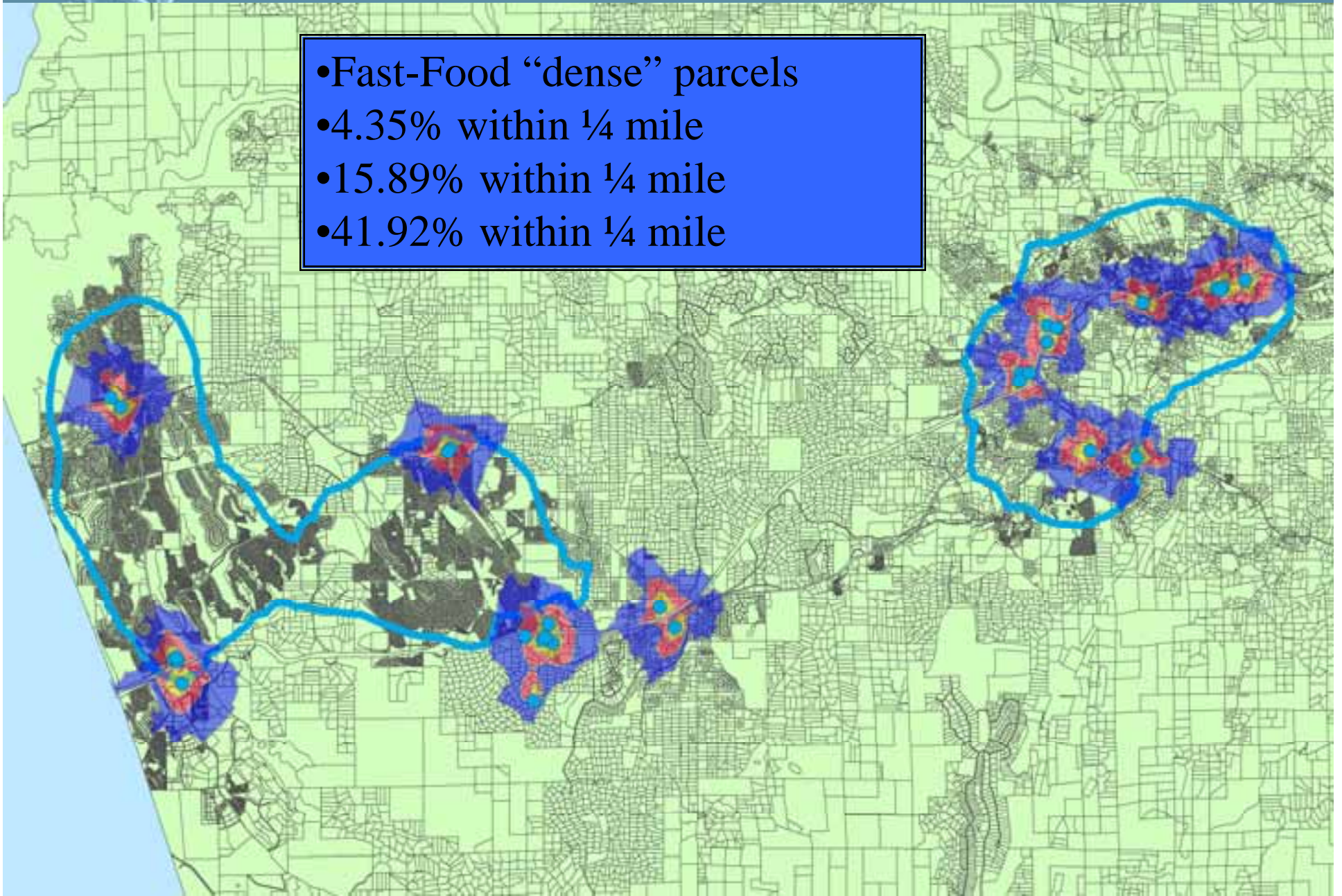
Placerville

>60 road junctions per sqmi

- Supermarkets “dense” parcels
- 0.61% within ¼ mile
- 5.33% within ¼ mile
- 22.42% within ¼ mile



- Fast-Food “dense” parcels
- 4.35% within ¼ mile
- 15.89% within ¼ mile
- 41.92% within ¼ mile





Food Service Study

- Geared towards Board of Supervisors and Planning Board -> influence future zoning and planning
- "There are 2x as many residential parcels within ¼ mile of a bar than a market, is that what you want your community to be?"
- Parallels "Jones Bill"
 - ***AB 437 – Public Health Officers and Improved Planning*** – Health experts agree that the design of our communities impact our health. AB 437 would authorize local health officers to engage in local land use and transportation planning, statutory authority for which they currently do not have. The bill is intended to interject public health considerations (e.g., obesity, asthma) into city/county housing, land use, and transportation planning and approvals.
- Provides a measure of our communities
- GIS is Planning, having GIS in PH gives an edge
- Further study refinement is in process



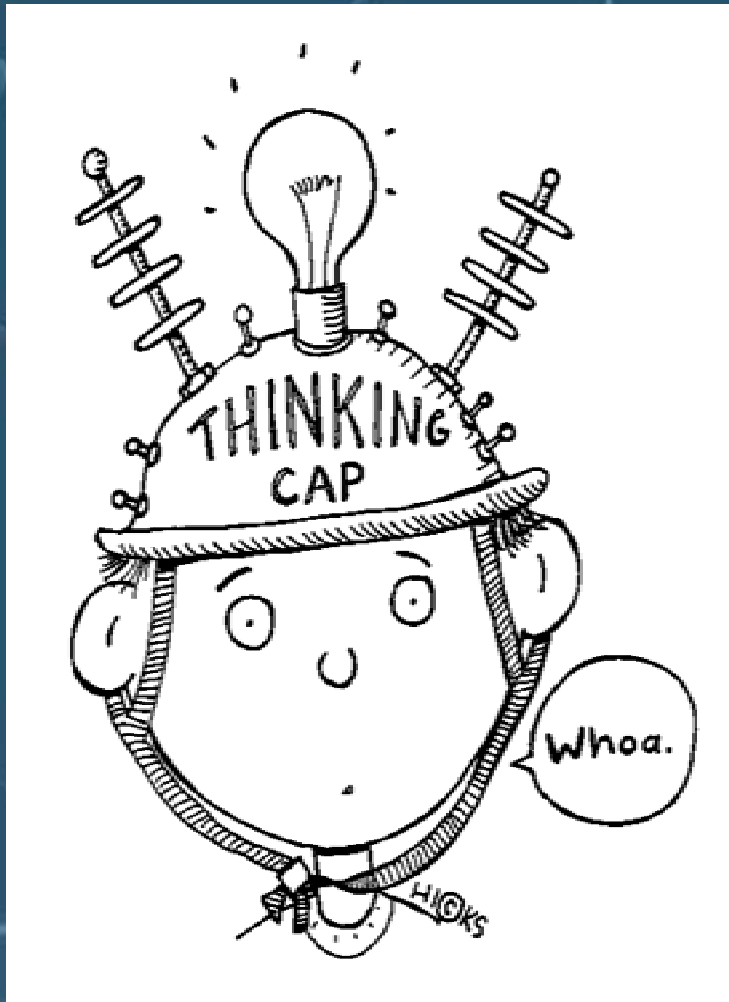


Final Thoughts

- GIS can aid a small LHD by supporting core Public Health functions
- Every division within LHD's can benefit from geographic thought.
 - Data collection
 - Storage
 - Analysis
- GIS analysts can also double as statisticians, and epidemiologists (with proper background)
- Not all LHD's need a GIS analyst (Epidemiologists, Disaster Planners, etc. can serve as Analysts)



Thank You



- El Dorado County:
steve.francis@edcgov.us
 - (530) 621-6148
- Consulting:
ssfrancis@gmail.com
- Questions?

