

Update on NAACCR's GIS Workgroup: Basic Practices Handbook

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Origin of the GIS Workgroup

- ◆ NAACCR Strategic Planning Meeting
 - Monterey, CA. July 26-27, 2000
 - NAACCR Staff and Board of Directors
 - Chairs of NAACCR Committees
 - NCI
 - CDC
- ◆ Discussion of overarching issues and goals and objectives

Appropriate Use of GIS

◆ Primary Issues

- Data quality
- Display of data
- Standards
- Interpretation
- Confidentiality

Responsible Parties

- ◆ Information and Technology Committee
- ◆ Education Committee
- ◆ Uniform Data Standards Committee
- ◆ CDC
- ◆ NCI
- ◆ Health GIS
- ◆ Environmental health community
- ◆ Health Canada

Purpose of the GIS Workgroup

- ◆ Encourage appropriate use of GIS
- ◆ Develop best practices guidelines
- ◆ Training and education
- ◆ Survey member registries
- ◆ Report to NAACCR Board of Directors
- ◆ www.schs.state.nc.us/NAACCR-GIS/

GIS Workgroup Members

Toshi Abe, NJSCR, Chair

Andy Amir-Fazli, NM Tumor Reg.

Tim Aldrich, U of S. Carolina

Robert Borchers, Wis Cancer Reg

Francis Boscoe, NY Cancer Reg

Cheryl Bowcock, Texas Cancer Reg

Judy Brockhouse, WY Cancer Surv.

Dianne Enright, NC Div Public Health

Scott Horel, Texas Dept of Health

Chris Johnson, Idaho Cancer Reg

Betsy Kohler, NJSCR

Mary Mroszczyk, Mass. Cancer Reg

David O'Brien, Alaska Cancer Reg

Linda W. Pickle, NCI

Thomas Richards, CDC

Rich Ann Roche, Texas D. of Health

Ric Skinner, Baystate Med. Ctr.

Amy Stoll, Arizona Cancer Registry

Marc Theriault, Cancer Care Ontario

Donna Turner, Cancer Care Ontario

Ray Vezina, Vermont Cancer Registry

Jim Wilson, NC Div of Public Health

Lyna Wiggins, Rutgers University,

Editor

Reviewers: Carolyn Lee, Gerald

Rushton, Robert Semenciw

Basic Practices Handbook

- ◆ Facilitator-led meeting of work group
 - September 2001
 - 2 days in Princeton, NJ
- ◆ Discussion of major issues and development of an outline for the Handbook
- ◆ Many conference calls from October 2001 through June 2002

Handbook Outline

- I. Brief Introduction to GIS
 - II. Patient Address Data
 - III. Accessibility to Information Distributed on the WWW
 - IV. Confidentiality
 - V. Spatial Analysis
 - VI. Cartography
 - VII. Additional Recommendations
- References
Appendix A

I. Brief Introduction to GIS

- ◆ Basic concepts and terminology
- ◆ GIS data acquisition
 - Metadata, Clearinghouses, etc.
- ◆ GIS success stories in Cancer Registry Data

II. Patient Address Data

- ◆ Broad perspective on patient address data
- ◆ Basics of address geocoding
 - Street files, attribute databases, geocoding process
- ◆ Problems of address geocoding
- ◆ Geocoding process: Improvements

Recommendations (Address Geocoding)

1. Use of commercial geocoding services
2. Use latitude-longitude coordinates
3. Use NAD 1983
4. Include temporal metadata
5. Adopt FGDC Geospatial Metadata Standard

Recommendations (Address Geocoding)

6. Adopt FGDC Address Standard
7. Add several fields to the FGDC Address Standard (next slide)
8. Evaluate outsourcing services
9. Test data for in-house address geocoding

Recommendation #7 – Add several fields

- ◆ Institutional names
- ◆ Jurisdictional city/town/locality
- ◆ County
- ◆ Date of geocoding
- ◆ Unit/multi-building complexes
- ◆ Quality of geocode

III. Accessibility to Information Distributed on the WWW

- ◆ Section 508(a)(2)(A) of the Rehabilitation Act (29 U.S.C. 792)
 - Accessibility of electronic information and data
 - World Wide Web Consortium (W3C)
 - Web Accessibility Initiative (WAI)

IV. Confidentiality

- ◆ Health Insurance Portability and Accountability Act (HIPAA)
- ◆ Guidance
 - Cancer clusters
 - Small numbers in small areas
- ◆ Methods to protect confidential data

Recommendations (Confidentiality)

10. Written policy on confidentiality

11. Policy guidelines on disclosure rules

V. Spatial Analysis

- ◆ Partnerships with epidemiologists and statisticians
- ◆ Selected references
- ◆ Examples of software programs for spatial statistics
- ◆ Maps of expected values

V. Spatial Analysis (cont.)

- ◆ Maps of locations of individual cases (points) as part of cancer cluster studies
- ◆ Maps of cancer incidence rates by various geographic units
 - Choice of geographic units
 - Mapping spatial-temporal patterns
 - Methods to adjust cancer incidence rates
 - Methods of representing the reliability of cancer rate estimates

Spatial Analysis (cont.)

- ◆ Evaluating whether observed spatial patterns in cancer rates are random
- ◆ Using GIS technology to enhance cancer surveillance efforts
- ◆ Analyzing access to care
- ◆ Methods to minimize the ecological inference problem

*Effect on Denominator Demographics
by Basing Census Tract Assignment on
Street-level Geocoding vs. ZIP Code Centroid.*

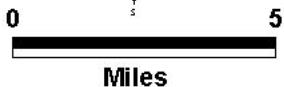
Case geocoded to street
block face level and true
Census Tract 'A' code assigned





True location of case
but geocoded to ZIP code
centroid and Census Tract 'B'
code assigned

Centroid of
ZIP Code
08540

Census Tract Code determines denominator demographics for Census Tract level analysis:

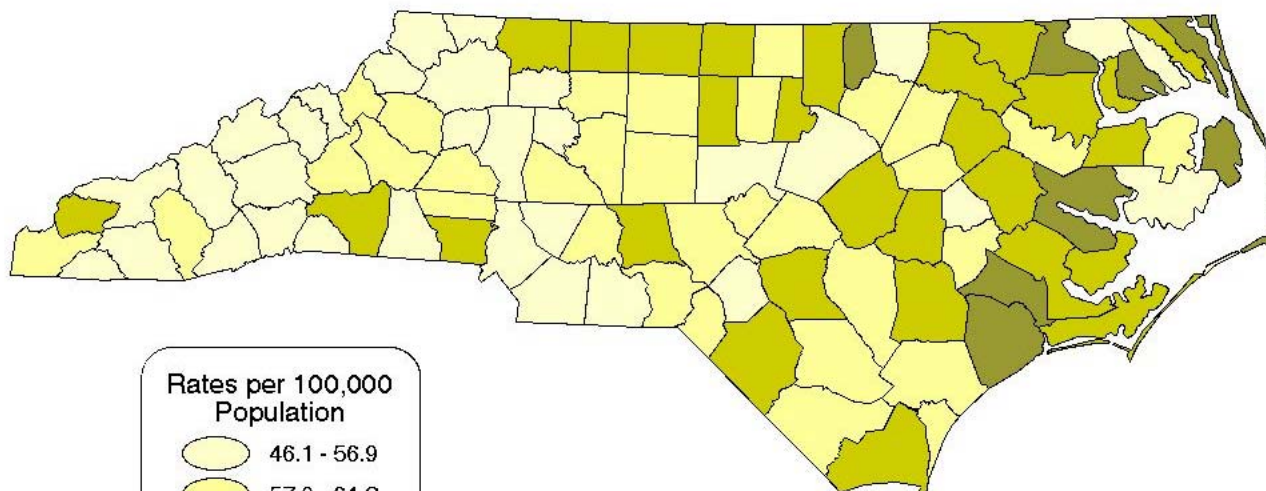
Demographics (1990 Census)			
Tract	%White	%Black	%Hispanic
A	95	1	2
B	81	13	5
(Tract B contains ZIP Code centroid)			
ZIP Code	86	6	3



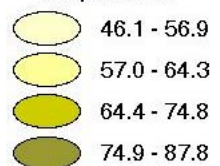
-  ZIP Code 08540
-  Census Tracts partially included in ZIP code
-  County Boundary
-  Centroid of ZIP Code 08540

Map created by Ric Skinner, NJDHSS.CES, 10/01/2001

North Carolina Lung Cancer Mortality Rates by County 1995-1999



Rates per 100,000
Population



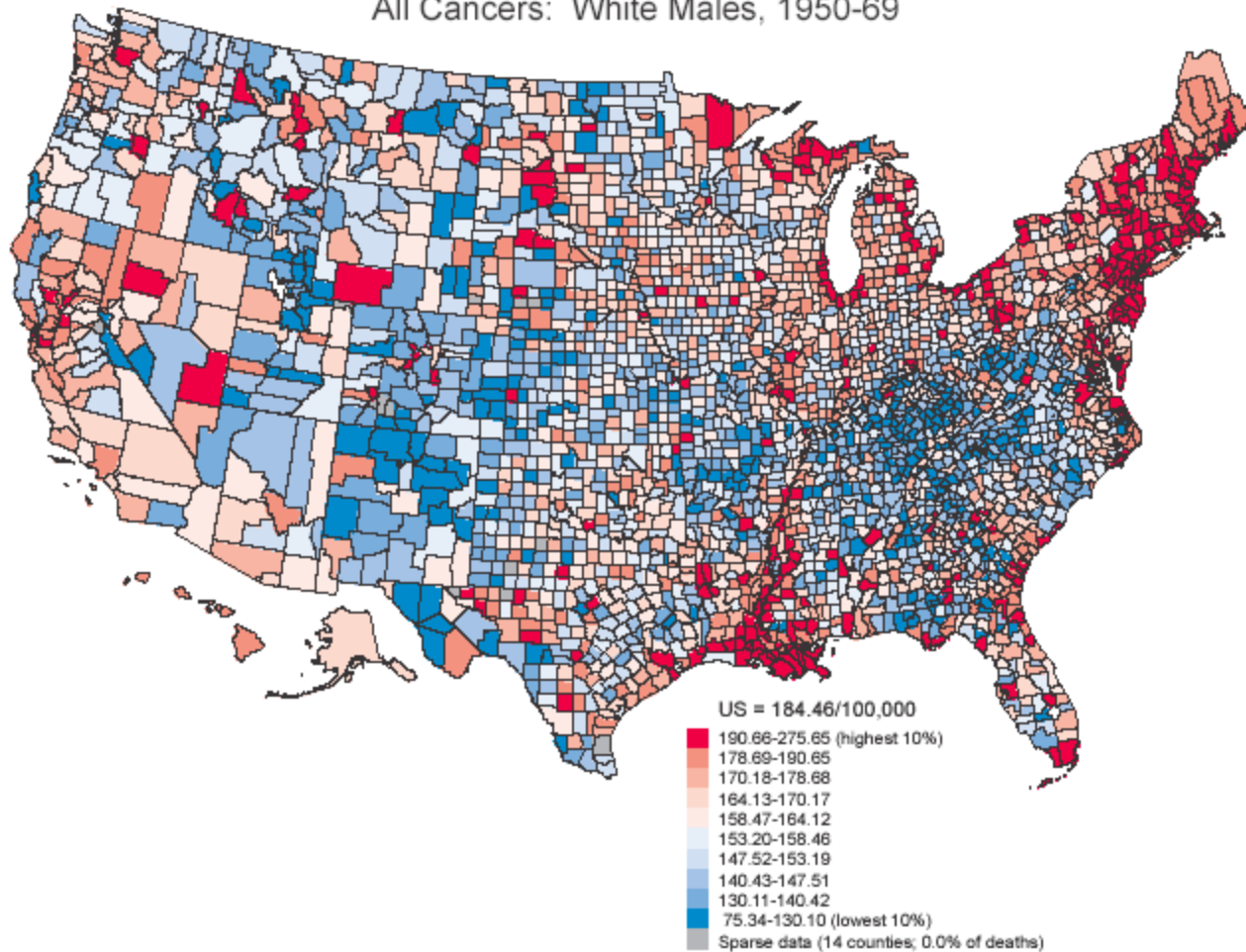
Note: Age-Adjusted to the 2000 Census Population.

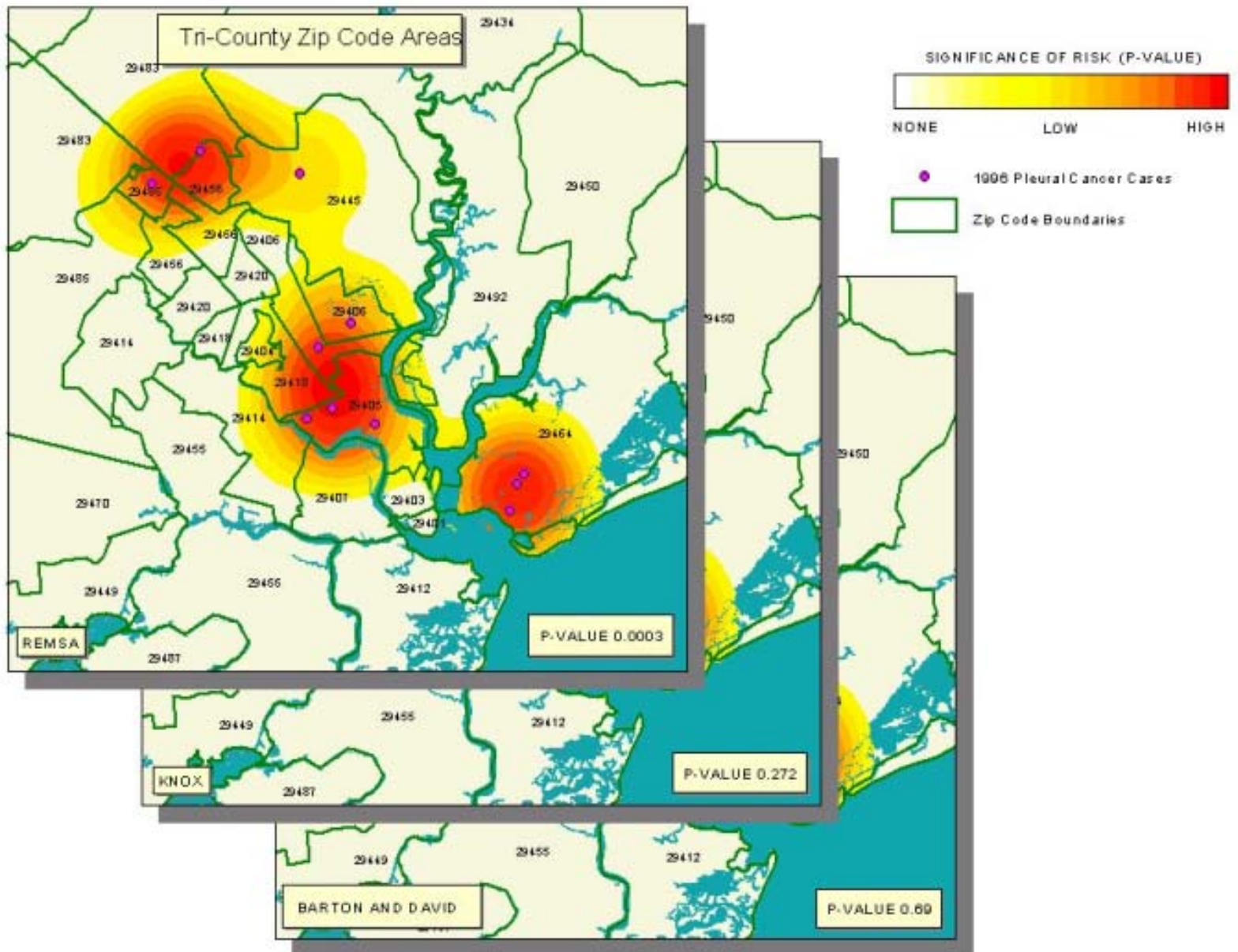


NC State Center for Health Statistics

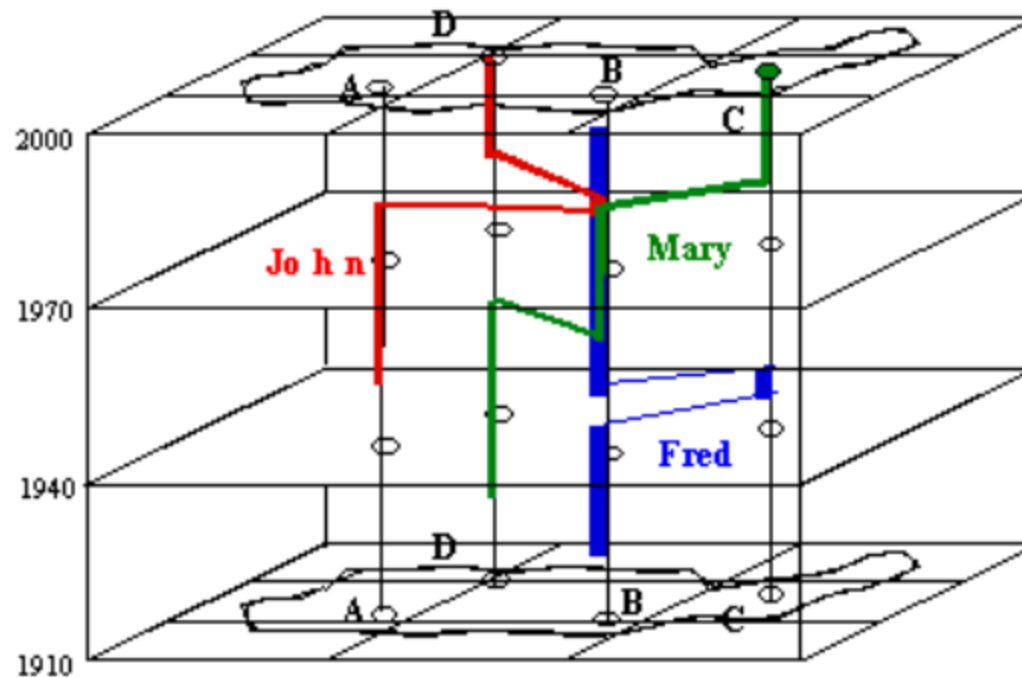
All Cancers

Cancer Mortality Rates by County (Age-adjusted 1970 US Population)
All Cancers: White Males, 1950-69





Human Mobility and the Analysis of Health Statistics



Source: Spatio-Temporal GIS Analysis for Environmental Health, David M. Mark, Ling Bjan and Peter Rogerson, Geography, University at Buffalo, John Vena, Social and Preventive Medicine, University at Buffalo, Max Egenhofer, Spatial Information Science & Engineering, University of Maine, National Center for Geographic Information and Analysis
<http://www.geog.buffalo.edu/ucgis/spatiotemp.html>

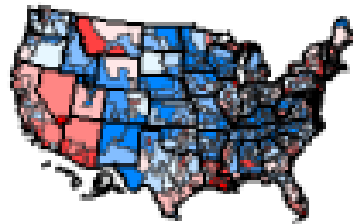
High   Low

Lung, trachea, bronchus, and pleura: White Males [All Ages]

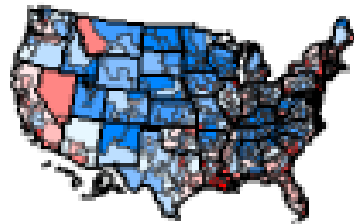
[View 5-year map animation](#)

Click on any map to view details for that time interval

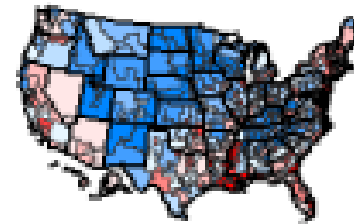
1950 - 1954



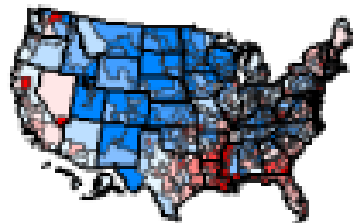
1955 - 1959



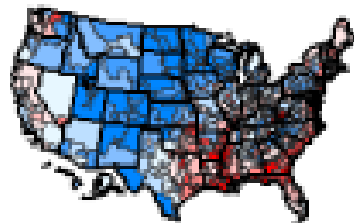
1960 - 1964



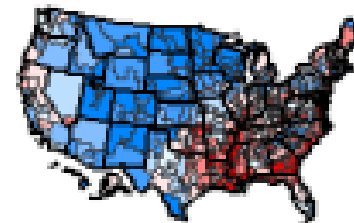
1965 - 1969



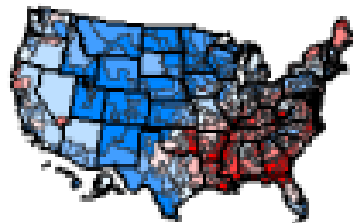
1970 - 1974



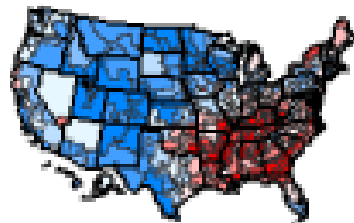
1975 - 1979



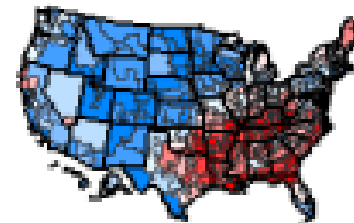
1980 - 1984



1985 - 1989



1990 - 1994



Source: Cancer Mortality Maps & Graphs Web site, a service of the National Cancer Institute

Recommendations (Spatial Analysis)

12. Collect annual reports and report innovative uses of maps
13. Research on estimating expected values on maps
14. Research on cancer cluster detection
15. Collecting longitudinal data

Recommendations (Spatial Analysis)

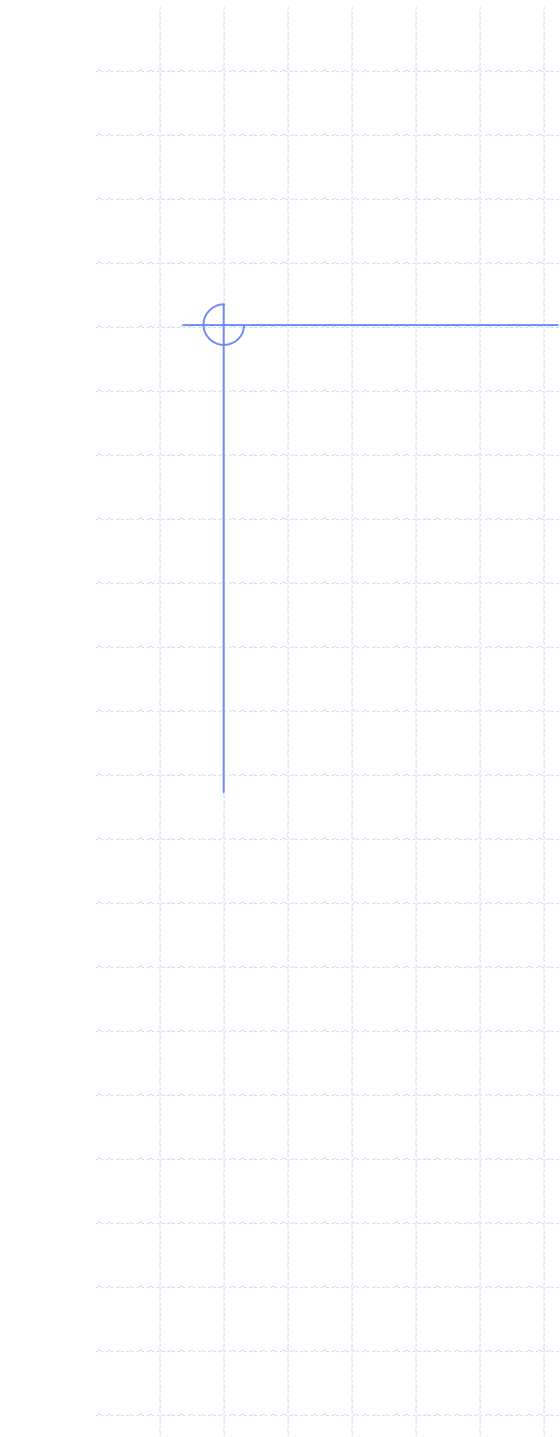
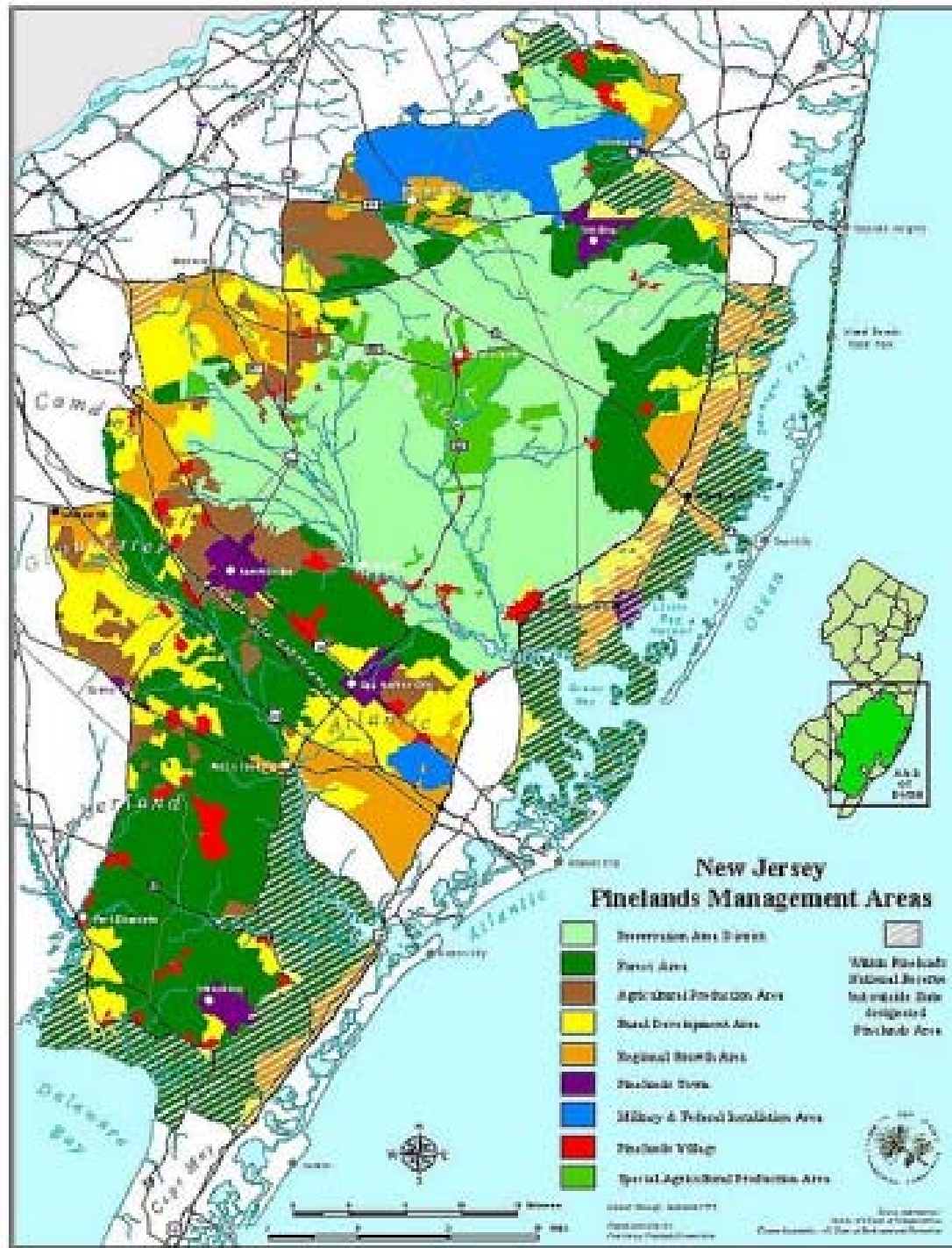
16. Metadata for administrative boundaries
17. Research on adjusted cancer incidence maps
18. Research on representing the reliability of rate estimates

Recommendations (Spatial Analysis)

19. Tutorials and guidelines for evaluating spatial patterns
20. Tutorials and examples of distance measures

VI. Cartography

- ◆ Basic map design elements
- ◆ Media of graphic communication
 - Map symbolization
 - Map types
 - Animated maps
- ◆ Color Use Guidelines
 - Work of Cynthia Brewer, Penn State
- ◆ Cognitive Aspects
 - ◆ Work of Linda Pickle and Douglas Hermann



number of classes

◀ 5 ▶

[learn more](#)

Step1



Digital Government
Quality Graphics

5-class sequential RdPu

[learn more about the map pattern](#)

[credits](#)

[reset view](#)

Step2 legend type

sequential

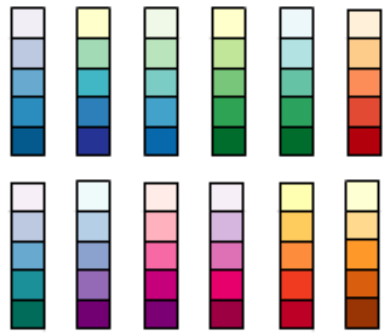
diverging

qualitative

[learn more](#)

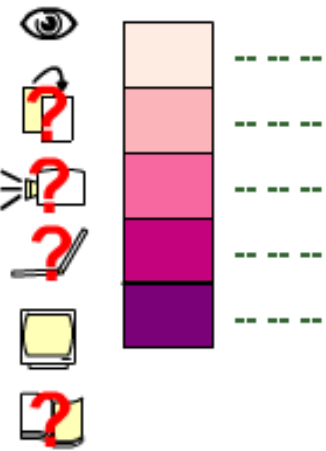
mini legends

Step3



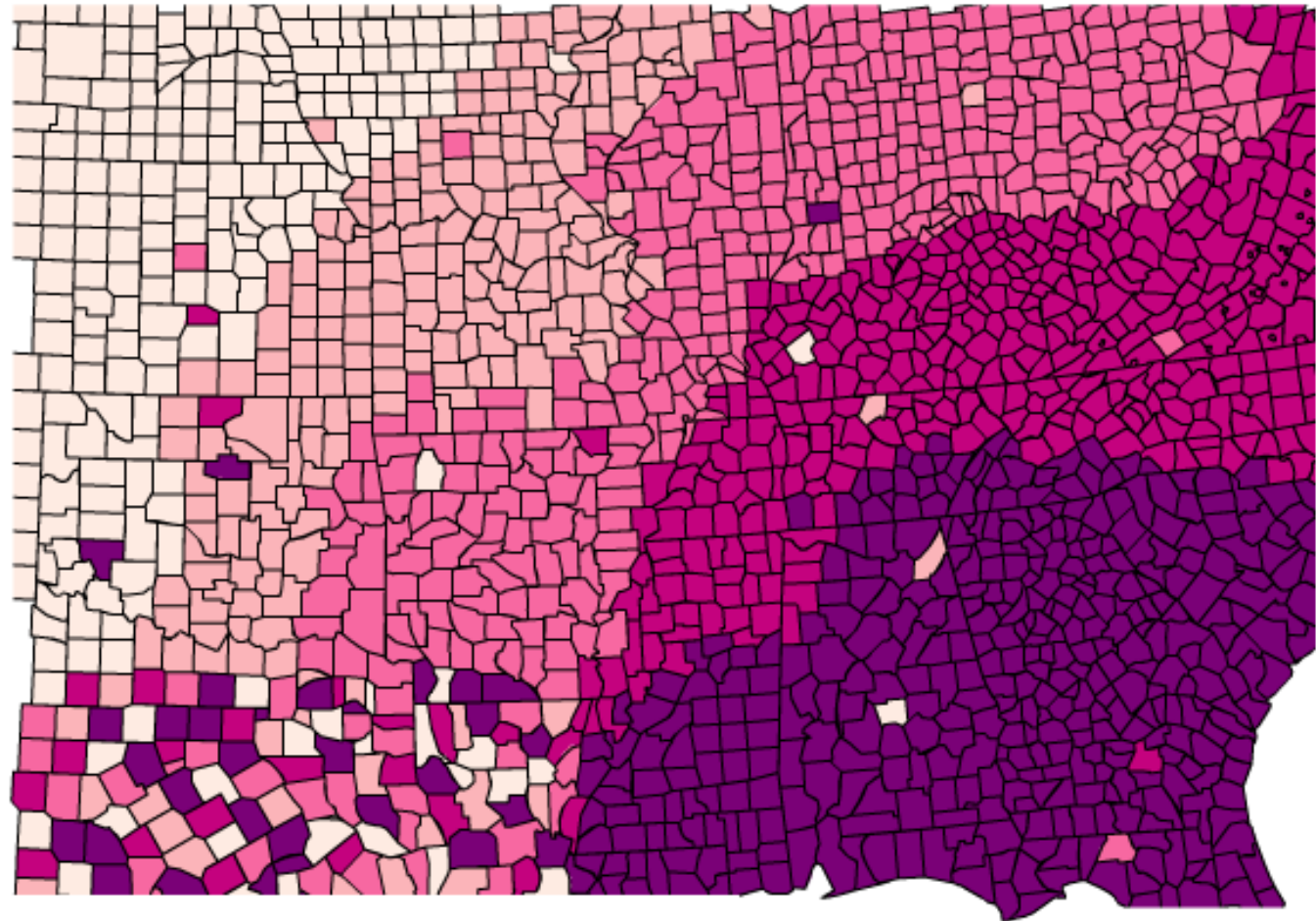
more ▶

cmyk rgb hex Lab AV3



color specs

[export](#)



⊖ map zoom ⊕

map borders on

city symbols on

road network on

background color



border color



white

black

[learn more](#)

road network color



Recommendations (Cartography)

21. Support research and education in cartography

Recommendations to NAACCR

22. Research projects

- ◆ Help registries use GIS more easily
- ◆ Models and templates
- ◆ Guidelines for mapped information on the web
- ◆ Address parsing software and other data cleaning procedures
- ◆ Data quality and location accuracy for address geocoding

Recommendations to NAACCR

- 23. Promote use of mapping
- 24. Participation in federal policy and standard setting
- 25. Organizational infrastructure
- 26. Periodic surveys
- 27. Coordination with other groups
- 28. Education

Conclusion

- ◆ The GIS Work group has completed a draft of a GIS Basic Practices Handbook
- ◆ The Handbook includes a variety of recommendations for further research and policy actions
- ◆ Next steps:
 - Approval by NAACCR Board
 - Review comments welcome – current version on Work Group web page