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CENTER FOR PUBLIC HEALTH PREPAREDNESS

SHARP GIS: UNC's Spatial Health Assessment and Research Program

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THE NORTH CAROLINA Institute *for* Public Health

SHARP GIS Services

- Filling a niche; providing GIS technical service to public health agencies
- Some activities will serve partner states under new Centers for Disease Control and Prevention program
  - Preparedness and Emergency Response Learning Centers (PERLCs)
  - UNC one of 14 centers nationwide

SHARP GIS Mission

- SHARP's Mission: Assist local, state, regional and national public health agencies with:
  - data collection and spatial analysis projects related to emergency preparedness or other community-wide or regional public health concerns.
  - Community Assessment for Public Health Emergency Response (CASPER)
  - GIS technical support
    GPS equipment and training

Assessment Methods

- Rapid Needs Assessments or Community Assessment for Public Health Emergency Response (CASPERs) are an objective way to collect information about:
  - External or flood damage to homes
  - Access to household utilities
  - Incidence of hurricane-related illness and injury
  - Access to food, water, medical care, etc.
  - Emotional stress and anxiety (new in 2005)
  - Other non-emergency assessments

CASPER in North Carolina

- A recognized national leader in development and deployment
- 15 + deployments since 2003
- Hurricanes Isabel, Charley, Wilma, Katrina
- Outbreak exercises
- Community health assessments
- Iowa floods
- Other research and planning (H1N1, evacuation, reproductive health needs)

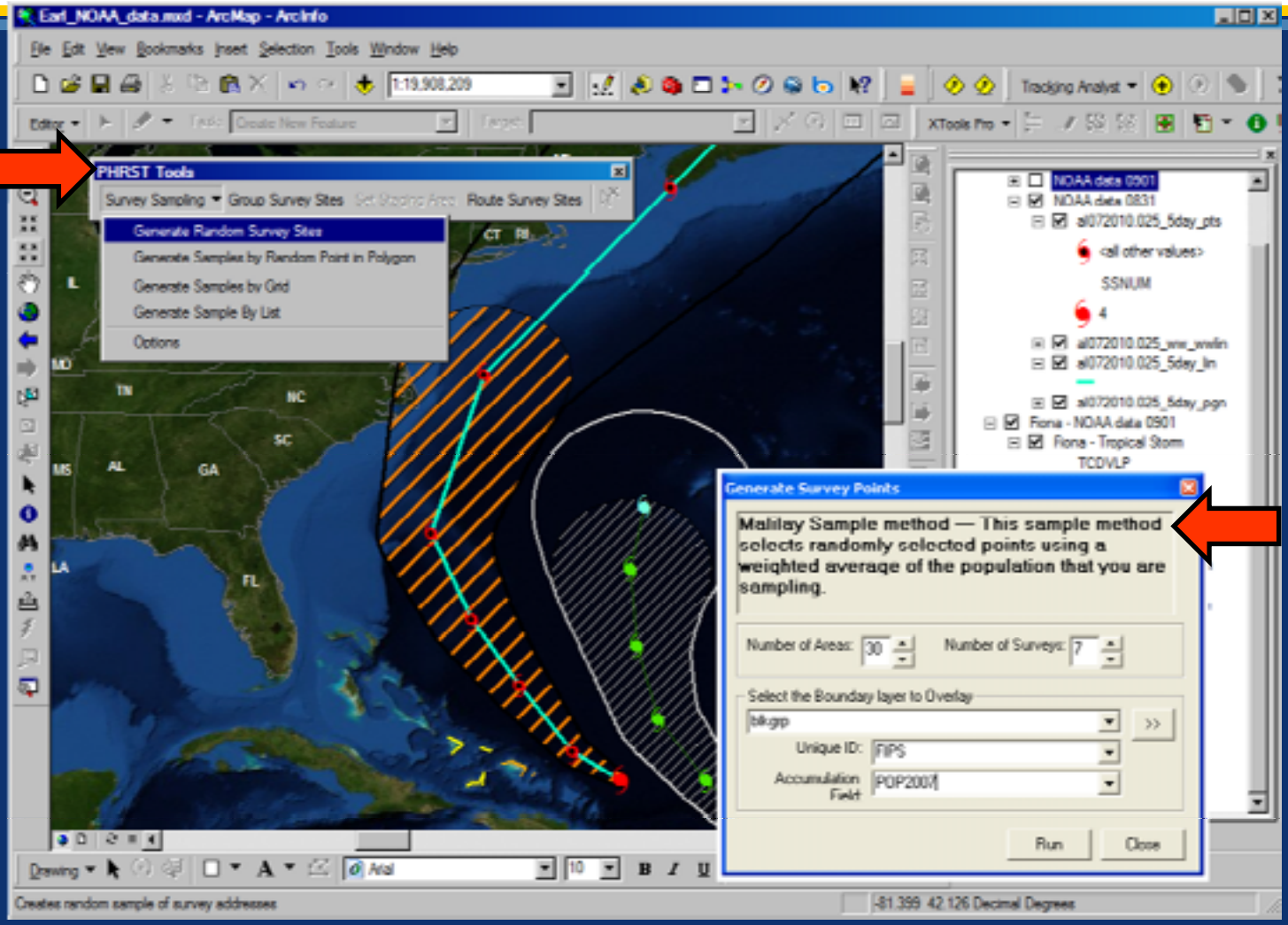
CASPER Methods in NC

- Two-stage cluster sampling (30/7)
  - PSU: Census data, blocks or block groups
  - Stage 1: Weighted average with a probability proportion to population or housing units is used to chose 30 clusters (blocks)
  - Stage 2: 7 random interview locations are chosen and reverse-geocoded
- ArcGIS toolbar called PHRST Tools
- 10 trained interview teams; standard questionnaire

PHRST Tools

Public Health Regional Surveillance Team

PHRST Toolbar created for ArcMap



Two-Stage Cluster Sample Tool

Site selection toolkit freely available from UNC (cphp.sph.unc.edu/sharpgis/)

Stage 1: Determine Sampling Frame and Primary Sampling Unit

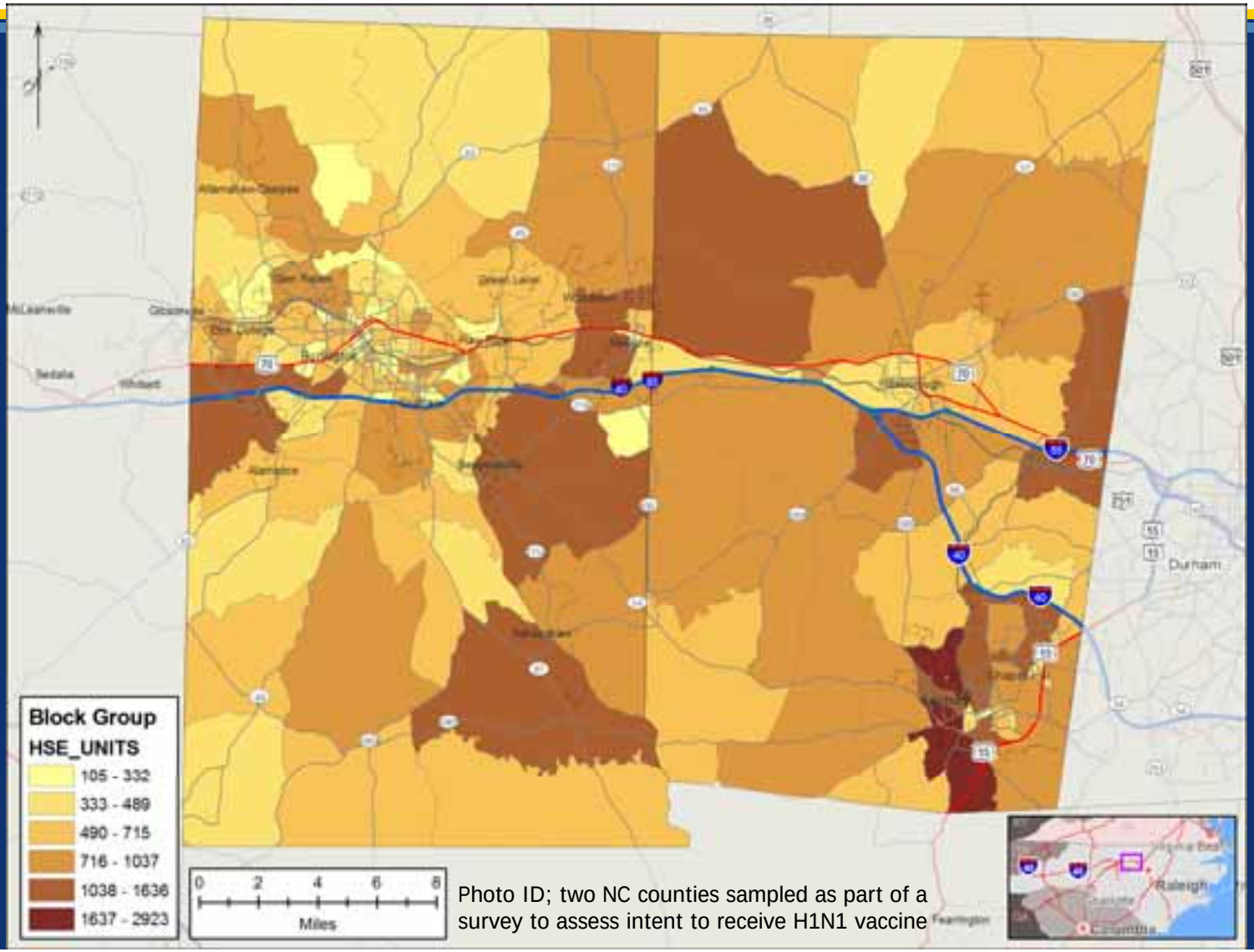


Photo ID; two NC counties sampled as part of a survey to assess intent to receive H1N1 vaccine

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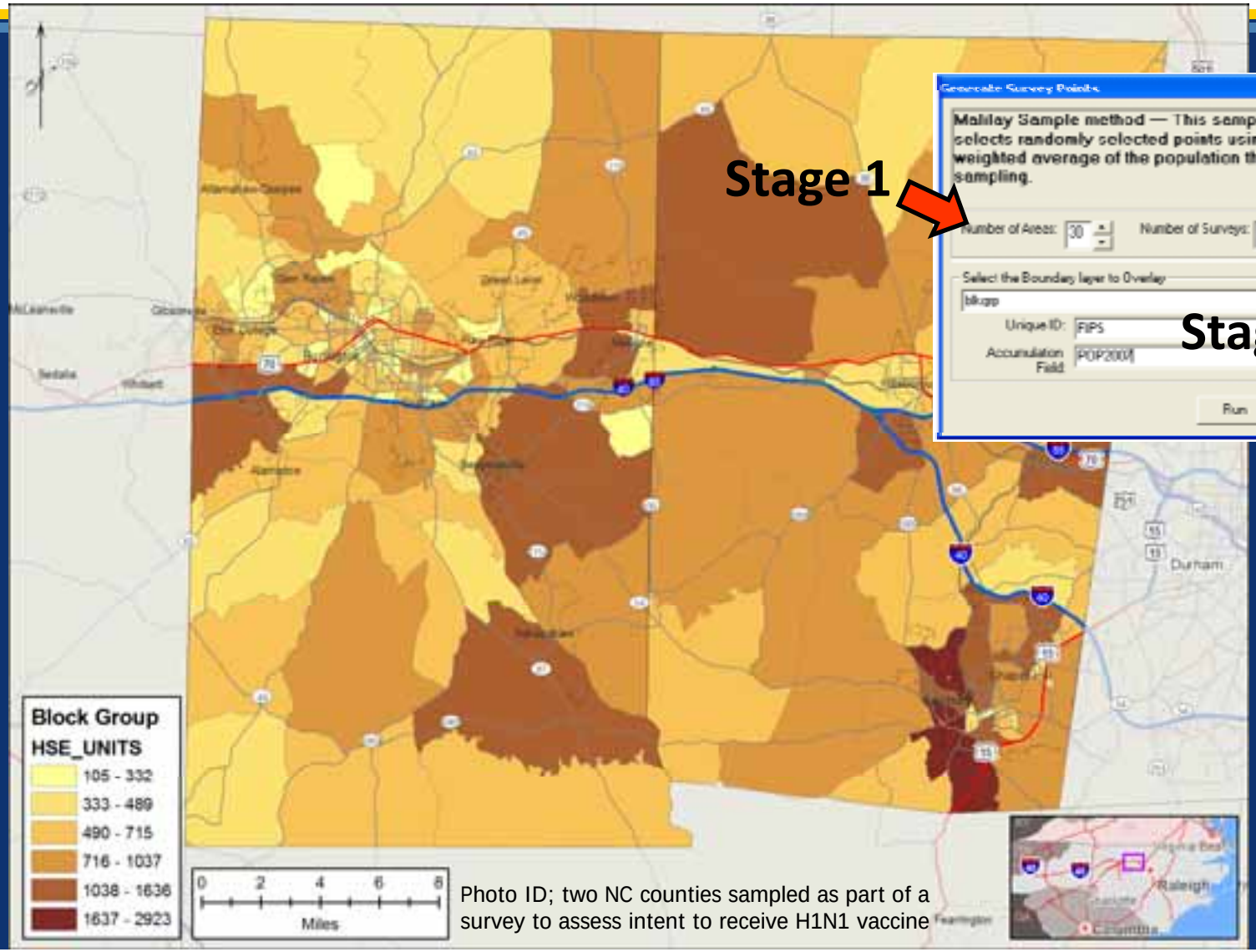
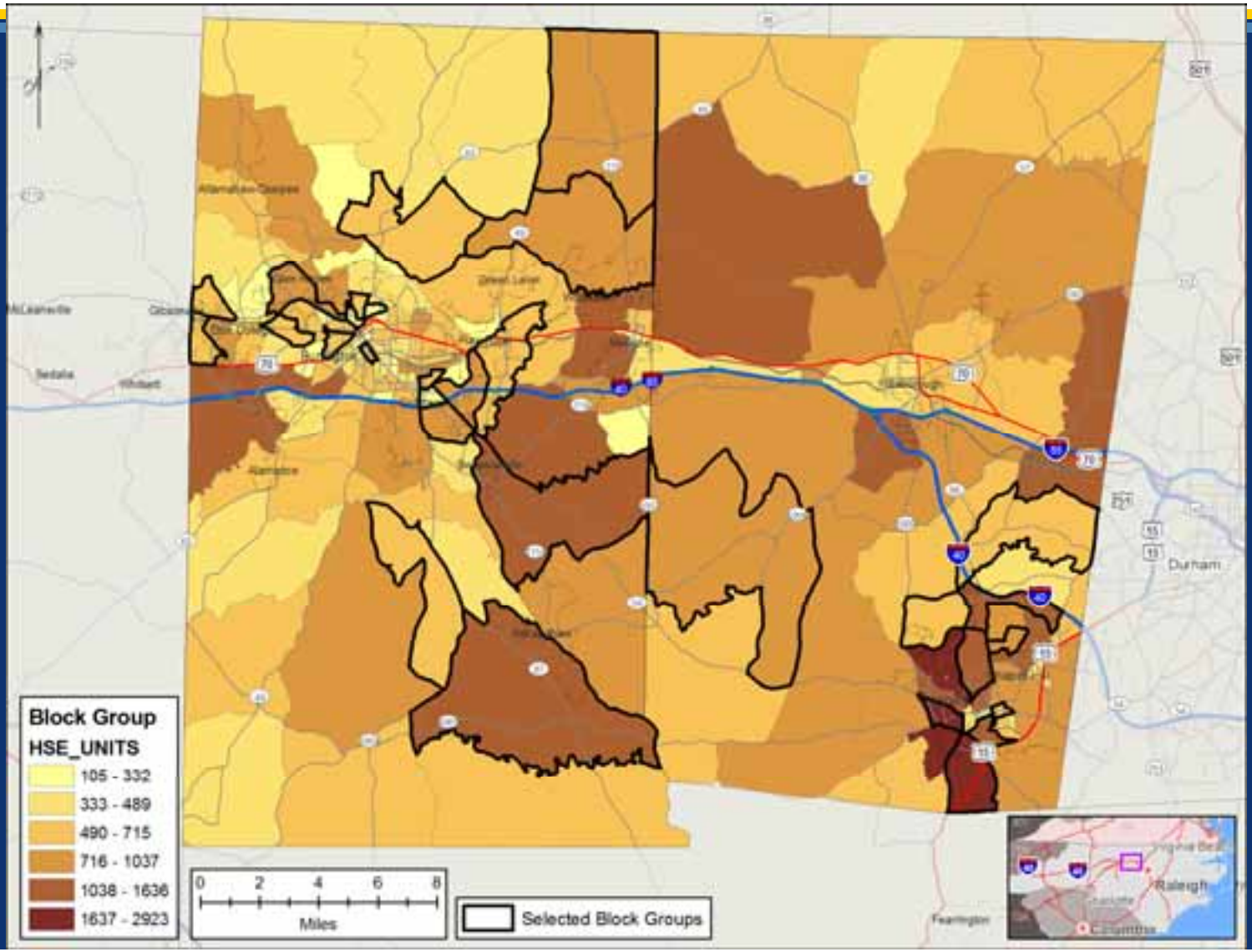
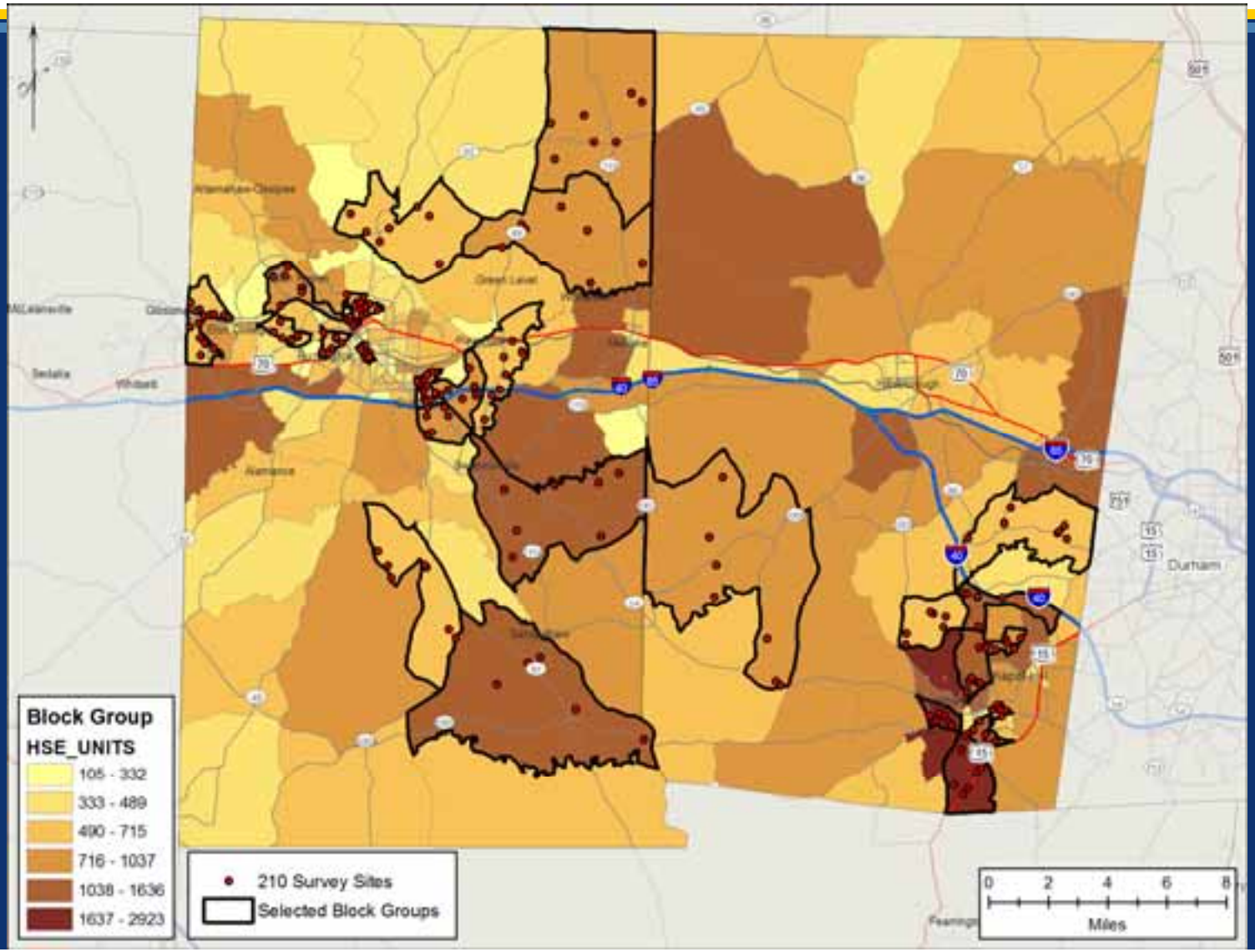


Photo ID; two NC counties sampled as part of a survey to assess intent to receive H1N1 vaccine

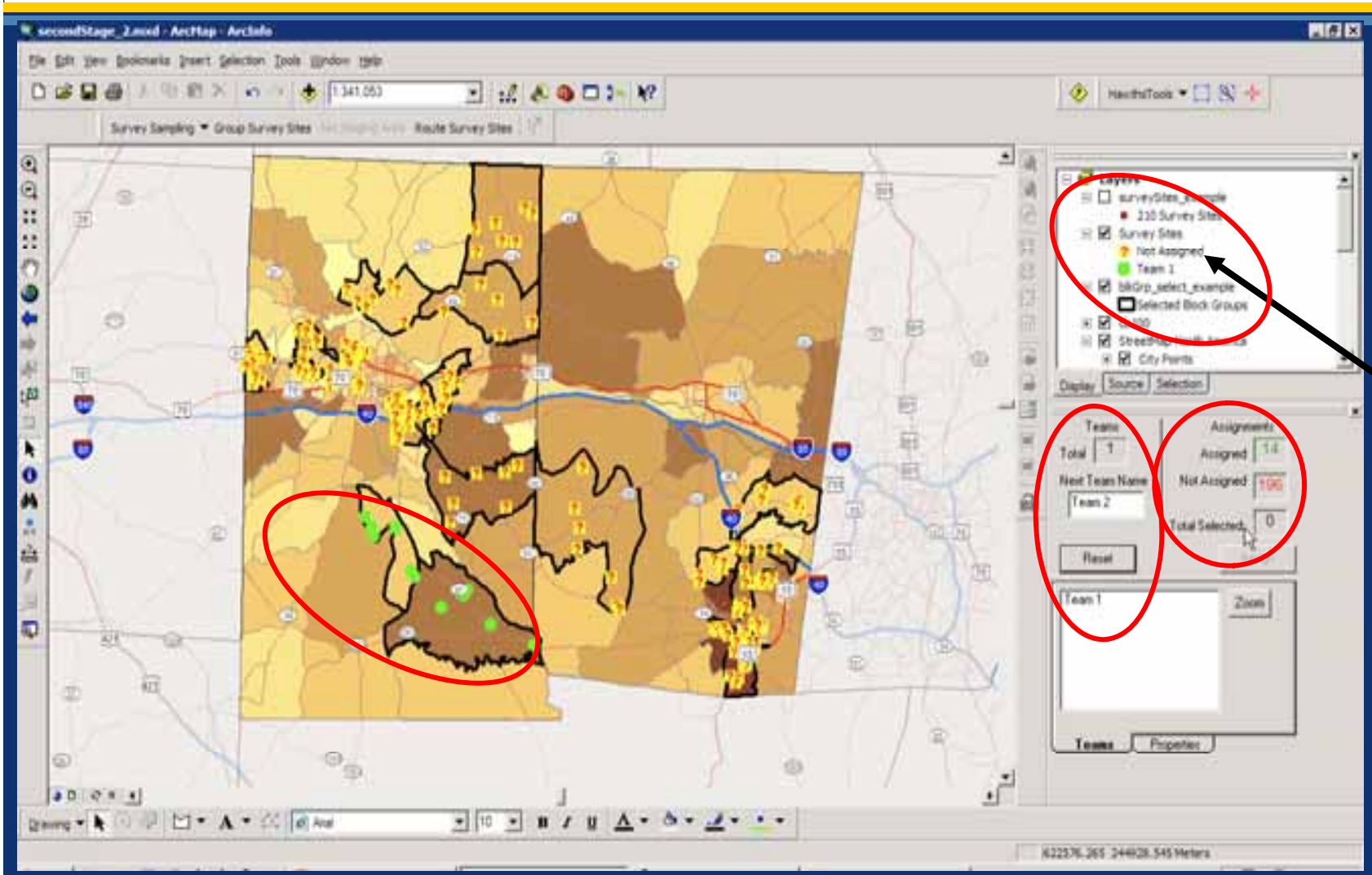
Stage 1: Sample with a Probability Proportionate to Population



Stage 2: Random Survey Locations

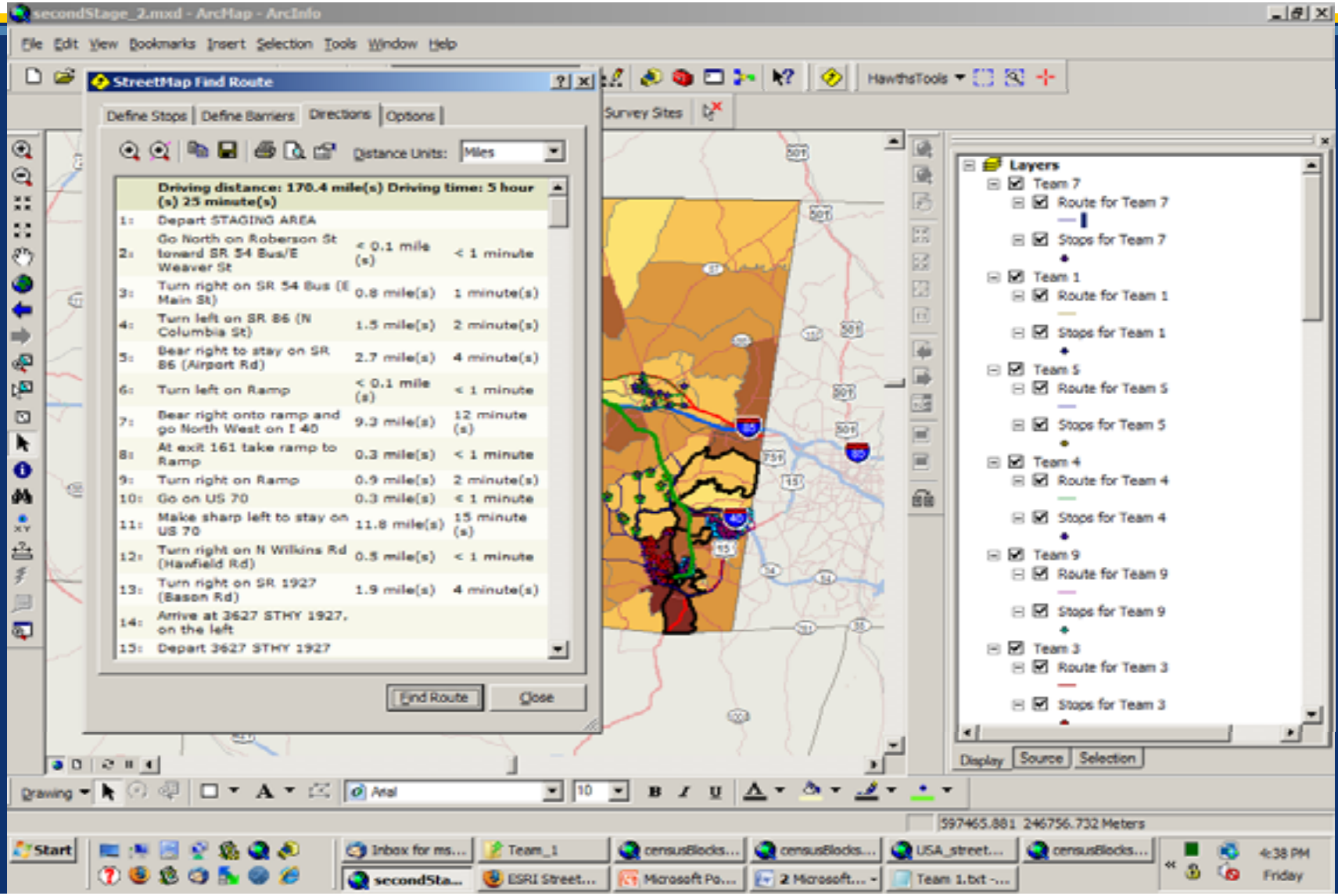


Interview Team Assignments

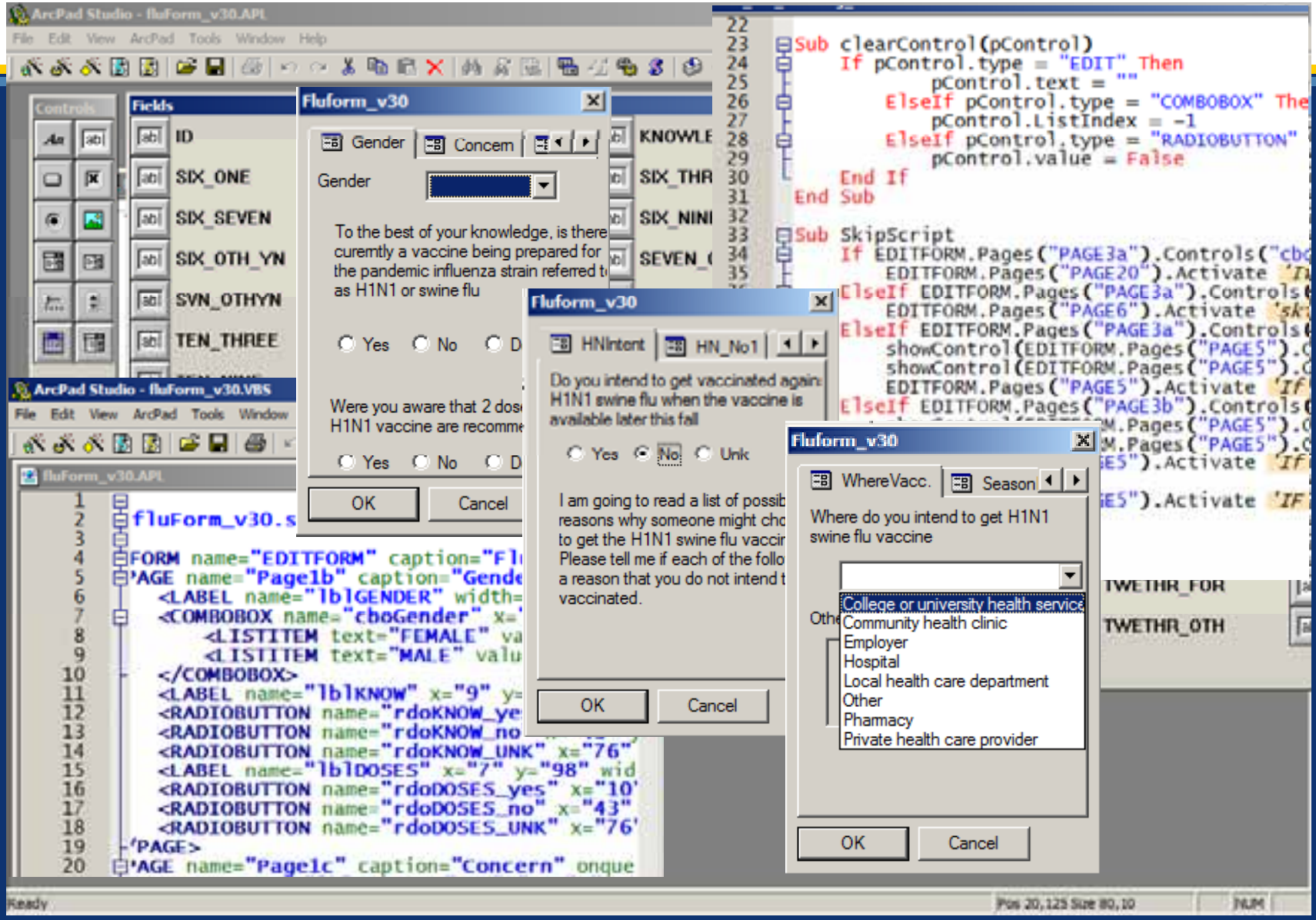


Keep track of team assign-ments

Optimized Driving Directions



ArcPad Studio is used to design custom forms for surveys



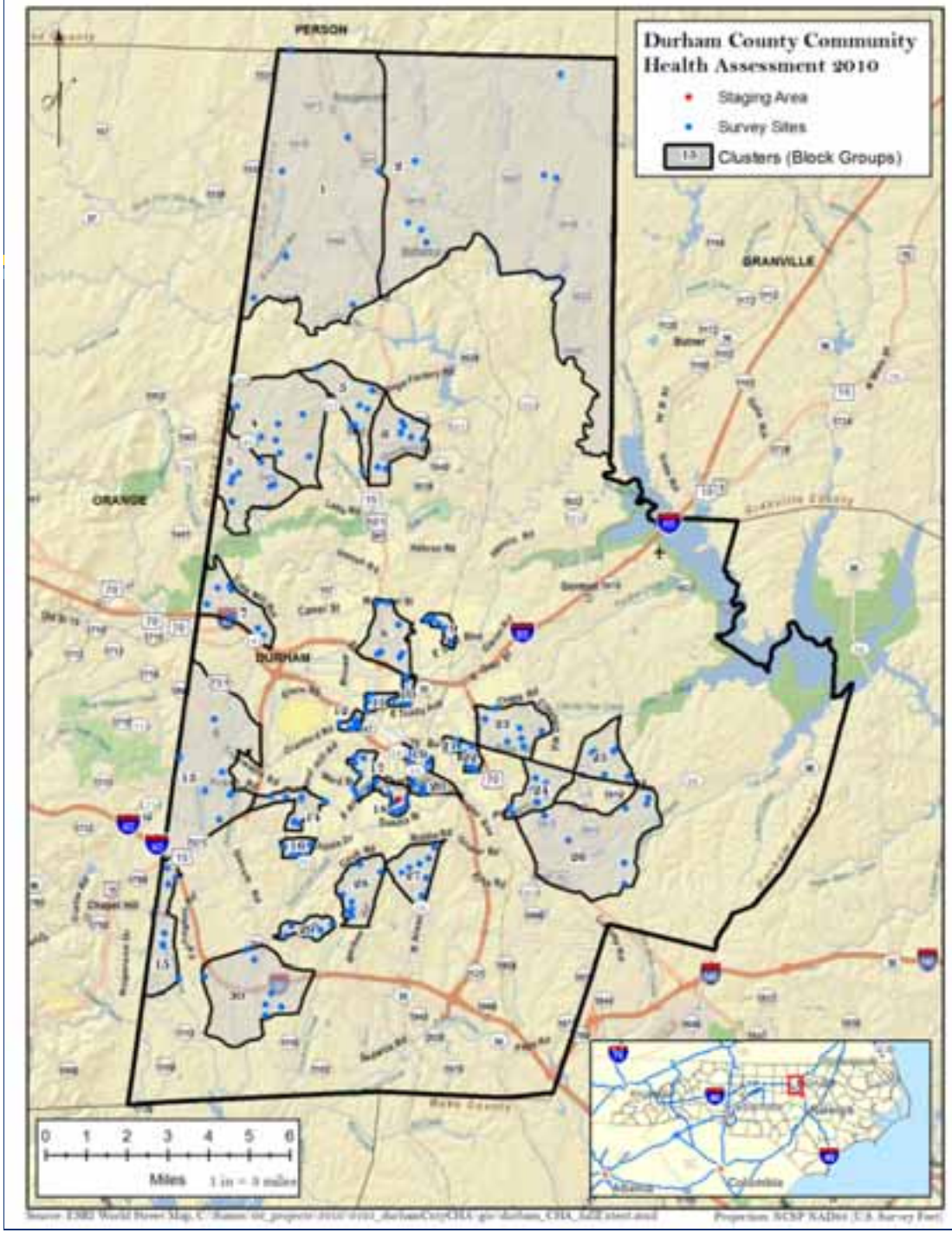
Handheld Data Collection

The Report

Status of household* health and needs after Hurricane Isabel — North Carolina, 2003

Status	Households (%)	(95% CI†)	No. of households projected, 14-county area§	(95% CI)
External home				
Minimal or no damage	65.3	(55.6–75.0)	61,240	(52,143–70,337)
Damaged, habitable	32.3	(22.8–41.7)	30,292	(21,383–39,108)
Damaged, uninhabitable	2.4	(0.2–4.6)	2,251	(188–4,314)
Flood water in home				
None	96.6	(93.6–99.6)	90,594	(87,781–93,408)
1–12 inches	2.3	(0.2–4.5)	2,251	(188–4,220)
13–36 inches	1.1	(0.0–2.6)	1,032	(0–2,438)
Household utilities				
No running water	23.8	(10.7–37.0)	22,320	(10,035–34,700)
No electricity	65.2	(47.3–83.2)	61,147	(44,359–78,027)
No functioning indoor toilet	7.0	(3.1–10.8)	6,565	(2,907–10,129)
No working telephone	21.0	(9.4–32.5)	19,694	(8,816–30,479)
No battery-operated radio	22.6	(12.8–32.4)	21,195	(12,004–30,386)
Generator used	30.5	(18.8–42.3)	28,604	(17,631–39,670)
Hurricane-related illness or injury				
Injury in household	1.3	(0.0–3.1)	1,219	(0.0–2907)
Illness in household after hurricane	4.7	(1.7–7.6)	4,408	(1,594–7,128)
Experiencing stress	29.5	(20.0–39.1)	27,666	(18,757–36,669)
Requiring medical care	8.4	(0.3–16.5)	7,878	(281–15,474)
Problems obtaining medical care	4.9	(1.5–8.3)	4,595	(1,407–7,784)
Problems obtaining medication	6.0	(1.8–10.2)	5,627	(1,688–9,566)
Food and water				
Using well water	8.3	(1.0–15.7)	7,784	(938–1,4724)
Using public water	48.6	(35.6–61.6)	45,579	(33,387–57,770)
Using bottled water	43.1	(30.3–55.8)	40,420	(28,416–52,331)
Without access to a 3-day food supply	12.6	(4.2–20.9)	11,817	(3,939–19,601)

*N = 210.
†Confidence interval.
§Based on combined 2000 U.S. Census estimates for the following counties: Bertie, Camden, Chowan, Currituck, Dare, Gates, Hertford, Hyde, Martin, Northampton, Pasquotank, Perquimans, Tyrell, and Washington.

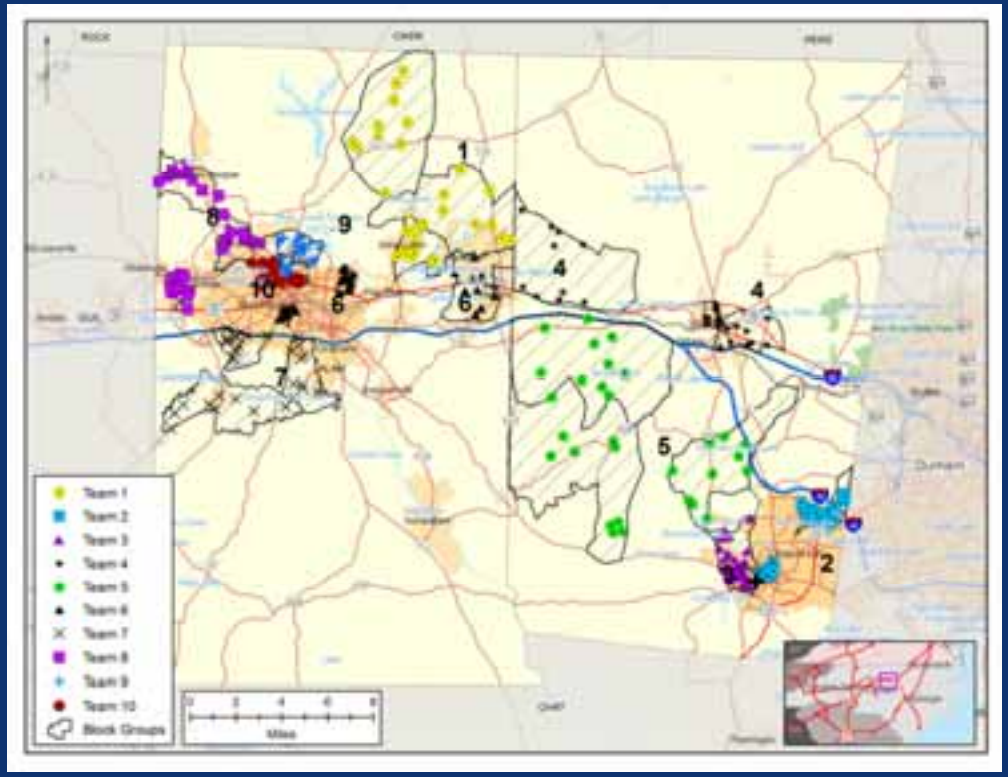


Durham County Community Health Assessment

- SHARP provided GIS and GPS technical assistance to the Durham County Health Department
- Designed digital survey instrument in ArcPad Studio
- Mapped potential survey sites for the two-stage cluster sample
- Provided on-site training and technical assistance to survey volunteers and staff

H1N1 Rapid Survey

- Quick Strike funding from RWJF
- Partner with NC DPH and 2 counties to assess barriers to receiving seasonal and pandemic flu vaccine
- Used CASPER methods

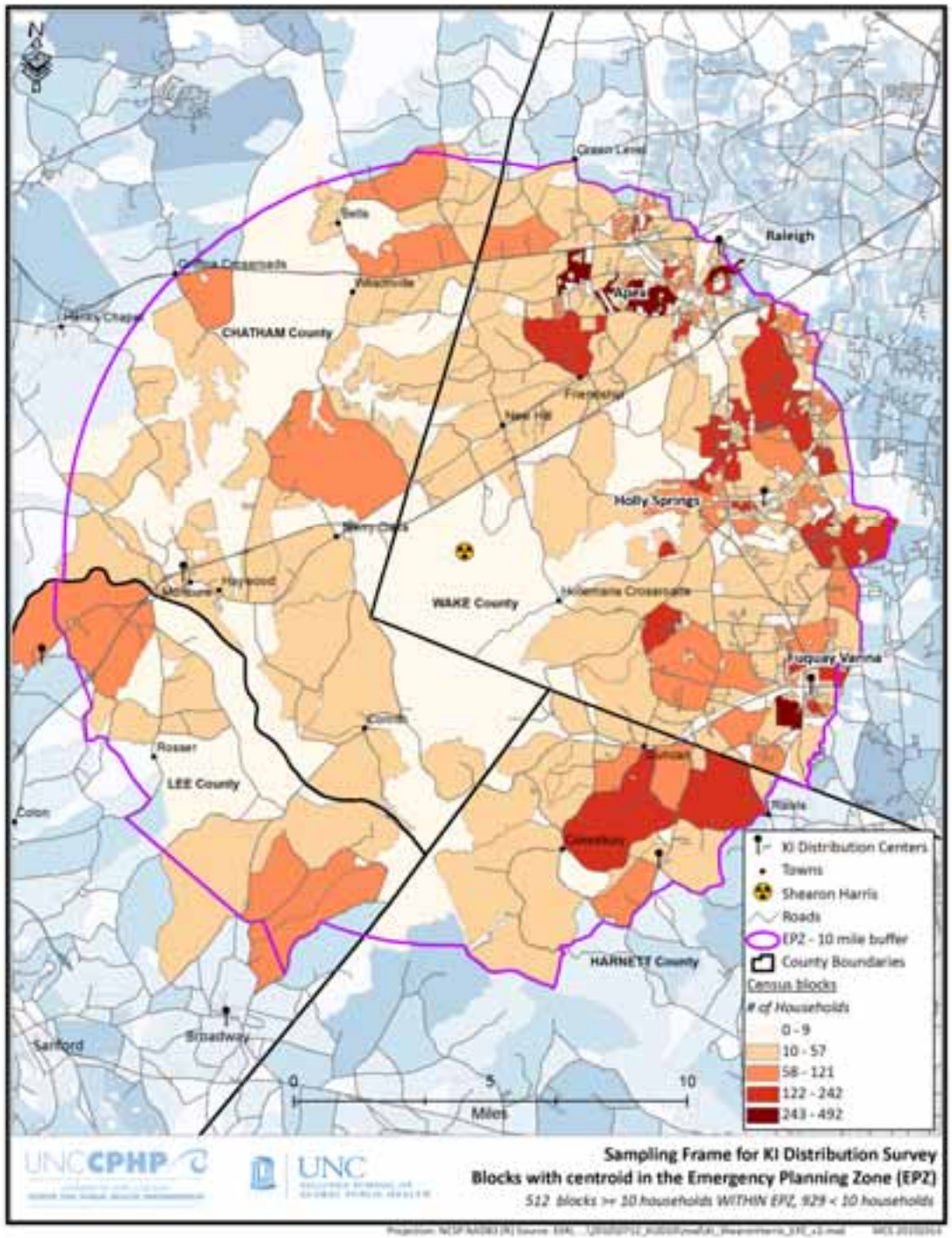


H1N1 Rapid Survey

- 133 (64%) respondents expressed intent to receive the pandemic H1N1 vaccine
  - Intent to receive strongly associated with:
    - 2008–09 seasonal vaccination (PR=1.47; 95%CI: 1.18, 1.82)
    - intent to receive 2009–10 seasonal vaccine (1.27; 1.14, 1.42)
    - being “very concerned” about H1N1 (1.55; 1.30, 1.85)
  - Main reasons to refuse: unlikely to be infected, not severe illness, belief vaccine will not be effective
- Most respondents (83%) reported they received information about H1N1 vaccine from television

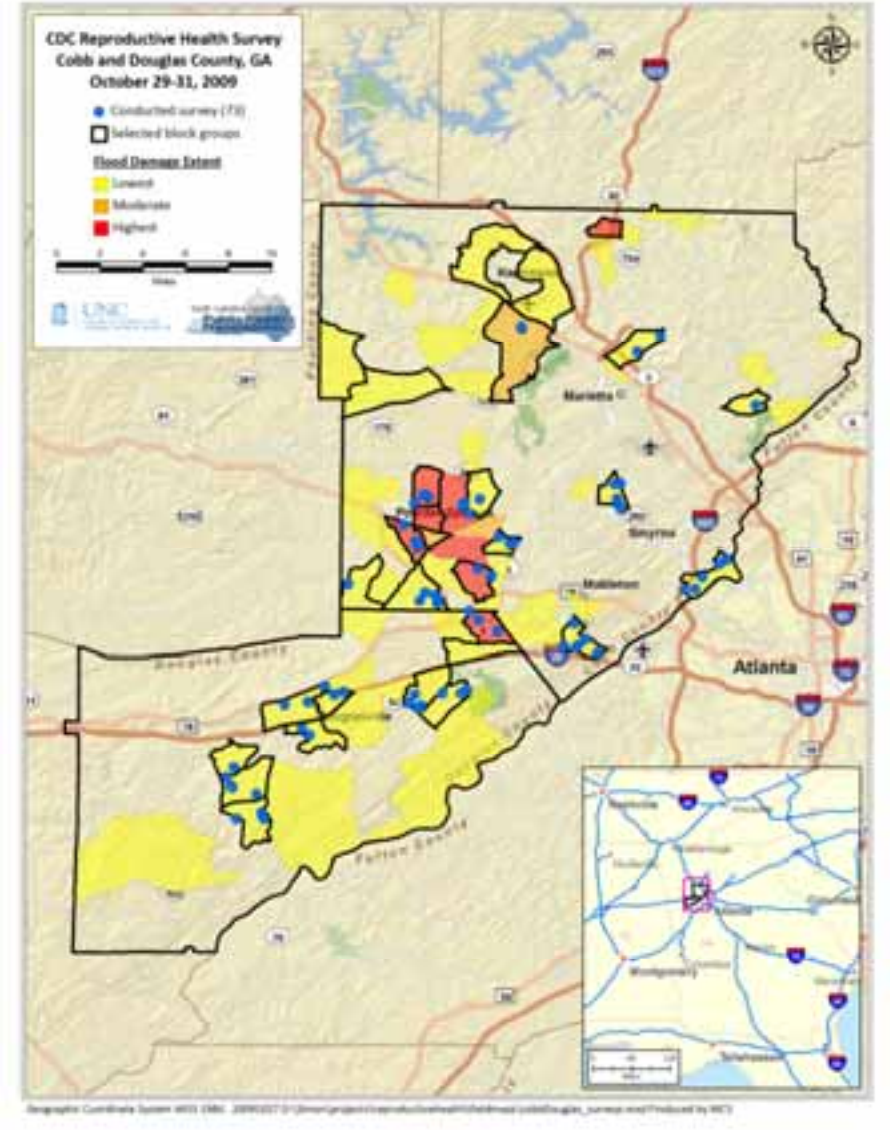
Potassium Iodide (KI) Survey

- Partnered with the NC DPH, NRC, and county health departments
- Assess coverage rates, knowledge & distribution models
- Used CASPER methods
- KI coverage rate 5.1%
  (non weighted results)



Rapid Assessment of reproductive health needs

- CDC funded pilot survey
- Community sampling for pregnant and post-partum women
- 2 stage sample with referral
  - Increased sample proportion of women of reproductive age who were pregnant/post-partum from 5% to 20%
- Will be surveying flood-damaged coastal NC



Conclusions

- SHARP has adopted CASPER methods to help public health and emergency management officials make informed, data driven decision.
- Handheld computers, GIS, and GPS add value to field-based data collection
- SHARP hopes to provide the tools and training to continue building technical capacity statewide

Form Building Software Alternatives

- NCPH Rapid Survey Builder
  - (beta release available upon request)
- FAST (Field Adapted Survey Toolkit)
    - http://www.geoage.com/software-fast.php
- Mobile Phone Technology
  - EpiSurveyor
    - http://www.datadyne.org/episurveyor
  - EpiCollect
    - http://www.spatialepidemiology.net/epicollect/

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Spatial Health Assessment Research Program (SHARP)

SHARP home | Survey Site Selection Toolkit

The UNC CPHP Spatial Health Assessment and Research Program (SHARP) is dedicated to assisting state and local public health agencies with data collection and spatial analysis projects related to emergency preparedness or other community-wide or regional public health concerns. Download a one-page overview of SHARP.

We provide geographic information systems (GIS) technical assistance in the following areas:

- Topical surveys and assessments including CDC's Community Assessment for Public Health Emergency Response (CASPER)
- Community health assessments to address local health department accreditation requirements or meet Healthy Carolinians' partnership goals
- Training in community survey techniques
- GIS equipment and technical support for public health

Learn more about the Survey Site Selection Toolkit.

Examples of past projects include:

- A community survey in a North Carolina counties on intention to receive H1N1 vaccination (2009)
- Development and implementation of a survey instrument for assessing reproductive health post-disaster; pilot tested in 2 Georgia counties affected by severe flooding (2009)
- Community health assessments in multiple North Carolina counties (2006-2010)
- A research study of evacuation behavior in northeastern North Carolina (2008)
- Training local health departments in use of GIS as part of a statewide preparedness effort in North Carolina (2004-2008)
- A pre-hurricane assessment of community preparedness in Carteret County, North Carolina (2007)
- Rapid needs assessments following hurricanes Isabel (2003), Charley (2004), Rita (2005), Wilma (2005), and Katrina (2005)

To learn more about SHARP or request assistance, please contact sharpgis@unc.edu.

UNC CPHP staff member Mark Simon talks with a Team Epi-Aid volunteer about collecting survey data using the handheld computer.

Team Epi-Aid volunteers at the Cobb-Douglas Health District in Marietta, Ga., preparing to conduct a post-disaster reproductive health assessment.

The UNC Center for Public Health Preparedness is dedicated to improving the capacity of public health agencies and their staff through research, educational programs, and technical assistance.

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Questions?

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- Extra slides

Hurricane Wilma (2005)

- Category 3 Hurricane with 125 mile per hour winds
- Landfall 10/24/05 near Naples, Florida
- Moved northeast through Florida causing damage from Miami to West Palm Beach
  - NC Division of Public Health received request through EMAC from Florida DOH for assistance with RNAs using handhelds

Hendry County, Florida

- Hendry County
  - Identified by F-DOH as most severely impacted rural area
  - Montura Ranch Estates
    - 81.3% mobile homes
    - 91% reported receiving disaster relief
  - Pioneer Plantation
    - 63.5% mobile homes
    - 80% reported receiving disaster relief

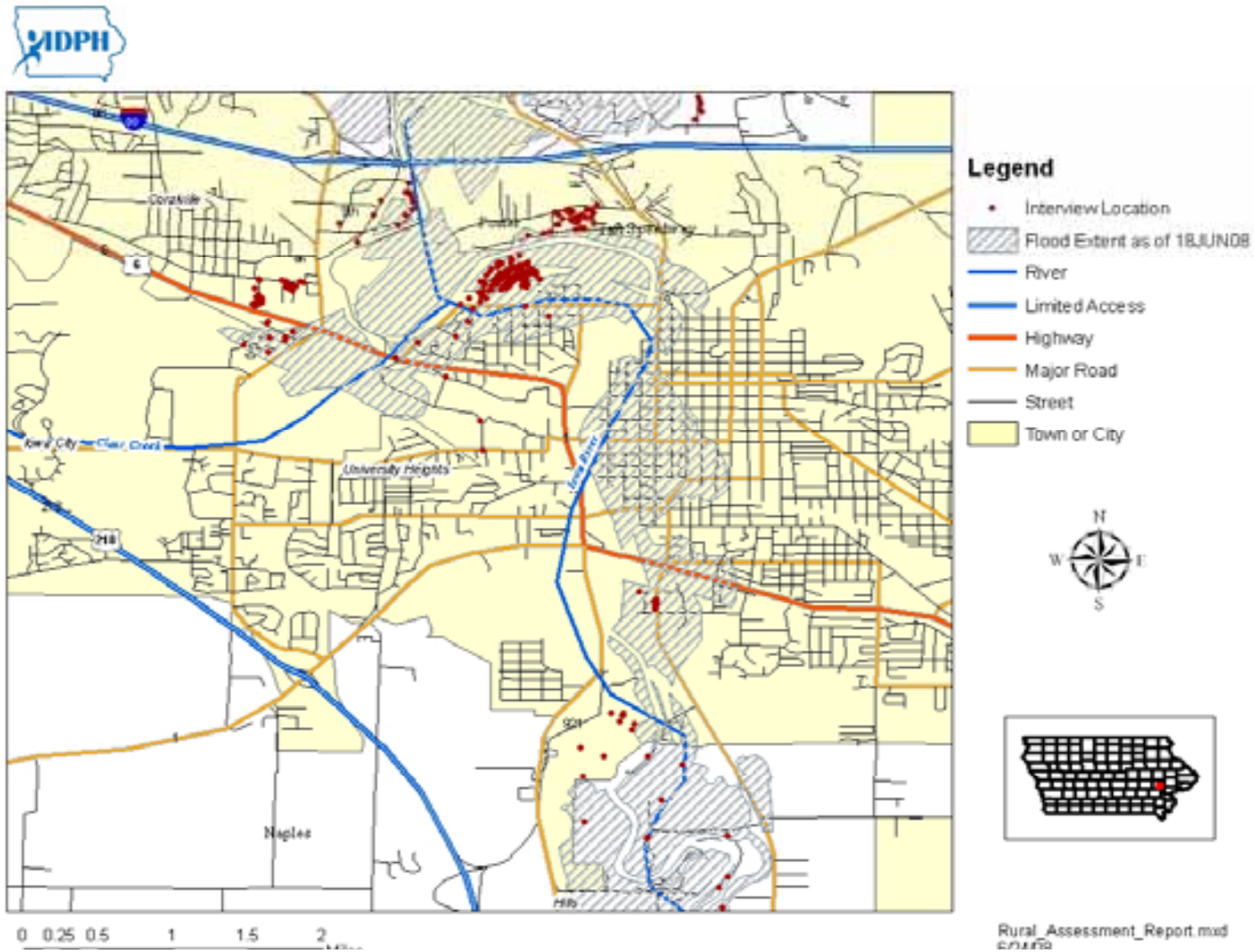
Broward County, Florida

- Broward County
  - 1.7 million residents
  - 1000 stoplights, only 124 working
  - 69.1% of sample live in building with 6 or more units
  - 17.6% still without power 10 days after landfall – approximately 66,000 households
    - Of these 30.9% using generators: 12 reported deaths in Broward Co. from CO poisoning

Hurricane Wilma Improvements

- Educational and information materials in multiple languages
  - Safe clean up, mold, generator safety
- Liaison with County and Florida Departments of Health for referrals
- Tracking interviews and sampling (particularly in multi-level residences)
- Communications
  - Use of VIPER 800 Mhz radios

Iowa Floods (2008)

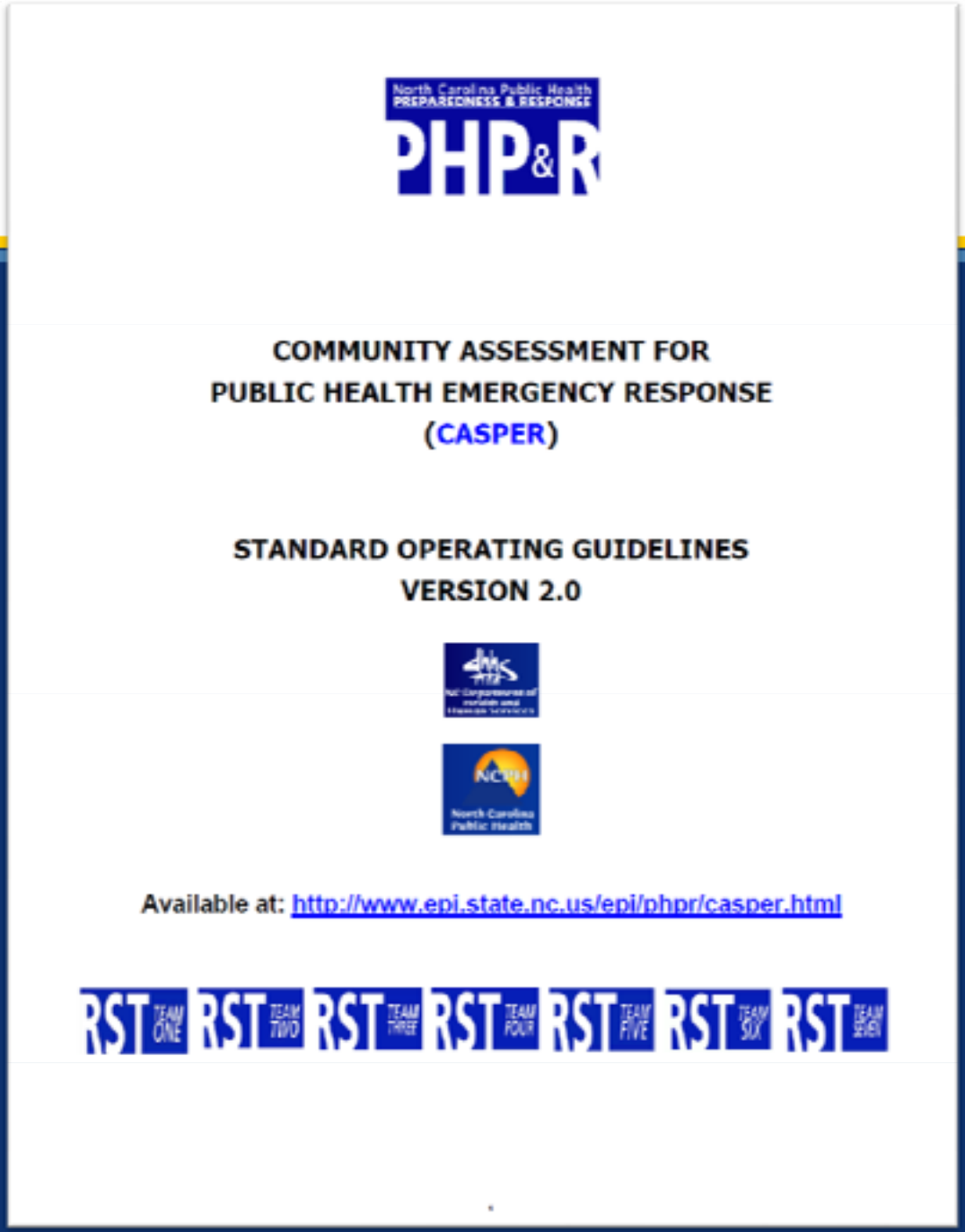


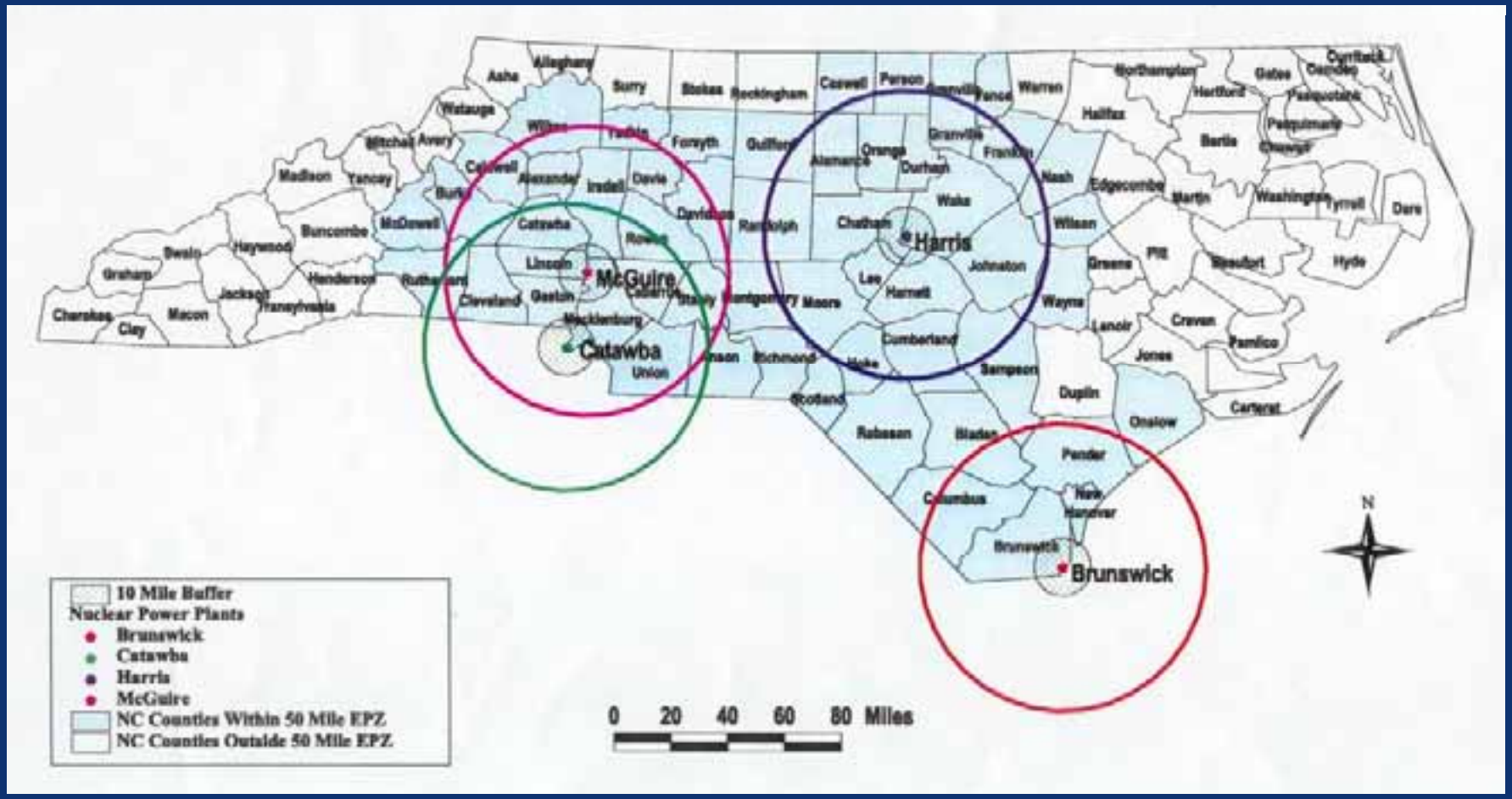
Key Findings Cedar Rapids

- Only 12.8% (5.3%, 20.2%) of residents in the assessment area are sleeping in their homes (71.2% with family and friends).
  - 87.3%, are using bottled water as their primary source of drinking water.
  - 18.3% of households have a household member who does not have access to a 3 day supply of medication because of the flood.
  - 58.5% of households have a member with difficulty concentrating since the flood, and 47.0% of households have a member that has sleep disturbance since the flood.
  - 54.6 (46.6%, 62.7%) report mosquitoes are worse than normal
  - 75% (64.4%, 85.1%) report mold in their homes

CASPER Standard Operating Guidelines (SOG)

- Team make-up
- Job Action Sheets
- Templates

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McGuire
Catawba
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10 Mile Buffer
Nuclear Power Plants
Brunswick
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Harris
McGuire
NC Counties Within 50 Mile EPZ
NC Counties Outside 50 Mile EPZ
0 20 40 60 80 Miles
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