



UNIVERSITY OF NORTH CAROLINA  
**CENTER FOR PUBLIC HEALTH PREPAREDNESS**

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

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# 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)



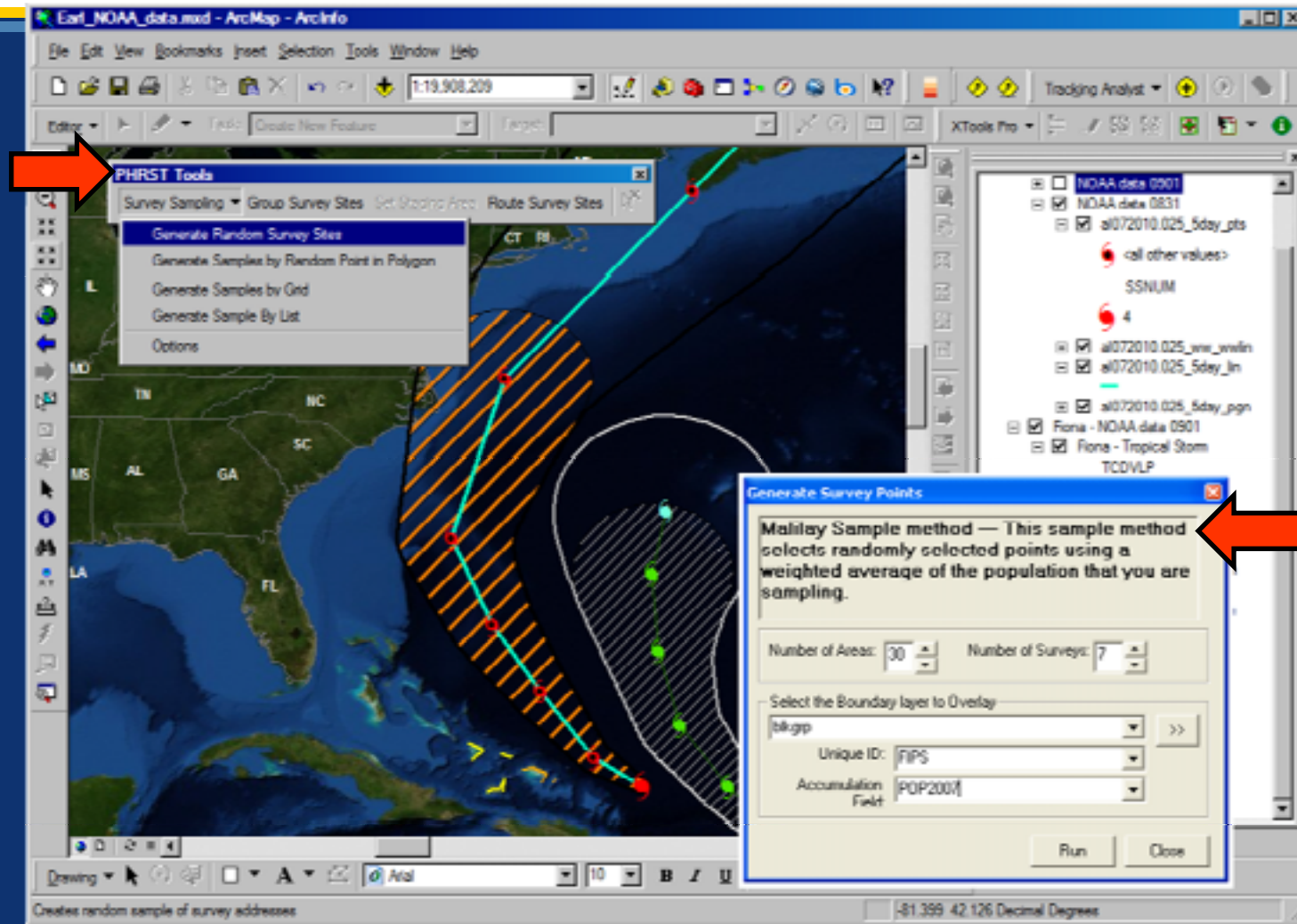
# CASPER Methods in NC

- **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

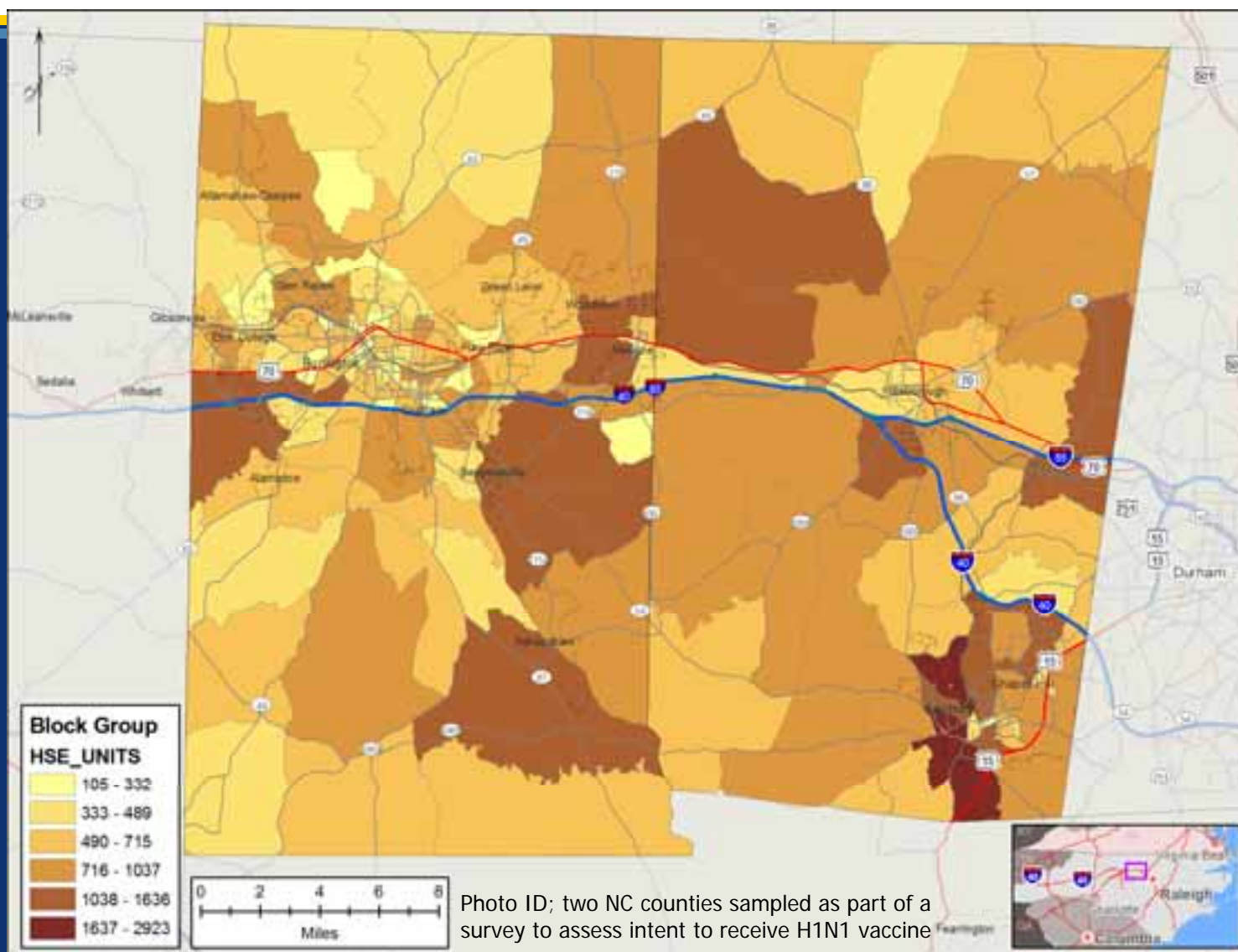


Two-Stage  
Cluster  
Sample  
Tool

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

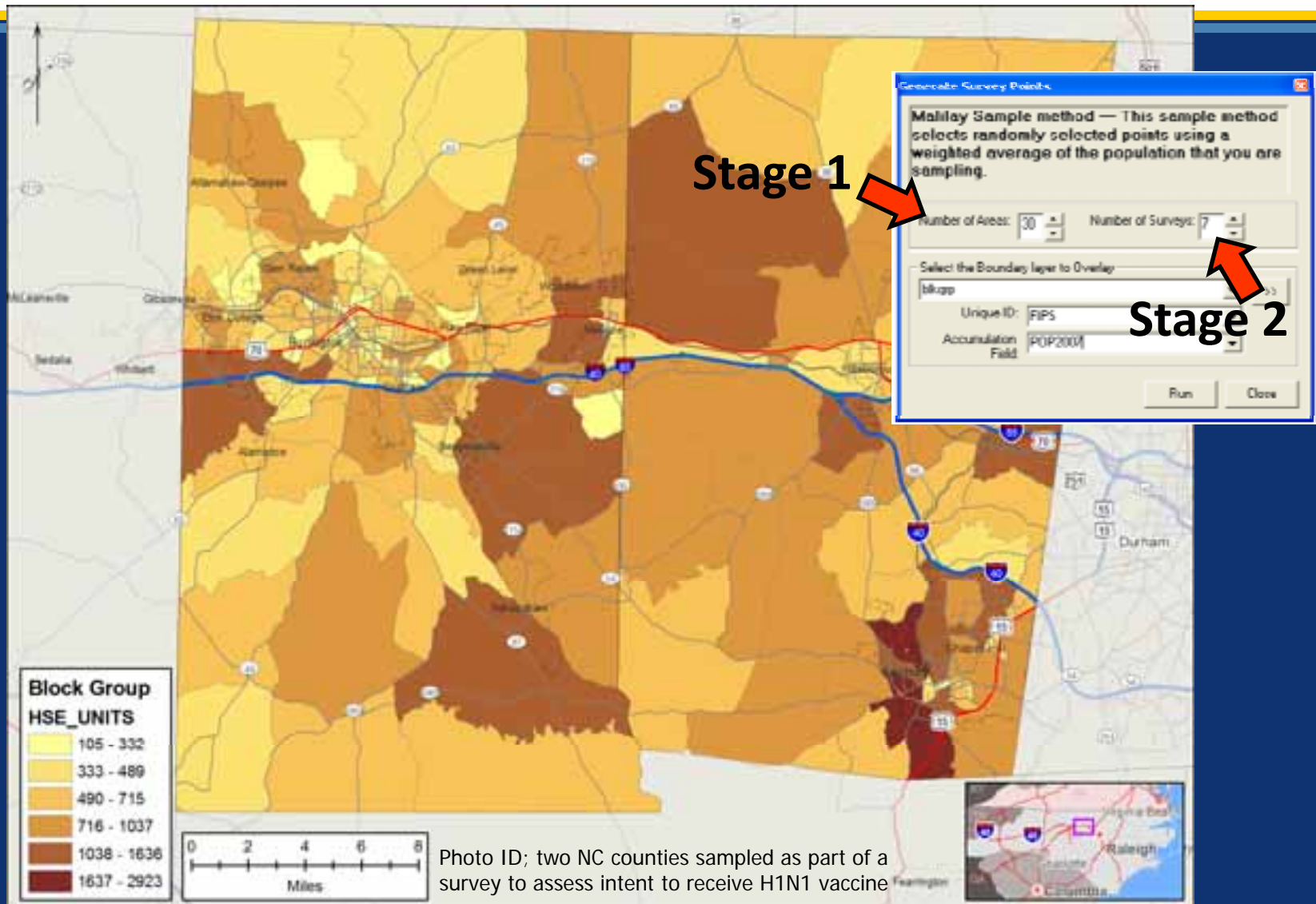


# Stage 1: Determine Sampling Frame and Primary Sampling Unit

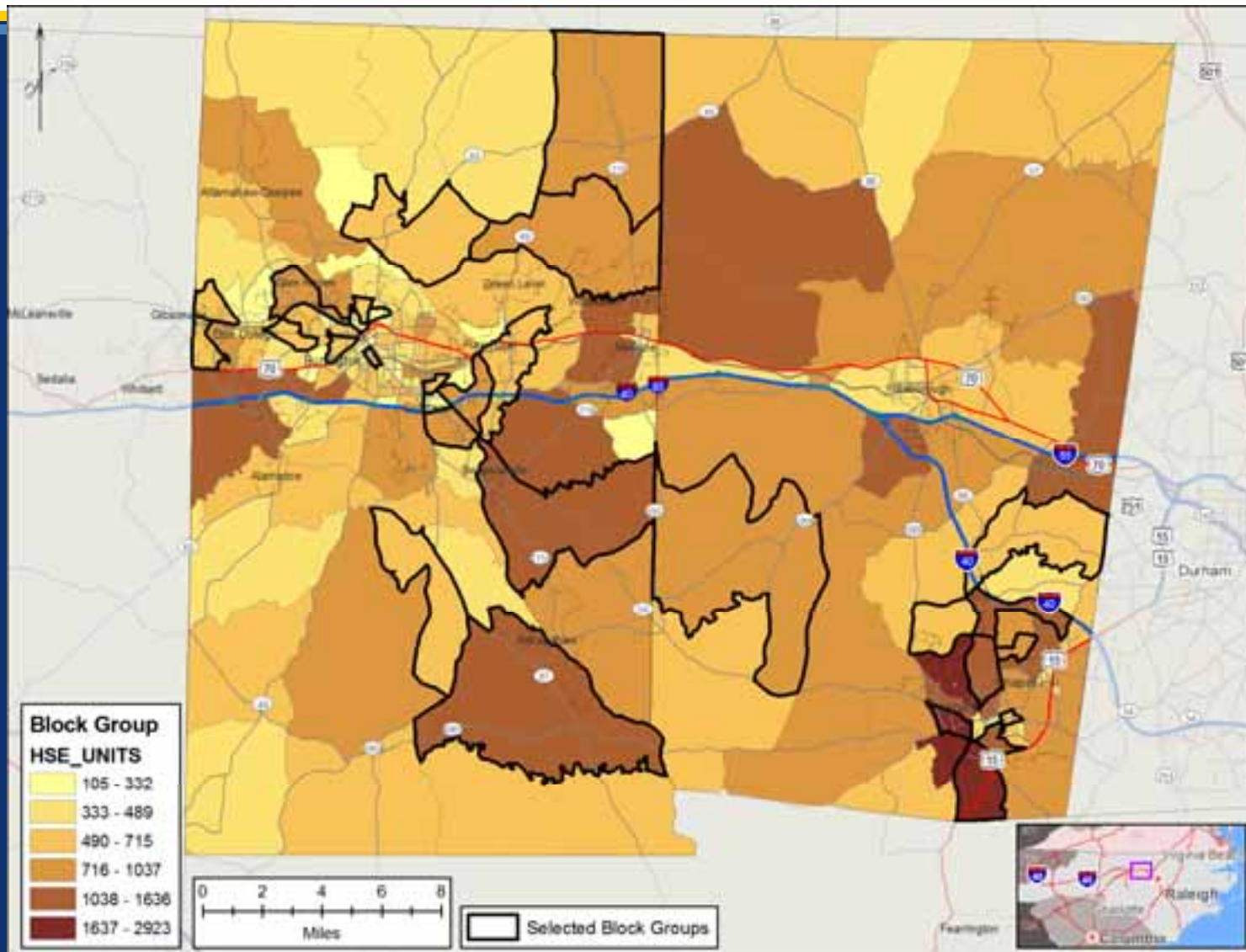




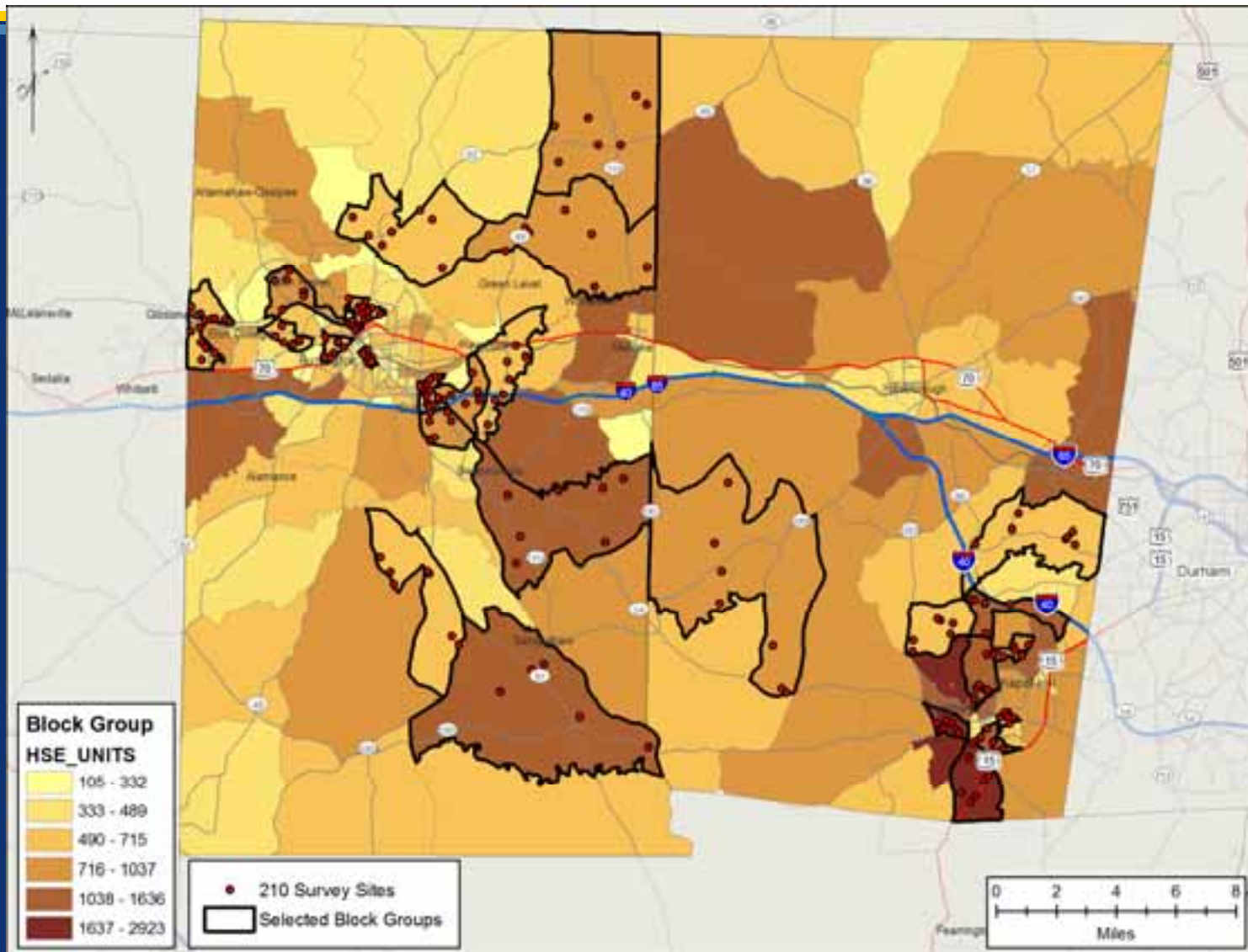
# Stage 1: Determine Sampling Frame and Primary Sampling Unit



# Stage 1: Sample with a Probability Proportionate to Population

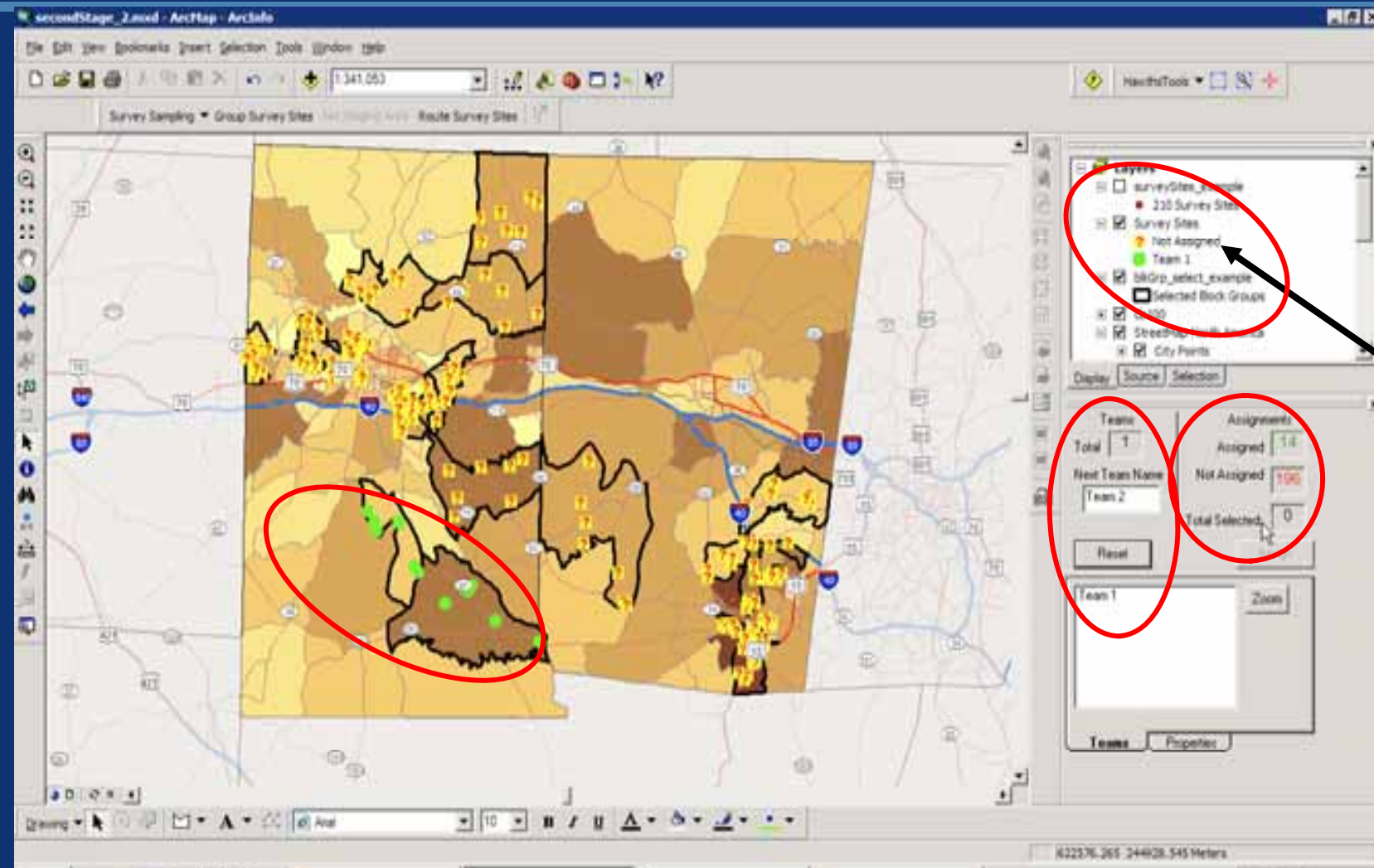


# Stage 2: Random Survey Locations





# Interview Team Assignments



Keep track of team assignments

# Optimized Driving Directions

The screenshot displays the ArcMap interface with the 'StreetMap Find Route' dialog box open. The dialog box shows the following driving directions:

Step	Instruction	Distance	Time
1:	Depart STAGING AREA		
2:	Go North on Roberson St toward SR 54 Bus/E Weaver St	< 0.1 mile(s)	< 1 minute(s)
3:	Turn right on SR 54 Bus (E Main St)	0.8 mile(s)	1 minute(s)
4:	Turn left on SR 86 (N Columbia St)	1.5 mile(s)	2 minute(s)
5:	Bear right to stay on SR 86 (Airport Rd)	2.7 mile(s)	4 minute(s)
6:	Turn left on Ramp	< 0.1 mile(s)	< 1 minute(s)
7:	Bear right onto ramp and go North West on I 40	9.3 mile(s)	12 minute(s)
8:	At exit 161 take ramp to Ramp	0.3 mile(s)	< 1 minute(s)
9:	Turn right on Ramp	0.9 mile(s)	2 minute(s)
10:	Go on US 70	0.3 mile(s)	< 1 minute(s)
11:	Make sharp left to stay on US 70	11.8 mile(s)	15 minute(s)
12:	Turn right on N Wilkins Rd (Hawfield Rd)	0.5 mile(s)	< 1 minute(s)
13:	Turn right on SR 1927 (Bason Rd)	1.9 mile(s)	4 minute(s)
14:	Arrive at 3627 STHY 1927, on the left		
15:	Depart 3627 STHY 1927		

The 'Layers' panel on the right shows the following layers:

- Team 7
  - Route for Team 7
  - Stops for Team 7
- Team 1
  - Route for Team 1
  - Stops for Team 1
- Team 5
  - Route for Team 5
  - Stops for Team 5
- Team 4
  - Route for Team 4
  - Stops for Team 4
- Team 9
  - Route for Team 9
  - Stops for Team 9
- Team 3
  - Route for Team 3
  - Stops for Team 3

# ArcPad Studio is used to design custom forms for surveys

The screenshot displays the ArcPad Studio interface for designing a survey form. The main window is titled "Fluform\_v30" and shows a form with several fields: "Gender", "Concern", "KNOWLE", "SIX\_THR", "SIX\_NINI", "SEVEN\_I", "HNIntent", "HN\_No1", "WhereVacc.", and "Season". The form is designed with a light blue background and includes radio buttons for "Yes", "No", and "Don't know" (D) for several questions.

On the right side, there is a code editor showing the following VBScript code:

```
22 Sub clearControl(pControl)
23   If pControl.type = "EDIT" Then
24     pControl.text = ""
25   ElseIf pControl.type = "COMBOBOX" Then
26     pControl.ListIndex = -1
27   ElseIf pControl.type = "RADIOBUTTON" Then
28     pControl.value = False
29   End If
30 End Sub
31
32 Sub SkipScript
33   If EDITFORM.Pages("PAGE3a").Controls("cbo
34     EDITFORM.Pages("PAGE20").Activate "Ta
35   ElseIf EDITFORM.Pages("PAGE3a").Controls("
36     EDITFORM.Pages("PAGE6").Activate "sk
37   ElseIf EDITFORM.Pages("PAGE3a").Controls("
38     showControl(EDITFORM.Pages("PAGE5").C
39     showControl(EDITFORM.Pages("PAGE5").C
40     EDITFORM.Pages("PAGE5").Activate "If
41   ElseIf EDITFORM.Pages("PAGE3b").Controls("
42     M.Pages("PAGE5").C
43     M.Pages("PAGE5").C
44     M.Pages("PAGE5").C
45     M.Pages("PAGE5").C
46     M.Pages("PAGE5").C
47     M.Pages("PAGE5").C
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96     M.Pages("PAGE5").C
97     M.Pages("PAGE5").C
98     M.Pages("PAGE5").C
99     M.Pages("PAGE5").C
100    M.Pages("PAGE5").C
```

The code editor also shows the following HTML code for the form fields:

```
1 fluForm_v30.s
2
3
4 FORM name="EDITFORM" caption="Flu
5 PAGE name="Page1b" caption="Gende
6 <LABEL name="lblGENDER" width=
7 <COMBOBOX name="cboGender" x=
8 <LISTITEM text="FEMALE" va
9 <LISTITEM text="MALE" valu
10 </COMBOBOX>
11 <LABEL name="lblKNOW" x="9" y=
12 <RADIOBUTTON name="rdoKNOW_je
13 <RADIOBUTTON name="rdoKNOW_no
14 <RADIOBUTTON name="rdoKNOW_UNK" x="76"
15 <LABEL name="lblDOSES" x="7" y="98" wid
16 <RADIOBUTTON name="rdoDOSES_je
17 <RADIOBUTTON name="rdoDOSES_no" x="43"
18 <RADIOBUTTON name="rdoDOSES_UNK" x="76"
19 </PAGE>
20 PAGE name="Page1c" caption="Concern" onque
```

The form design includes several questions and options:

- Gender: A dropdown menu with options "FEMALE" and "MALE".
- Concern: A text area with the text "To the best of your knowledge, is there currently a vaccine being prepared for the pandemic influenza strain referred to as H1N1 or swine flu".
- Yes/No/Don't know (D) radio buttons for the concern question.
- HNIntent: A text area with the text "Do you intend to get vaccinated against H1N1 swine flu when the vaccine is available later this fall".
- Yes/No/Unk radio buttons for the HNIntent question.
- WhereVacc.: A text area with the text "Where do you intend to get H1N1 swine flu vaccine".
- Season: A dropdown menu with options "College or university health service", "Community health clinic", "Employer", "Hospital", "Local health care department", "Other", "Pharmacy", and "Private health care provider".

The ArcPad Studio interface also shows a "Fields" list on the left with fields like "ID", "SIX\_ONE", "SIX\_SEVEN", "SIX\_OTH\_YN", "SVN\_OTHYN", and "TEN\_THREE". The status bar at the bottom indicates "Ready" and "Pos 20, 125 Size 80, 10".



# Handheld Data Collection



# The Report

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

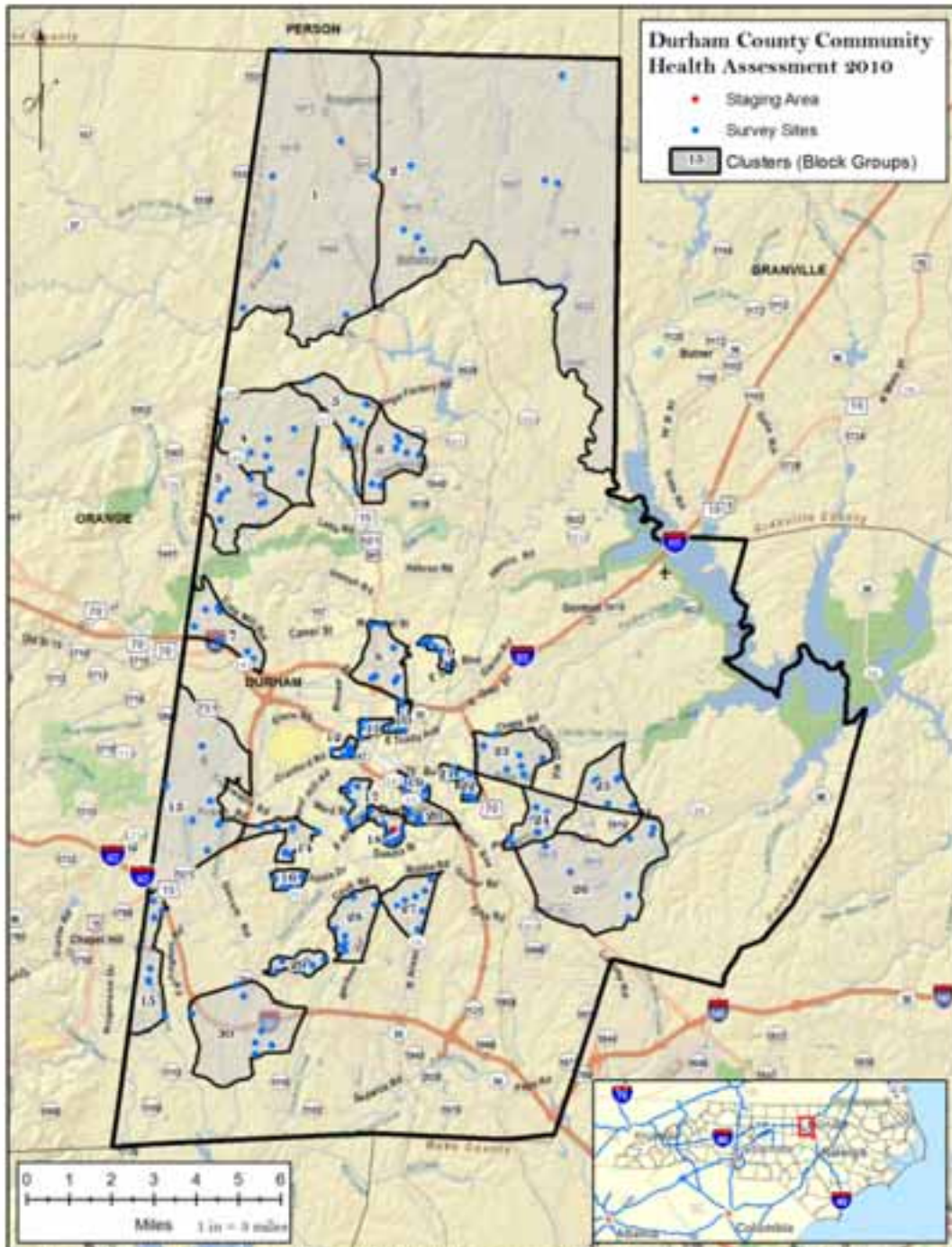
Status	Households (%)	(95% CI†)	No. of households projected, 14-county area§	(95% CI)
<b>External home</b>				
Minimal or no damage	65.3	(55.6–75.0)	61,240	(52,143–70,337)
Damaged, habitable	32.3	(22.8–41.7)	30,292	(21,383–39,108)
Damaged, uninhabitable	2.4	(0.2–4.6)	2,251	(188–4,314)
<b>Flood water in home</b>				
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)
<b>Household utilities</b>				
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)
<b>Hurricane-related illness or injury</b>				
Injury in household	1.3	(0.0–3.1)	1,219	(0.0–2,907)
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)
<b>Food and water</b>				
Using well water	8.3	(1.0–15.7)	7,784	(938–14,724)
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	(4.2–20.0)	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

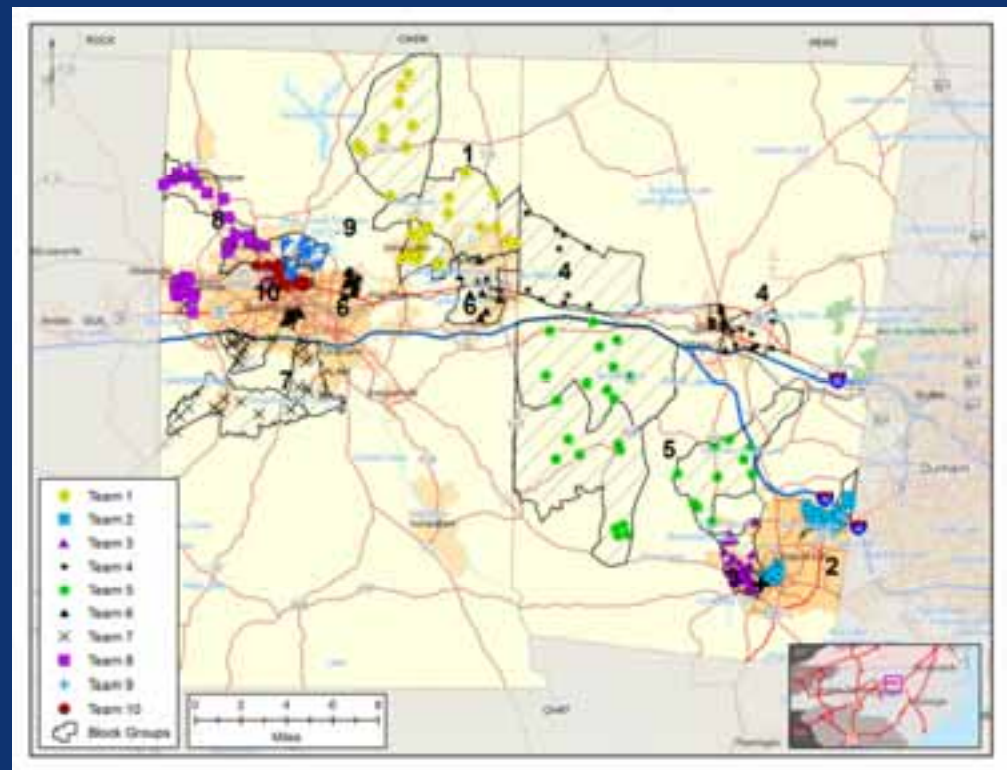


- SHARP provided GIS and GPS technical assistance to the Durham County Health Department
- Designed digital survey instrument in ArcPad Studio
- Mapped potential survey sites for the two-stage cluster sample
- Provided on-site training and technical assistance to survey volunteers and staff



# 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

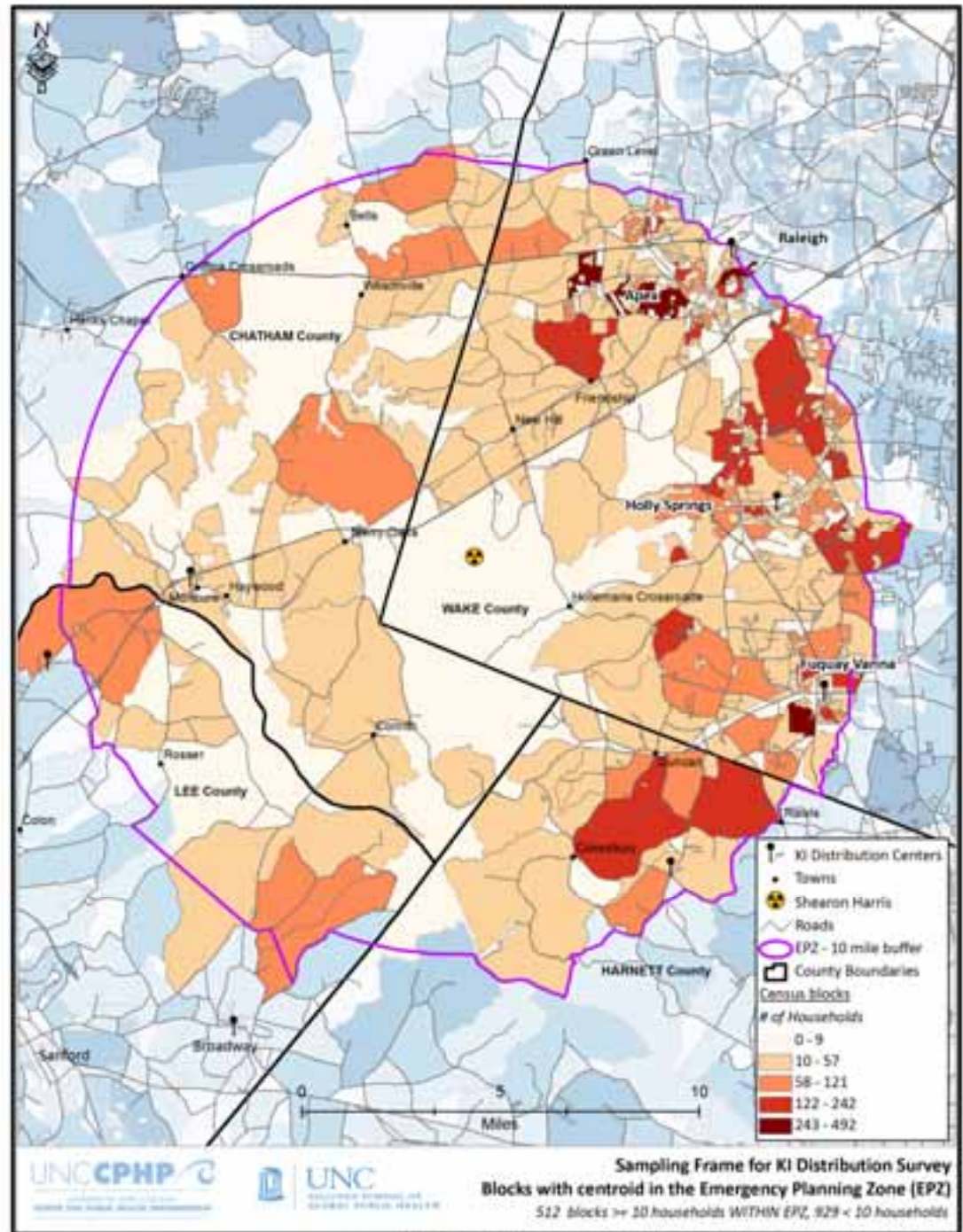


# H1N1 Rapid Survey

- 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

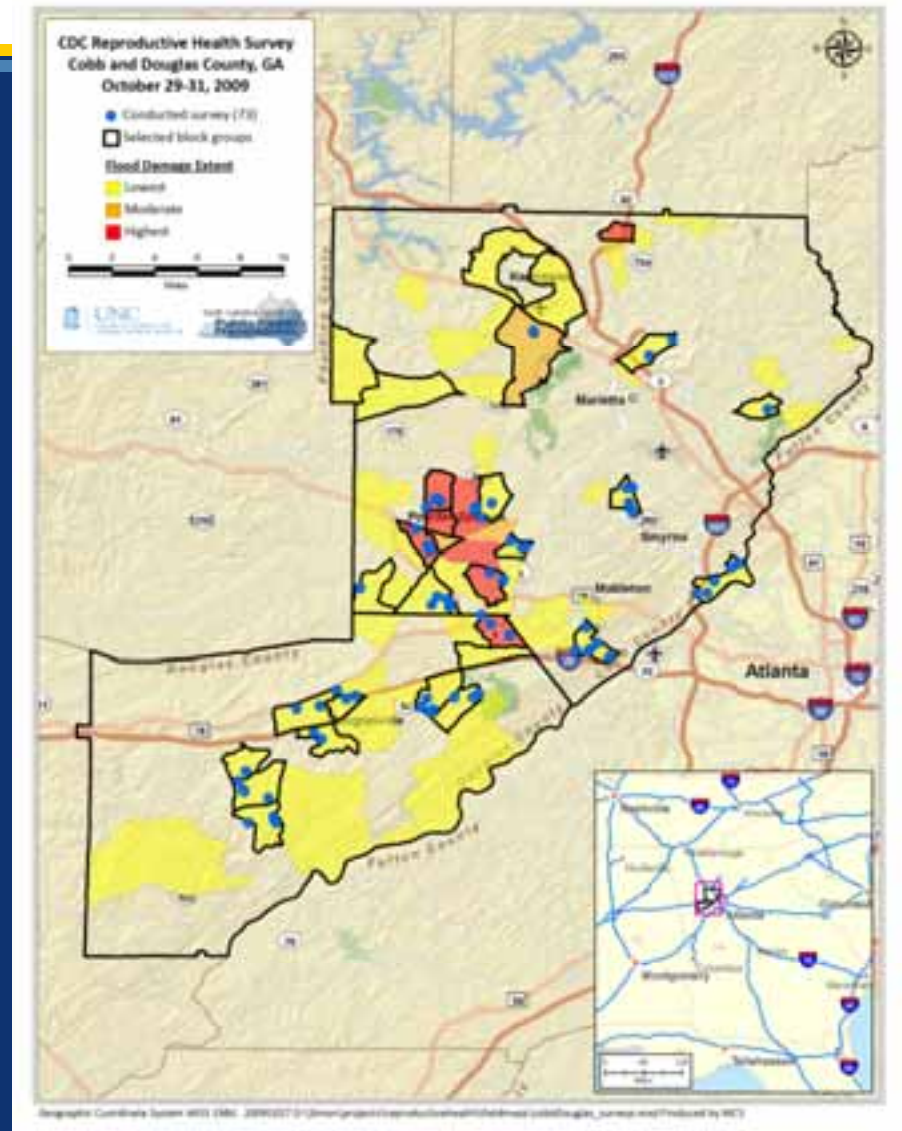
- Partnered with the NC DPH, NRC, and county health departments
- Assess coverage rates, knowledge & distribution models
- Used CASPER methods
- KI coverage rate 5.1%  
(non weighted results)





# 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/>

North Carolina Center for Pu...  
cphp.sph.unc.edu/sharpgis/

## UNC CPHP

UNIVERSITY OF NORTH CAROLINA  
CENTER FOR PUBLIC HEALTH PREPAREDNESS

### Home

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## Spatial Health Assessment Research Program (SHARP)

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 complete overview of SHARP.](#)

We provide [comprehensive information resources](#), technical assistance in the following areas:




- Typical surveys and assessments including [CDC's Community Assessment for Public Health Emergency Response \(CAPHER\)](#)
- Community health assessments to address local health department accreditation requirements or meet [Healthy Communities'](#) 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 (2009-2014)
- 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](#), [Ivan](#), [Charley](#), [Irene](#), [Rita](#) (2005), [Wilma](#) (2005), and [Katrina](#) (2005)

To learn more about SHARP or request assistance, please contact [sharpgis@unc.edu](mailto:sharpgis@unc.edu)



UNC CPHP staff member talks with Team Sprint volunteer about collecting survey data using the handheld console.



Team for-402 volunteers at the Liberty-Congover Health District in Warrenton, OR, 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.

UNC Center for Public Health Preparedness  
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updated 10/1/18

# 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



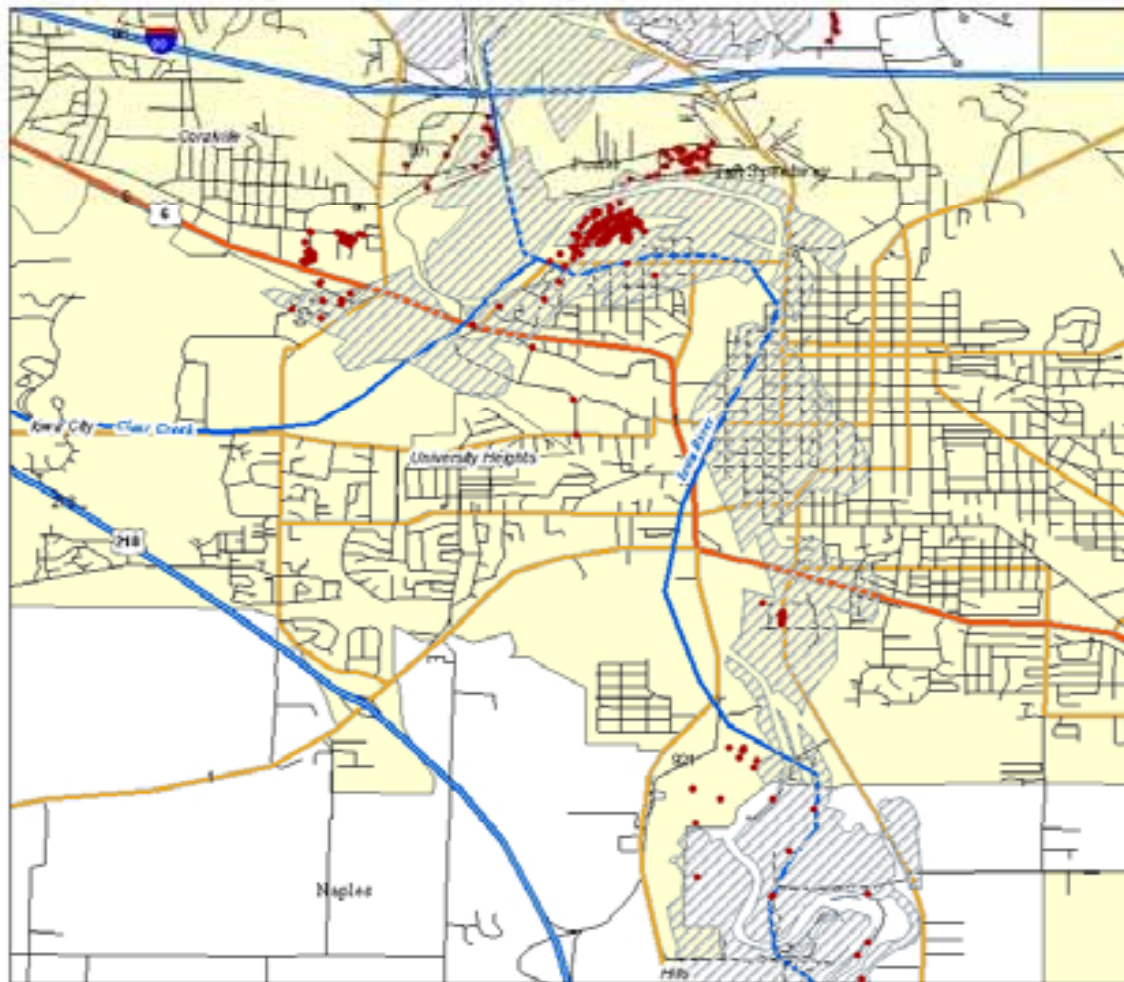




# Hurricane Wilma Improvements

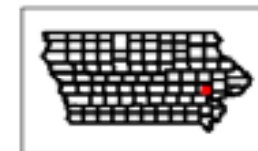
- Educational and information materials in multiple languages
  - Safe clean up, mold, generator safety
- Liaison with County and Florida Departments of Health for referrals
- Tracking interviews and sampling (particularly in multi-level residences)
- Communications
  - Use of VIPER 800 Mhz radios

# Iowa Floods (2008)



## Legend

- Interview Location
- ▨ Flood Extent as of 18JUN08
- River
- Limited Access
- Highway
- Major Road
- Street
- Town or City





# 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



## COMMUNITY ASSESSMENT FOR PUBLIC HEALTH EMERGENCY RESPONSE (CASPER)

### STANDARD OPERATING GUIDELINES VERSION 2.0



Available at: <http://www.epi.state.nc.us/epi/phpr/casper.html>



