



Homeland Security

Location Based Analysis and the National Fire Incident Reporting System (NFIRS)

What is Location Based Analysis?

- Spatial component
- Where something happened
- Other places like it?



Homeland
Security

How do we do it?

- Data available in each incident report
- Geocode
- Join NFIRS dataset with other datasets
 - Census
 - Cadastral
 - Rural/Urban continuum
 - ???
- Analyze



Homeland
Security

Why Geocode?

- Additional Data
 - Census
 - Cadastral
 - Rural/Urban
- Small Area Analysis
- Specialized Incident identification
- Apples to Apples
- Identification of Apples, Oranges and Pears



Homeland
Security

Geocoding basics

- Concatenated Address Fields from Basic module
- NFIRS 4.1 vs. 5.0, CAD
- Proxy zip code



Homeland
Security

Geocoding Tools

- Within your Geographic Information System (GIS) i.e., ArcGIS
 - Integrated within system
 - “simple” to use
 - Summary accuracy score
- Standalone geocoding application (FEMA uses Centrus)
 - External to GIS, although could be integrated
 - Finicky
 - Detailed result description
- Reference Dataset



Issues/Concerns

- Privacy of information
 - Address is public record
 - Only present aggregated results



Homeland
Security

Issues/Concerns

- Accuracy of geocode
 - Limit of precision/area of analysis
 - Street/Address based geocode
 - Zip code centroid based geocode
 - Case by case suitability
 - Few cases may be reviewed manually



Homeland
Security

Geocoding Results

- NFIRS 2005 Public Data Release file, Location Type 1, Version 5.0
- 1,537,682 records processed
- 96% geocoded to Zip centroid or better
- 72% geocoded to a street section



Homeland
Security

Current Applications

- Fire Experience in Student Dominated Residential Areas near Colleges/Universities (aka Off Campus Fires)
- NFIRS Representativeness study (OMB)



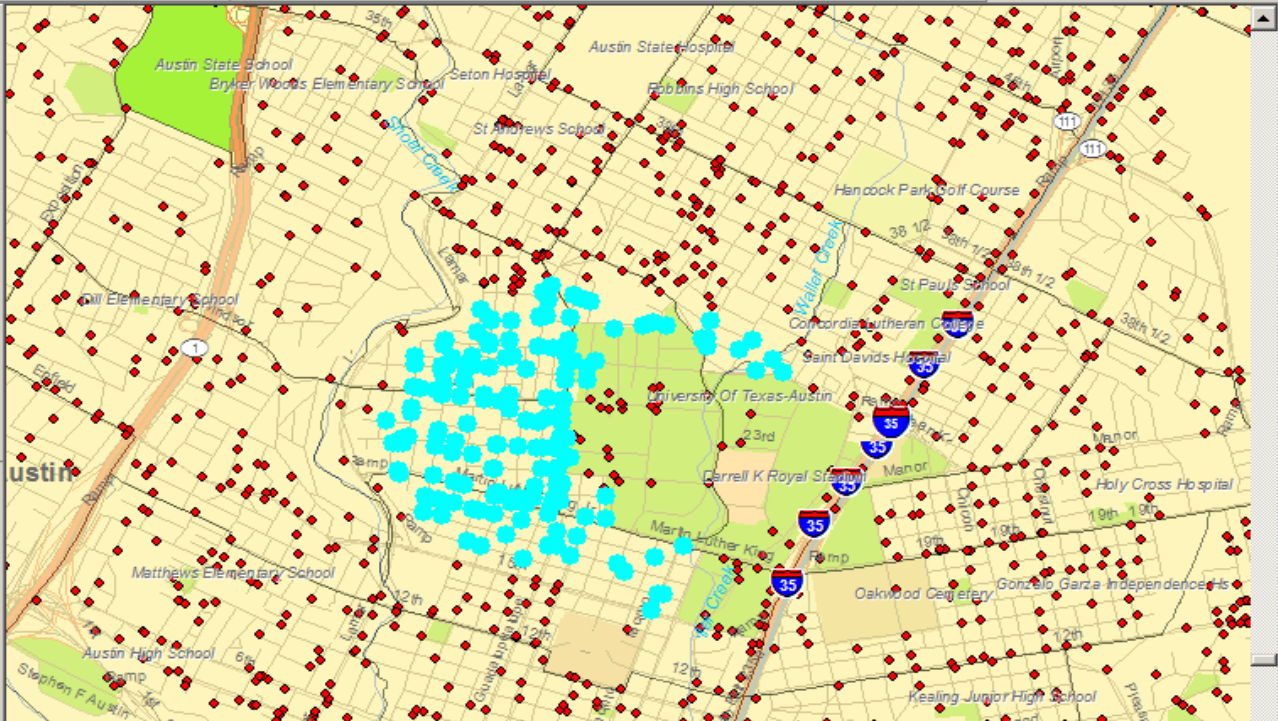
Homeland
Security

UT Austin

- cnt_fires_0305 Ev
- Block Group Bound
- Census Tract Bou
- Named Streams a
- US Census Popula
- Water bodies (Lak
- Freeway System t
- Major Roads
- streets
- Landmarks
- US Census Popula
- State Boundaries

UNC Chapel Hill

UI Champaign



Identify

Identify from: **Block Group Boundaries**

Block Group Boundaries

48

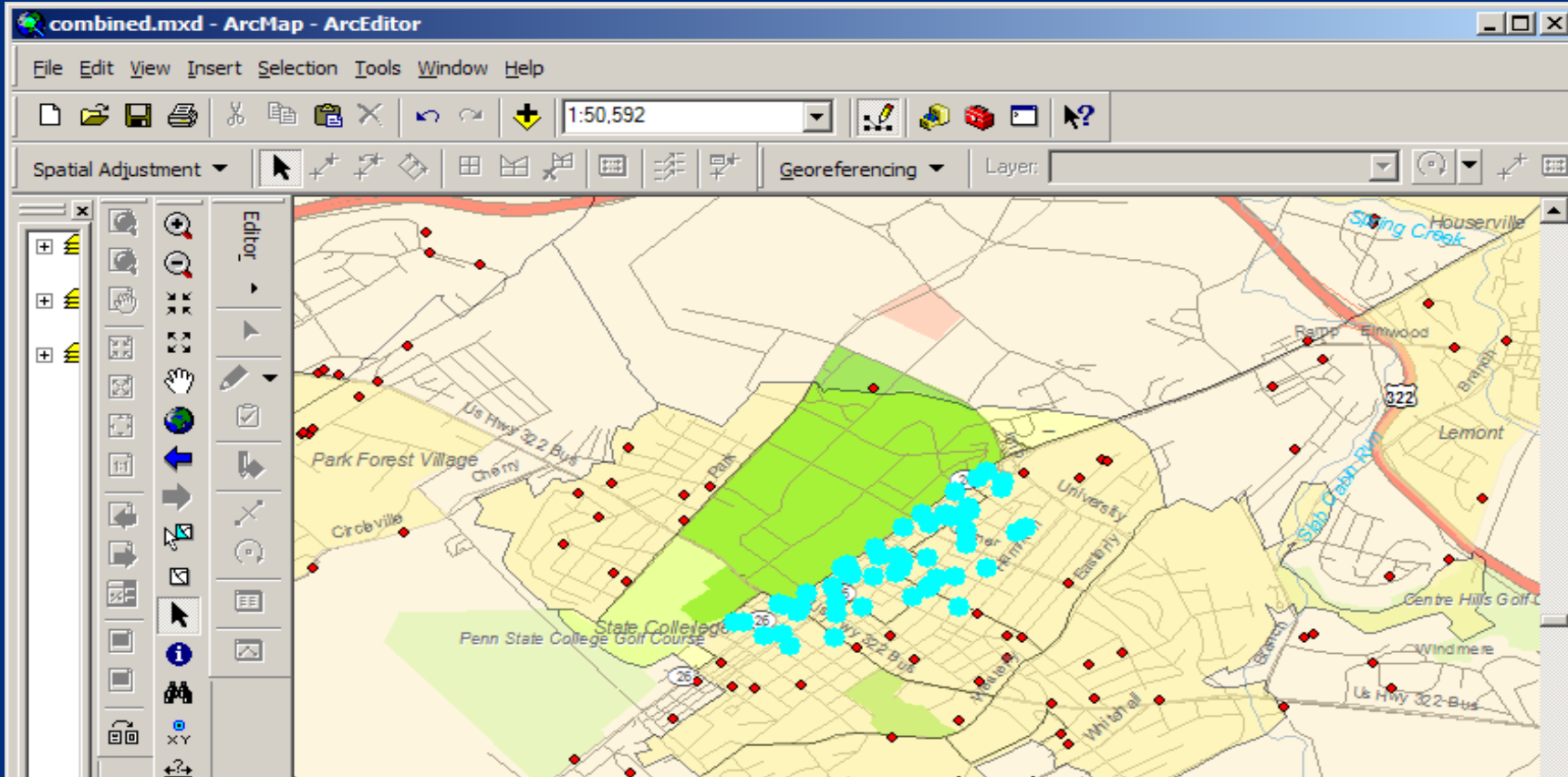
| Field | Value |
|------------|---------|
| MARHH_NO_C | 13 |
| MHH_CHILD | 1 |
| FHH_CHILD | 0 |
| FAMILIES | 27 |
| AVE_FAM_SZ | 2.07 |
| HSE_UNITS | 661 |
| VACANT | 19 |
| OWNER_OCC | 22 |
| RENTER_OCC | 620 |
| SQMI | 0.07 |
| Shape | Polygon |

Block Group Boundaries

Location: -97.742504 30.284211 Decimal Degrees

| Field | Value |
|------------|-------|
| MALES | 742 |
| FEMALES | 705 |
| AGE_UNDER5 | 0 |
| AGE_5_17 | 10 |
| AGE_18_21 | 923 |
| AGE_22_29 | 362 |
| AGE_30_39 | 88 |
| AGE_40_49 | 32 |
| AGE_50_64 | 15 |
| AGE_65_UP | 17 |
| MED_AGE | 20.8 |





Identify

Identify from: **Block Group Boundaries**

Block Group Boundaries
42

Location: -77.859423 40.792157 Decimal Degrees

| Field | Value |
|------------|-------|
| HSEHLD_1_F | 168 |
| MARHH_CHD | 2 |
| MARHH_NO_C | 28 |
| MHH_CHILD | 1 |
| FHH_CHILD | 1 |
| FAMILIES | 40 |
| AVE_FAM_SZ | 2.05 |
| HSE_UNITS | 673 |
| VACANT | 27 |
| OWNER_OCC | 37 |
| RENTER_OCC | 609 |

Identify

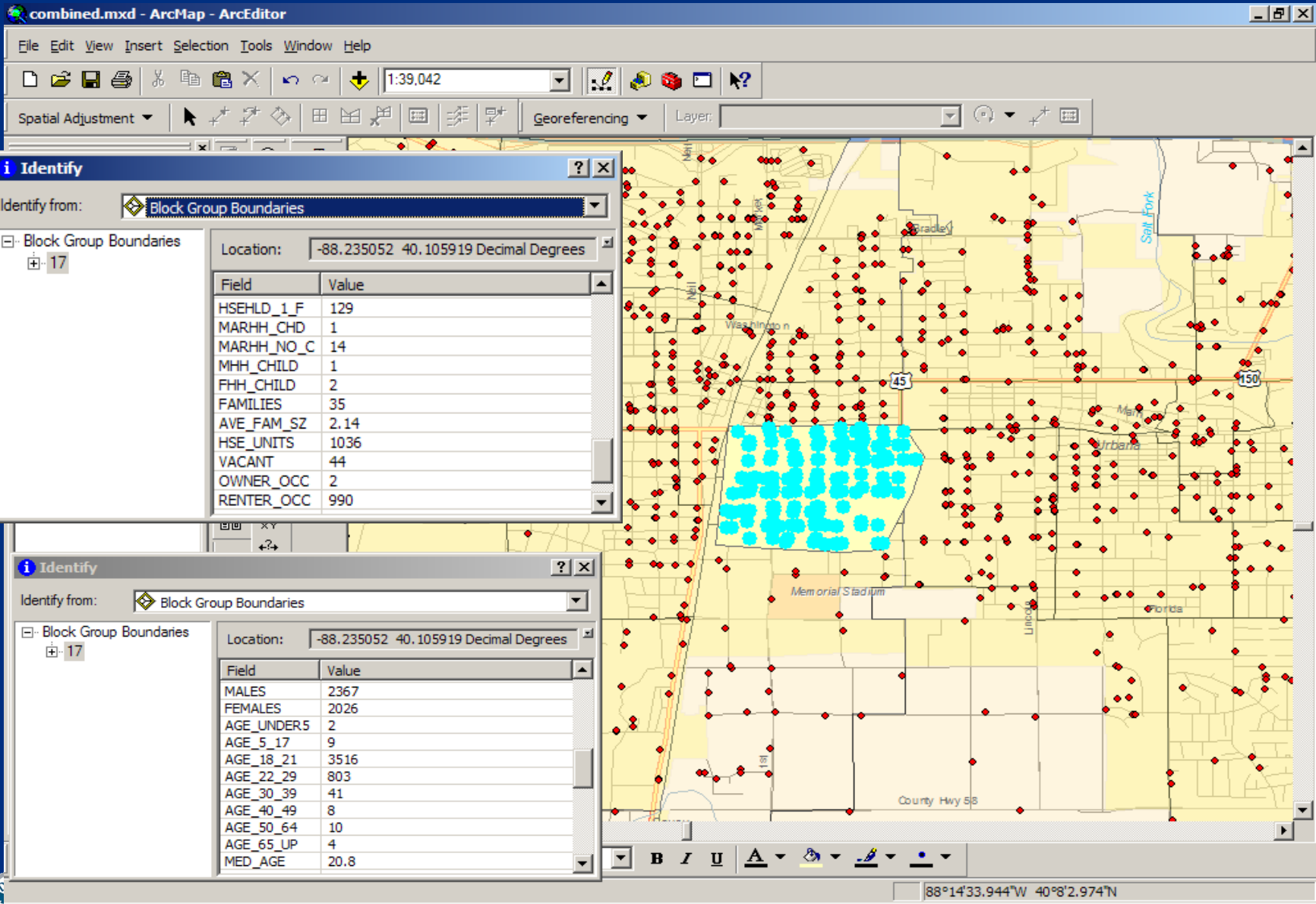
Block Group Boundaries

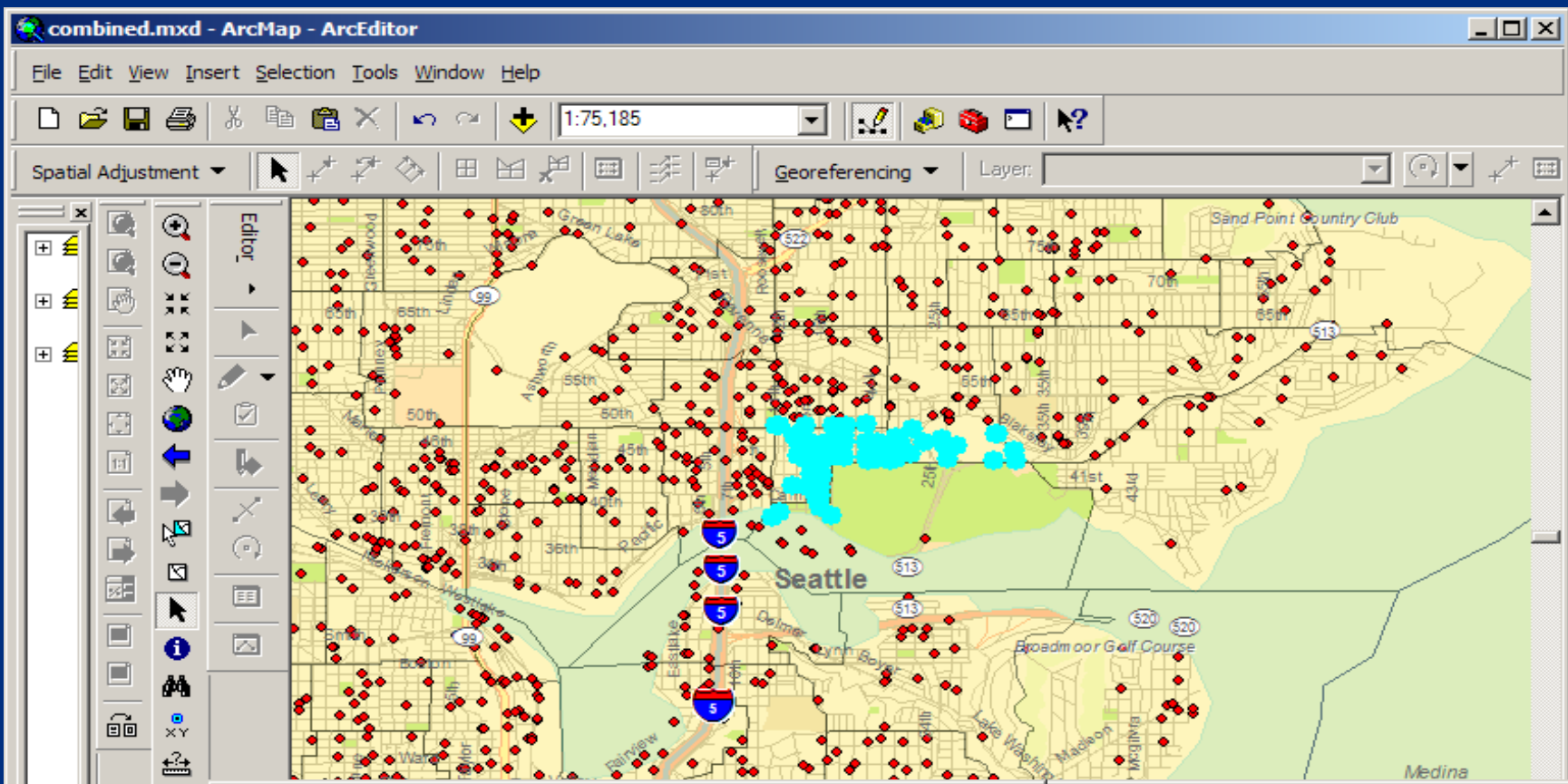
Location: -77.859423 40.792157 Decimal Degrees

| Field | Value |
|------------|-------|
| MALES | 609 |
| FEMALES | 656 |
| AGE_UNDER5 | 2 |
| AGE_5_17 | 2 |
| AGE_18_21 | 543 |
| AGE_22_29 | 490 |
| AGE_30_39 | 52 |
| AGE_40_49 | 33 |
| AGE_50_64 | 61 |
| AGE_65_UP | 82 |
| MED_AGE | 22.3 |



Homeland Security





Identify

Identify from: **Block Group Boundaries**

Location: -122.306699 47.662961 Decimal Degree:

| Field | Value |
|------------|-------|
| HSEHLD_1_F | 196 |
| MARHH_CHD | 27 |
| MARHH_NO_C | 58 |
| MHH_CHILD | 2 |
| FHH_CHILD | 9 |
| FAMILIES | 129 |
| AVE_FAM_SZ | 2.4 |
| HSE_UNITS | 867 |
| VACANT | 47 |
| OWNER_OCC | 75 |
| RENTER_OCC | 745 |

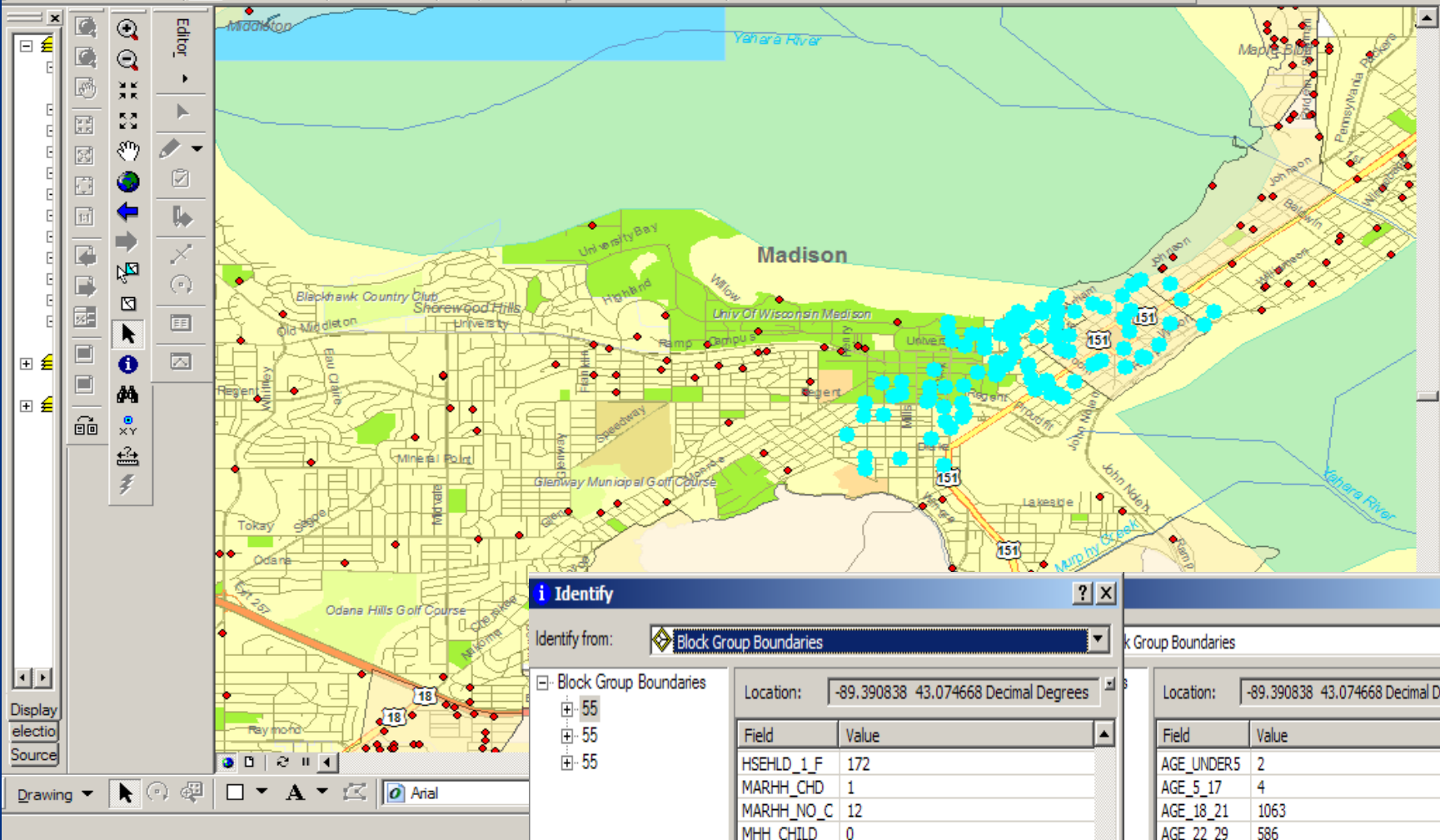
Block Group Boundaries

Location: -122.306699 47.662961 Decimal Degree:

| Field | Value |
|------------|-------|
| MALES | 1198 |
| FEMALES | 1007 |
| AGE_UNDER5 | 30 |
| AGE_5_17 | 19 |
| AGE_18_21 | 1090 |
| AGE_22_29 | 647 |
| AGE_30_39 | 201 |
| AGE_40_49 | 90 |
| AGE_50_64 | 81 |
| AGE_65_UP | 47 |
| MED_AGE | 21.9 |



Homeland Security



Identify

Identify from: Block Group Boundaries

- Block Group Boundaries
- 55
- 55
- 55

Location: -89.390838 43.074668 Decimal Degrees

| Field | Value |
|------------|-------|
| HSEHLD_1_F | 172 |
| MARHH_CHD | 1 |
| MARHH_NO_C | 12 |
| MHH_CHILD | 0 |
| FHH_CHILD | 1 |
| FAMILIES | 26 |
| AVE_FAM_SZ | 2.19 |
| HSE_UNITS | 968 |
| VACANT | 72 |
| OWNER_OCC | 4 |
| RENTER_OCC | 892 |

Block Group Boundaries

Block Group Boundaries

Location: -89.390838 43.074668 Decimal Degrees

| Field | Value |
|------------|-------|
| AGE_UNDER5 | 2 |
| AGE_5_17 | 4 |
| AGE_18_21 | 1063 |
| AGE_22_29 | 586 |
| AGE_30_39 | 86 |
| AGE_40_49 | 27 |
| AGE_50_64 | 18 |
| AGE_65_UP | 7 |
| MED_AGE | 21.6 |
| MED_AGE_M | 22 |
| MED_AGE_F | 21.2 |



Homeland Security

NFIRS Representativeness

- OMB directed
- Geographic representation of NFIRS dataset
- Methodology:
 - Match NFIRS reporting Fire Departments to the USFA Fire Department Census
 - Break FDs into NFIRS/non-NFIRS groups
 - Compare and contrast by Location, Population Protected, and other variables of interest



Questions



Homeland
Security

Thank you!

Jim Heeschen
National Fire Data Center
U.S. Fire Administration
16825 South Seton Avenue
Emmitsburg, MD 21727
301-447-1180
Jim.heeschen@dhs.gov



Homeland
Security