



Resilience Analysis and Planning Tool (RAPT)

National Integration Center Technical Assistance

September 2020



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The National Integration Center (NIC) develops doctrine and tools to lead the whole community implementation of the National Preparedness System (NPS) and the National Incident Management System (NIMS).

Resilience Analysis and Planning Tool (RAPT)

- Publicly available GIS tool to inform **strategies for preparedness, response, and recovery**.
- Allows **combined analysis** of Population / Community data, Infrastructure data, and Hazard data. All data is open source.
- **20 Commonly-Used Community Resilience Indicators** from peer-reviewed published methodologies.
- Infrastructure data from Homeland Infrastructure Foundation-Level Data (HIFLD) includes **location and characteristics**
- Hazard layers: **historic data, risk data, and real-time severe weather forecasts**
- **Analysis Tools**: Incident Analysis Tool, Select Population Summary, Query
- **Add Data**: Temporarily upload additional GIS layers



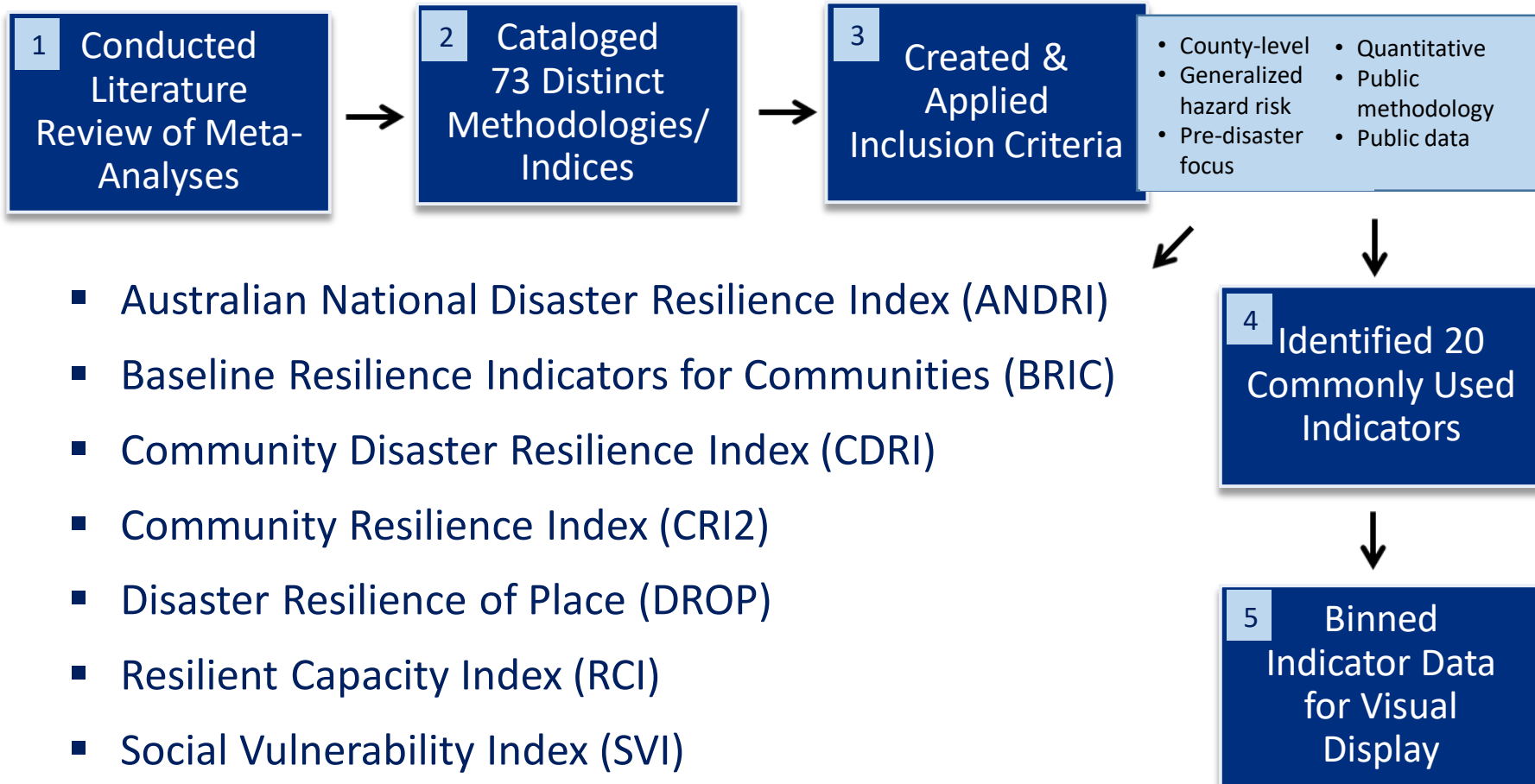
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Community Resilience Indicator Analysis:

Methodology to Identify Commonly Used Indicators of Community Resilience



- Australian National Disaster Resilience Index (ANDRI)
- Baseline Resilience Indicators for Communities (BRIC)
- Community Disaster Resilience Index (CDRI)
- Community Resilience Index (CRI2)
- Disaster Resilience of Place (DROP)
- Resilient Capacity Index (RCI)
- Social Vulnerability Index (SVI)
- The Composite Resilience Index (TCRI)



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Commonly Used Community Resilience Indicators

11 Population-Focused Indicators and Metric Used

Educational Attainment: % population over 25 without high school diploma

Unemployment Rate: % of labor force unemployed

Disability: % of population with a disability

English Language Proficiency: % limited-English-speaking households

Mobility: % of occupied housing units with no vehicles available

Home Ownership: % owner-occupied housing units

Age: % of population 65 years and over

Household Income: median household income

Income Inequality: Gini Index

Health Insurance: % of population with no health insurance coverage (private or public)

Single-parent Households: % of single-parent households



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Commonly Used Community Resilience Indicators

9 Community-Focused Indicators and Metric Used

Connection to Civic and Social Organizations: # of organizations per 10,000 people
Hospital Capacity: # of hospitals per 10,000 people
Medical Professional Capacity: # of health diagnosing and treating practitioners per 1,000 people
Affiliation with a Religion: % of population that are religious adherents
Mobile Homes: % of mobile homes
Population Change: % change in residents who have lived in same county for more than 5 years
Public School Capacity: # of public schools per 5,000 population
Hotel/Motel Capacity: # of hotels/motels per 5,000 population
Rental Property Capacity: % vacant rental housing units



Mapping and Analysis

- **Choropleth Maps** from binning process to provide high-level visual understanding of relative values of census data
- **Correlation Analysis** provides greater understanding of inter-connectedness between indicators
- **Aggregate Indicator** shows national relative standard deviation of all 20 indicators combined

Table 2: Pearson Correlation Coefficients

	Age 65 and Older	Lack of HS Diploma	Disability	Limited English Language Proficiency	Lack of Health Insurance	Lack of Vehicle	Unemployment Rate	Household Income	Income Inequality	Home Ownership	Single-Parent Household	Presence of Mobile Homes	Public School Capacity	Medical Professional Capacity	Hospital Capacity	Hotel/Motel Capacity	Rental Property Capacity	Affiliation with a Religion	Connection to Civic and Social Organizations	Population Change
Age 65 and Older	1.00	-0.12	0.41	-0.07	-0.15	-0.16	-0.11	-0.27	0.01*	-0.12	-0.31	0.13	0.23	-0.08	0.26	0.14	0.10	0.03*	0.21	-0.34
Lack of HS Diploma	-0.12	1.00	0.43	0.43	0.46	0.34	0.50	-0.59	0.37	-0.19	0.53	0.45	-0.12	-0.49	-0.01*	-0.11	-0.01*	0.02*	-0.15	-0.19
Disability	0.41	0.43	1.00	0.11	0.09	0.16	0.41	-0.66	0.24	-0.18	0.25	0.48	-0.03*	0.34	0.04	-0.05	0.04*	-0.08	-0.02*	-0.39
Limited English Language Proficiency	-0.07	0.43	0.11	1.00	-0.04*	0.33	0.52	-0.31	0.28	-0.11	0.38	-0.20	-0.06	-0.14	-0.01*	-0.02*	0.02*	0.02*	-0.05	0.04*
Lack of Health Insurance	-0.15	0.46	0.09	-0.04*	1.00	0.11	0.16	-0.26	0.17	-0.29	0.28	0.37	0.09	-0.41	0.06	0.09	0.12	0.08	-0.08	0.07
Lack of Vehicle	-0.16	0.34	0.16	0.33	0.11	1.00	0.50	-0.30	0.39	-0.32	0.59	-0.05	-0.05	-0.12	-0.09	-0.06	-0.04*	-0.03*	-0.01*	-0.16
Unemployment Rate	-0.11	0.50	0.41	0.52	0.16	0.50	1.00	-0.50	0.41	-0.24	0.66	0.17	-0.16	-0.28	-0.13	-0.09	-0.01*	-0.12	-0.13	-0.13
Household Income	-0.27	-0.59	-0.66	-0.31	-0.26	-0.30	-0.50	1.00	-0.43	0.34	-0.48	-0.42	-0.05	0.42	-0.12	0.02*	-0.07	-0.04*	-0.01*	0.47
Income Inequality	0.01*	0.37	0.24	0.28	0.17	0.39	0.41	-0.43	1.00	-0.34	0.49	0.14	-0.12	-0.04*	-0.06	-0.06	0.04*	0.04*	-0.11	-0.08
Home Ownership	-0.12	-0.19	-0.18	-0.11	-0.29	-0.32	-0.24	0.34	-0.34	1.00	-0.28	-0.11	-0.20	0.30	0.07	-0.30	-0.29	0.04*	-0.10	0.10
Single-Parent Household	-0.31	0.53	0.25	0.38	0.28	0.59	0.66	-0.48	0.49	-0.28	1.00	0.15	-0.25	-0.21	-0.19	-0.13	-0.05	-0.04*	-0.18	-0.14
Presence of Mobile Homes	0.13	0.45	0.48	-0.20	0.37	-0.05	0.17	-0.42	0.14	-0.11	0.15	1.00	0.01*	-0.39	0.02*	0.00*	0.04*	-0.12	-0.09	-0.17
Public School Capacity	0.23	-0.12	-0.03*	-0.06	0.09	-0.05	-0.16	-0.05	-0.12	-0.20	-0.25	0.01*	1.00	-0.18	0.38	0.33	0.12	0.22	0.27	-0.20
Medical Professional Capacity	-0.08	-0.49	-0.34	-0.14	-0.41	-0.12	-0.28	0.42	-0.04*	0.30	-0.21	-0.39	-0.18	1.00	-0.10	-0.09	-0.11	0.02*	-0.04*	0.19
Hospital Capacity	0.26	-0.01*	0.04*	-0.01*	0.06	-0.09	-0.13	-0.12	-0.06	-0.07	-0.19	0.02*	0.38	-0.10	1.00	0.21	0.08	0.26	0.29	-0.24
Hotel/Motel Capacity	0.14	-0.11	-0.05	-0.02*	0.09	-0.06	-0.09	0.0*	-0.06	-0.30	-0.13	0.00*	0.33	-0.09	0.21	1.00	0.25	0.05	0.24	-0.05
Rental Property Capacity	0.10	-0.01*	0.04*	0.02*	0.12	-0.04*	-0.01*	-0.07	0.04*	-0.29	-0.05	0.04*	0.12	-0.11	0.08	0.25	1.00	0.07	0.07	-0.03*
Affiliation with a Religion	0.03*	0.02*	-0.08	0.02*	0.08	-0.03*	-0.12	-0.04*	0.04*	0.04*	-0.04*	-0.12	0.22	0.02*	0.26	0.05	0.07	1.00	0.14	-0.15
Connection to Civic and Social Organizations	0.21	-0.15	-0.02*	-0.05	-0.08	-0.01*	-0.13	-0.01	-0.11	-0.10	-0.18	-0.09	0.27	-0.04*	0.29	0.24	0.07	0.14	1.00	-0.18
Population Change	-0.34	-0.19	-0.39	0.04*	0.07	-0.16	-0.13	0.47	-0.08	0.10	-0.14	-0.17	-0.20	0.19	-0.24	-0.05	-0.03*	-0.15	-0.18	1.00

*not statistically significant

Positive relationships have green shading

Negative relationships have blue shading

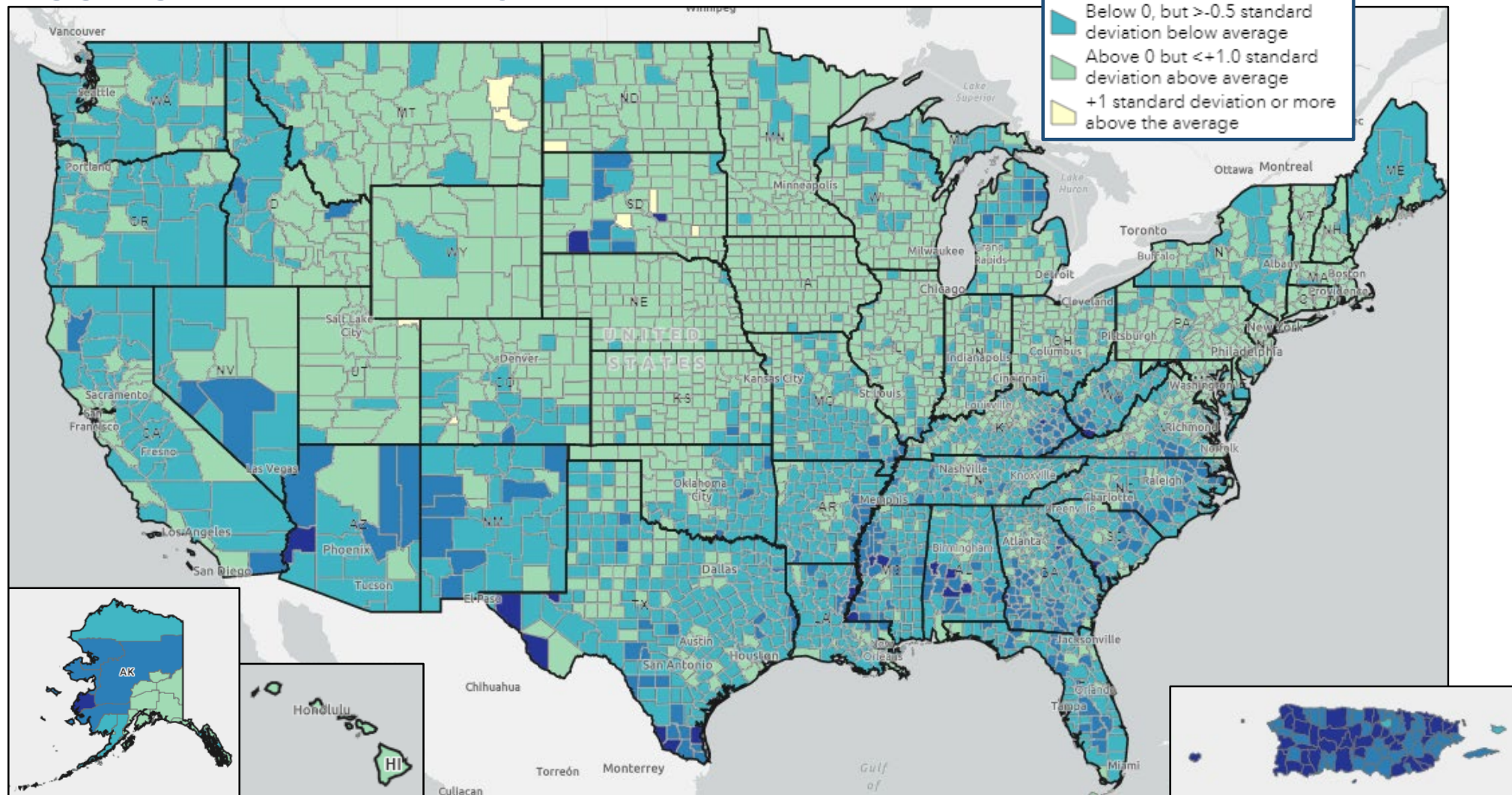


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Aggregate Community Resilience Indicator



Counties in the least resilient bins (darker blues) tend to be in:
 Central Appalachian counties, Mississippi Delta LA/MS, Alabama, Southeastern US,
 South Dakota, South Texas, Puerto Rico, the western coast and interior of Alaska



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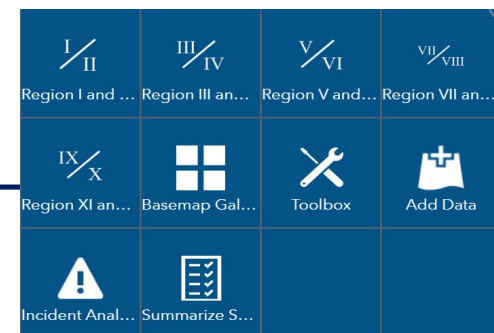
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Population-Focused Indicators	Community-Focused Indicators	Infrastructure Data	Hazard Data
CRIA Commonly Used Indicators	CRIA Commonly Used Indicators		Historic / Risk
% Population without Health Insurance ^{a,b}	Connection to Civic/Social Organizations	Nursing Homes	Flood Hazard Zones
% Population Unemployed ^{a,b}	Hospital Capacity	Hospitals	Tornado Paths
% Population without a High School Education ^{a,b}	Medical Professional Capacity	Urgent Care Facilities	Tropical Storms
% Population with a Disability ^{a,b}	Affiliation with a Religion	Public Health Depts.	Seismic Hazards
% Population without Access to a Vehicle ^{a,b}	Presence of Mobile Homes*	Fire Stations	Wildfire
% Population with Home Ownership ^{a,b}	Public School Capacity	Emergency Medical Services (EMS) stations	
% Population over 65 ^{a,b}	Population Change	Local Law Enforcement locations	NOAA Layers
% Population Single-Parent Households ^{a,b}	Hotel/Motel Capacity	911 Service Area Boundaries	Current Watches/Warnings
% Population with Limited English Proficiency ^{a,b}	Rental Property Capacity ^{a,b}	Mobile Home Parks	Hurricane Outlook: Atlantic
Median Household Income ^{a,b}		Places of Worship	Severe Weather Outlook
Gini Index: Income Inequality ^b		Public Schools	Excessive Rainfall Outlook
		Private Schools	River Flood Outlook
Other Population Indicators		Colleges and Universities	
At-risk electricity-dependent Medicare beneficiaries		Prison Boundaries	
Tribal Populations		Transmission Lines	
		Electric Power Plants	
		Solid Waste Landfills	
		Wastewater Treatment Plants	
a Both U.S. Census Bureau county and census tract data;		Pharmacies (RX Open)	
ACS 2014-2018 five-year estimates.		Dialysis Centers	
b Tribal territory population data available.		High Hazard Dams	

RAPT Landing Page www.fema.gov/rapt

☐ I agree to the above terms and conditions



FEMA Resilience Analysis and Planning Tool (RAPT) 2.0

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For more information on how to use the RAPT please see the following documents:

[RAPT Overview](#): A one-page introduction to RAPT.

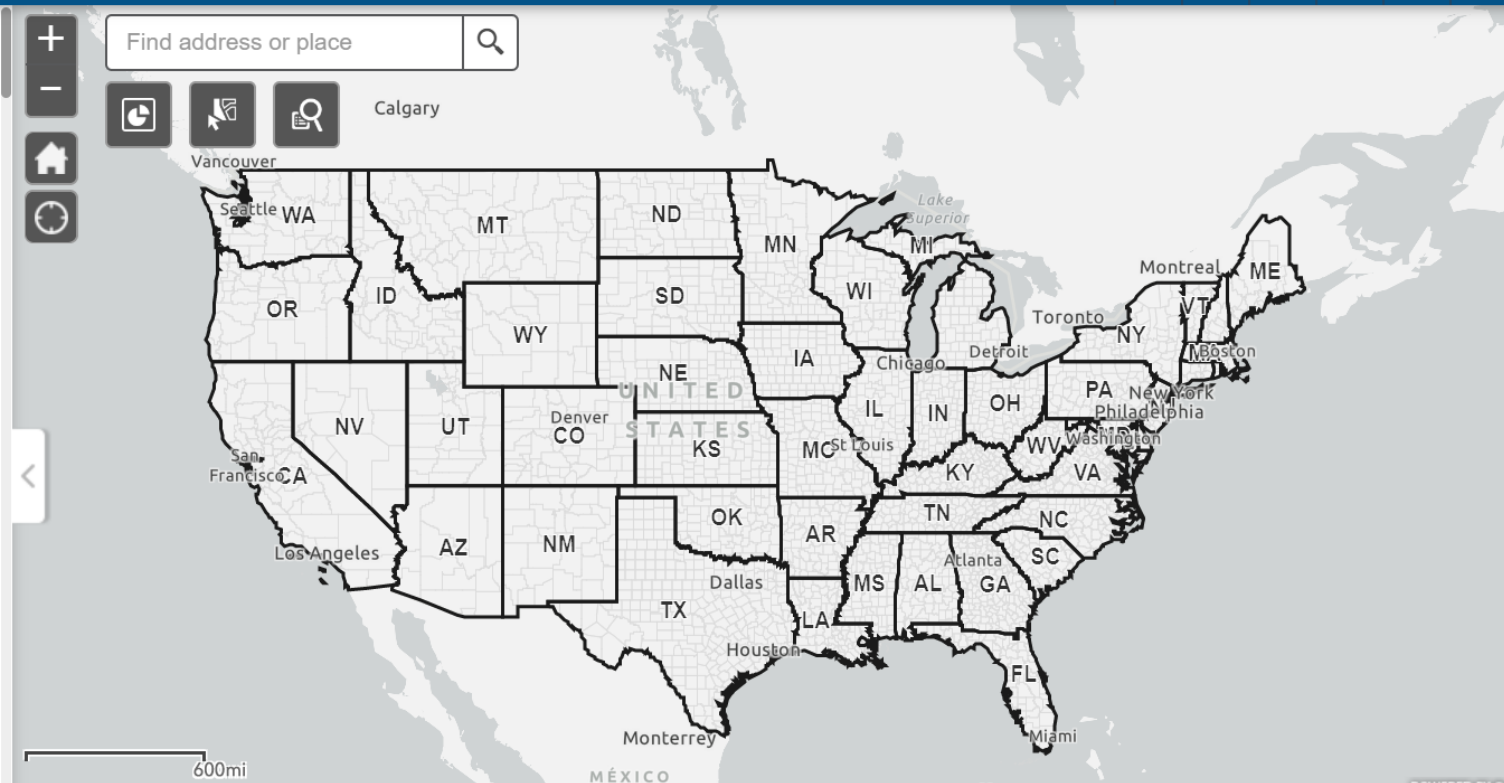
[RAPT User Guide](#): Describes RAPT's various features and tools.

[RAPT Video Guides](#): A series of videos demonstrating how to use RAPT

[RAPT Data Layers and Sources](#): Includes information on all the data layers in the RAPT and the source of each data layer.

[Community Resilience Indicator Summary](#): Provides detailed information on each of the community resilience indicators including the indicator's connection to resilience, the data source, national average and binning method.

[CRIA Correlation Analysis](#): Describes how individual community resilience indicators



FAQs

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Basemap Gallery

Basemap Gallery



Charted Territory Map



Colored Pencil Map



Community Map



Dark Gray Canvas



Firefly Imagery Hybrid



Human Geography Dark



Human Geography Map



Imagery



Imagery Hybrid



Light Gray Canvas



Mid-Century Map



Modern Antique Map



National Geographic Style



Navigation



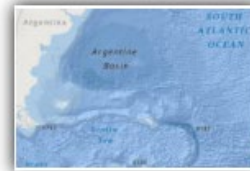
Navigation (Dark Mode)



Newspaper Map



Nova Map



Oceans



OpenStreetMap



Streets



Streets (Night)



Terrain with



Topographic



USA Topo Maps



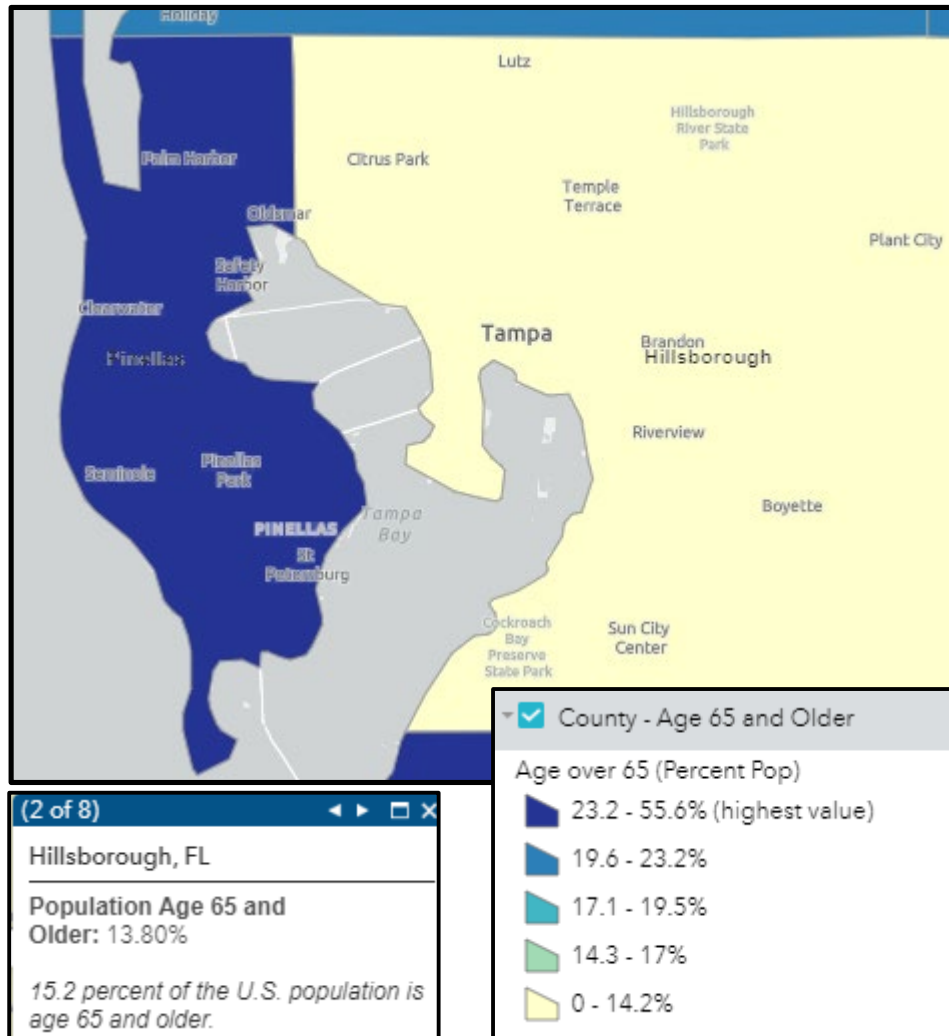
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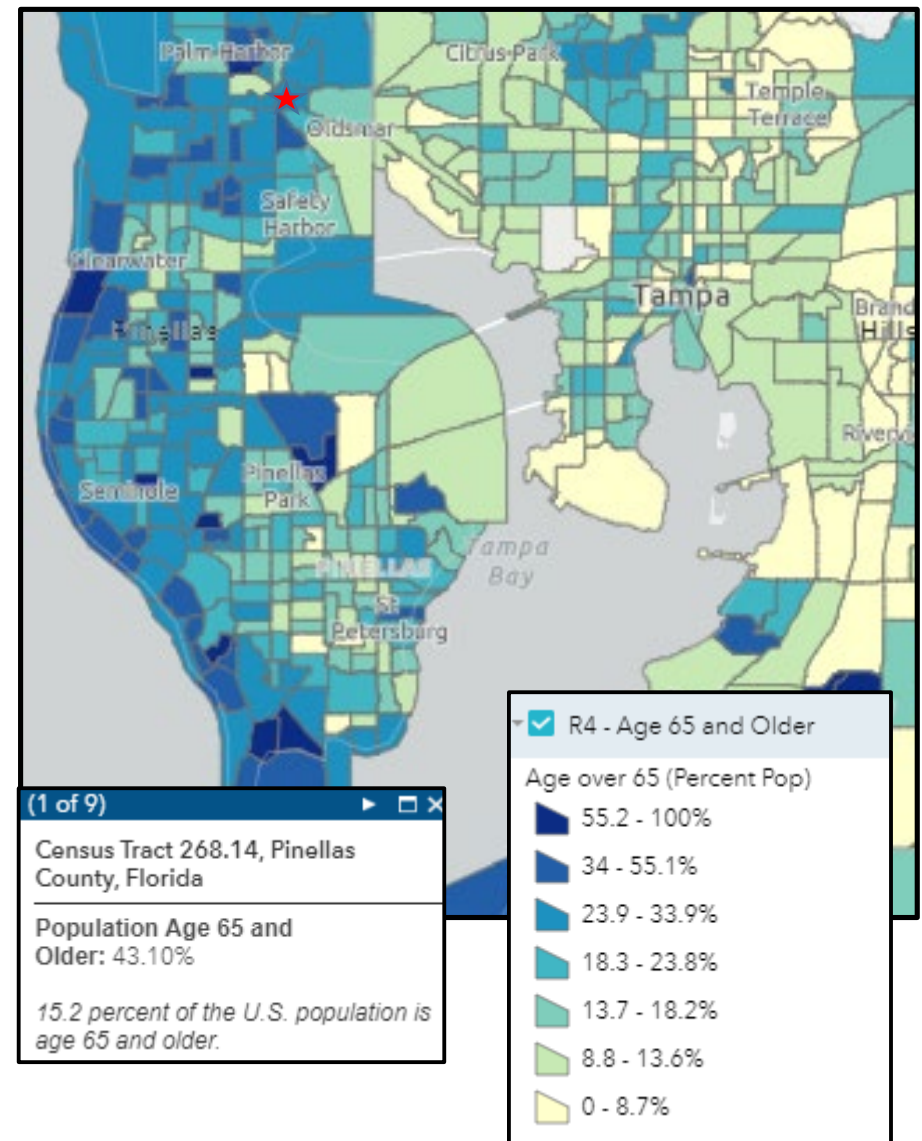
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Population Indicator: Age

Hillsborough FL with County Data



Hillsborough FL with Census-Tract Data

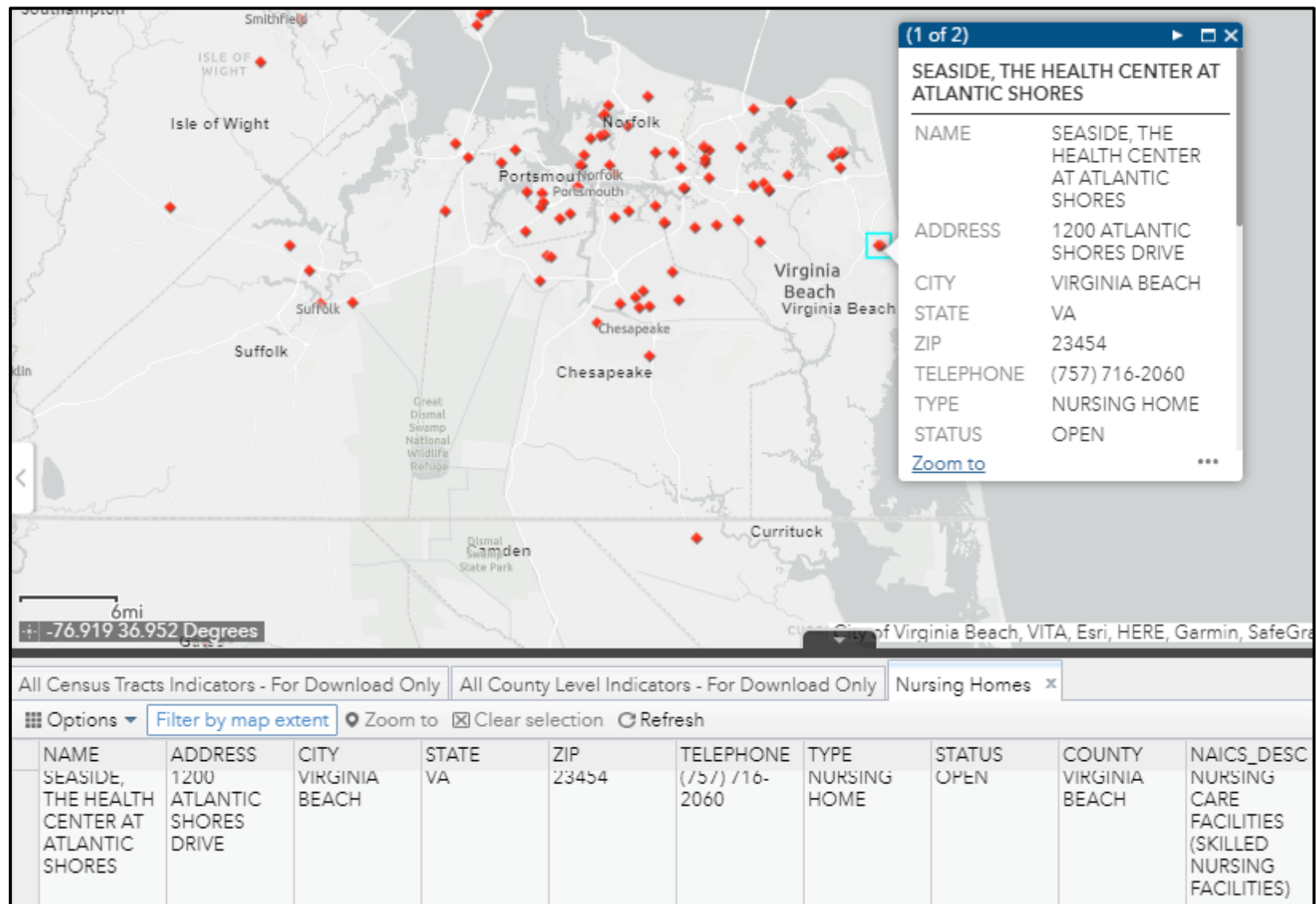


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Infrastructure Data- Nursing Homes



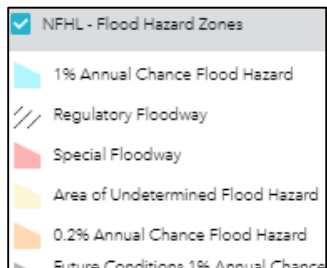
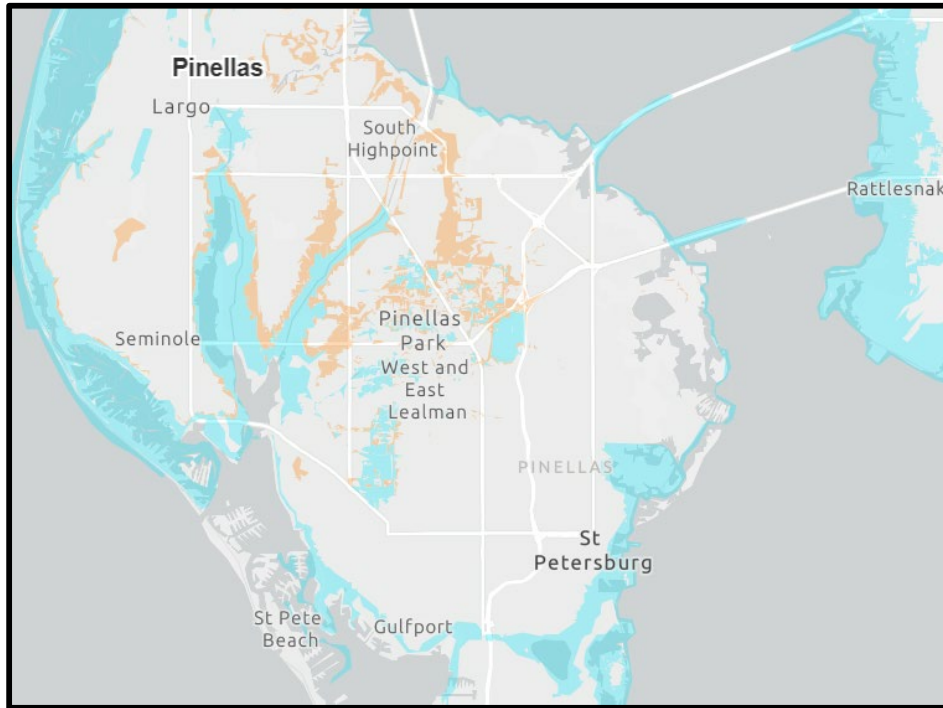
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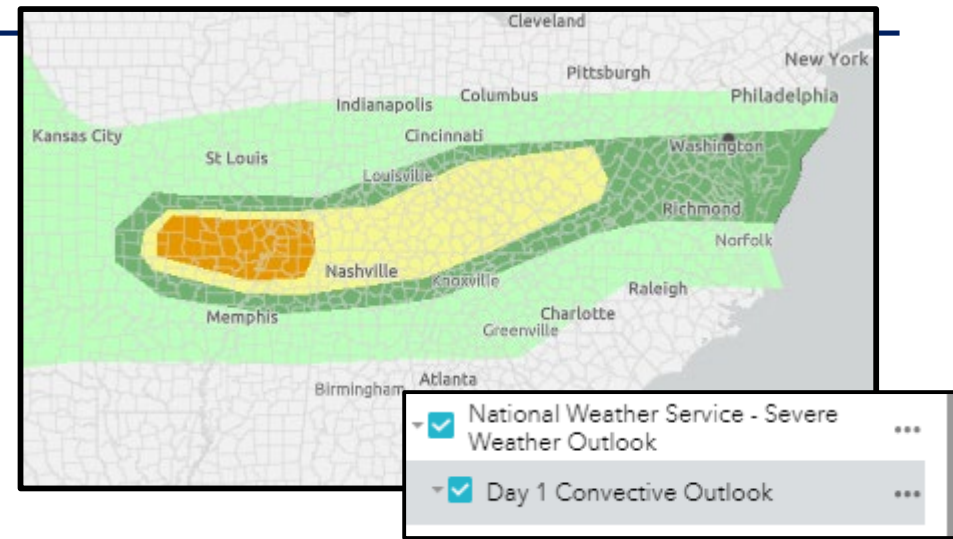
Hazard Data

Flooding



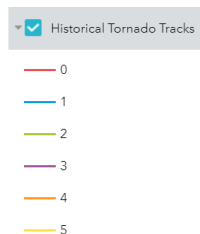
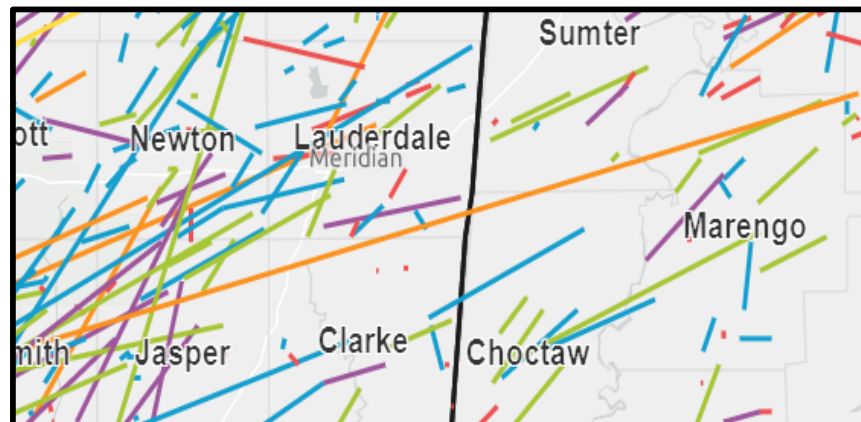
FEMA National Flood Hazard Layer GIS
<https://fema.maps.arcgis.com/home/item.html?id=cbe088e7c8704464aa0fc34eb99e7f30>

NWS Severe Weather Outlook



<https://fema.maps.arcgis.com/home/item.html?id=cbe088e7c8704464aa0fc34eb99e7f30>

Historic Tornado Tracks

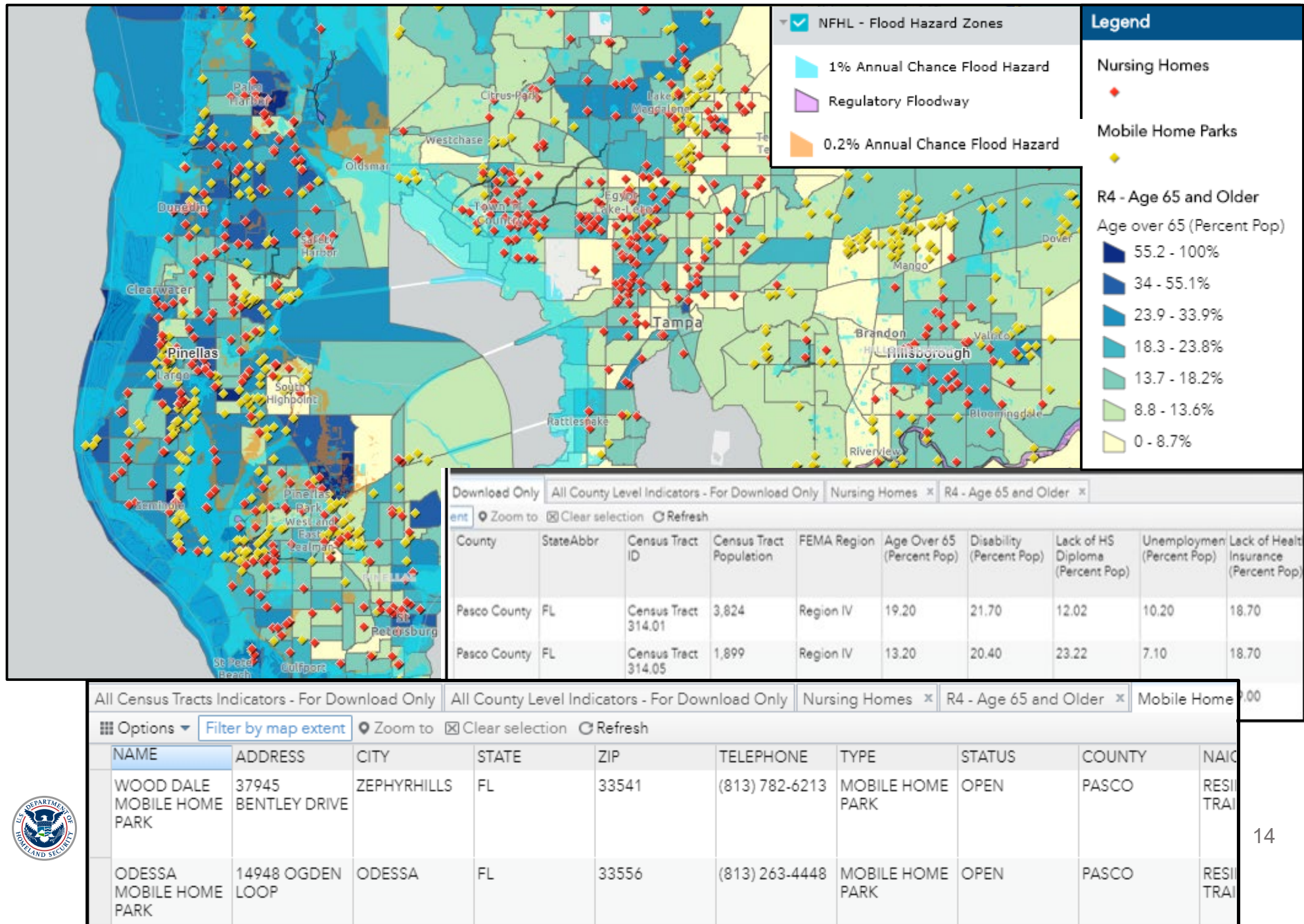


Historic Tornado Tracks	
Tornado Number (Count)	311,079
Year	2011
Month	4
Day	27
Date	2011-04-27
Time	16:42:00
Time Zone	3
State	MS
State FIPS	28
State Number	81
F-Scale	4
Injuries	17
Fatalities	7
Estimated Property Loss	25.81
Length in Miles	122.04
Width in Yards	1,050

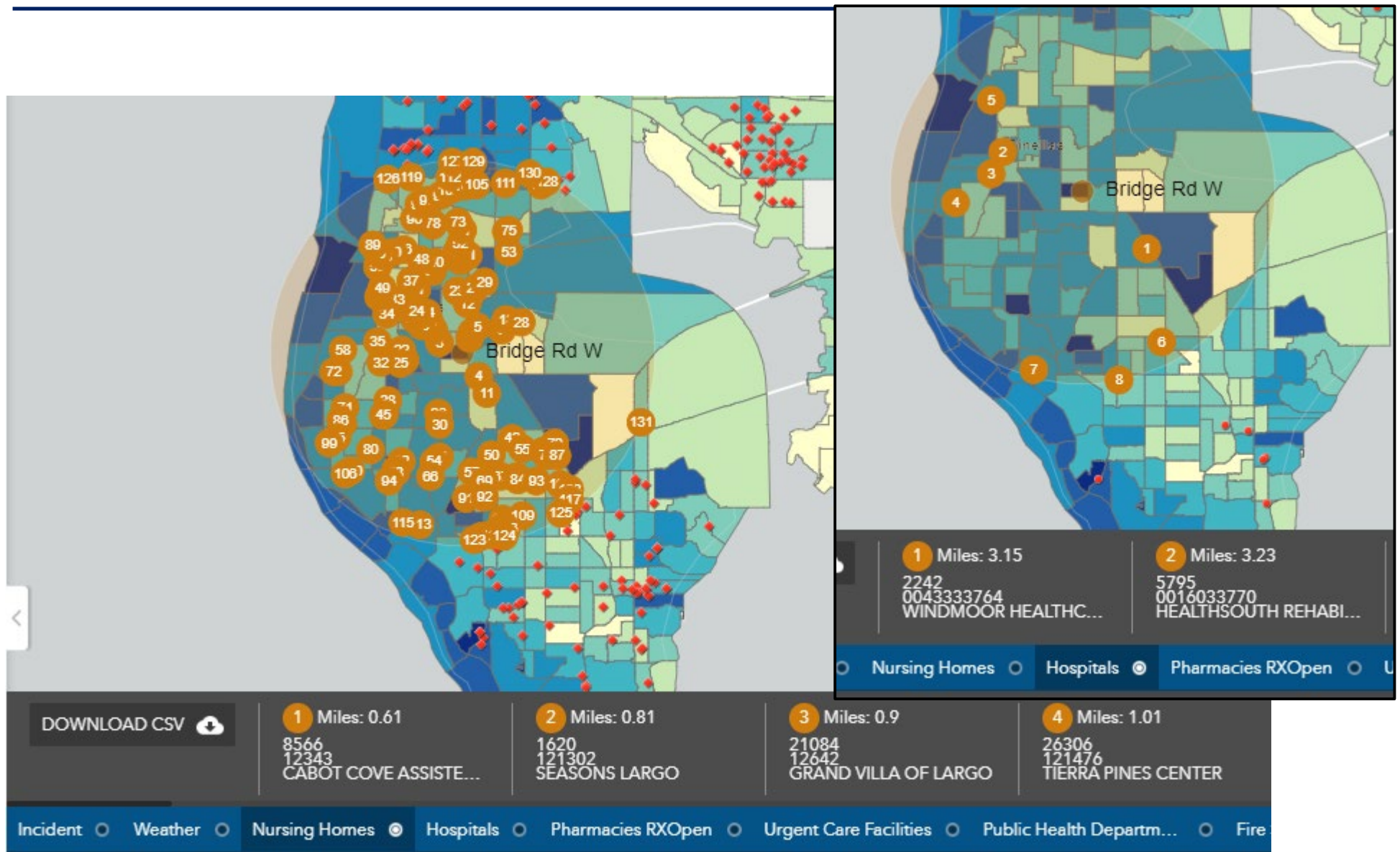


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Data Overlays: Population Indicator (Age), Infrastructure Layers (Nursing Homes and Mobile Homes), Flood Risk



Incident Analysis Tool: Nursing Homes and Hospitals within 5 Miles of an Incident

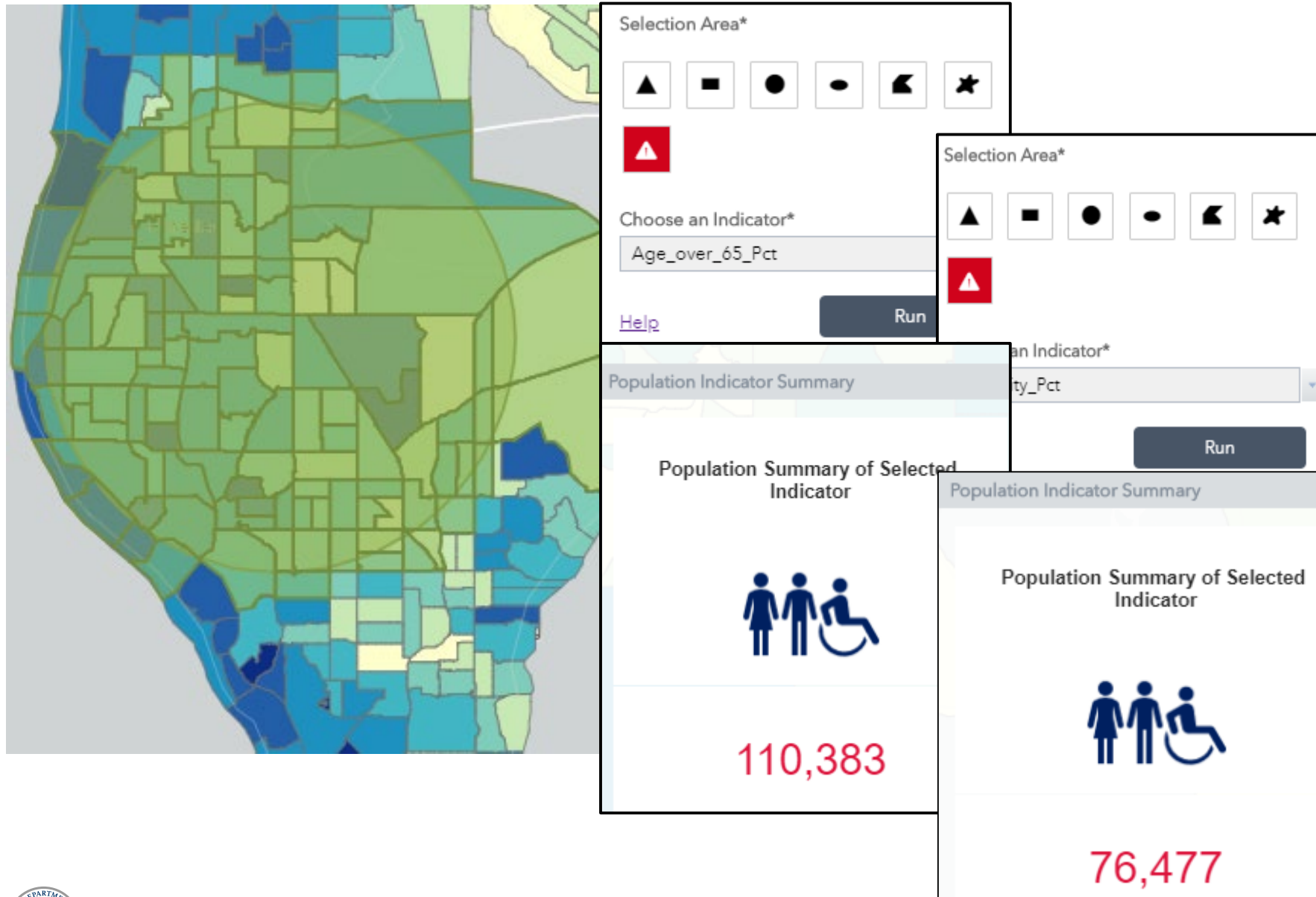


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Population – Summary of Selected Indicator Tool



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RAPT Benefits

- User-friendly research tool that helps visualize the interplay of population characteristics, infrastructure, and hazards
- Basis for community resilience profile:
 - To visualize risk and challenges to resilience, and
 - To identify collaborative planning team members that represent diverse community interests.
- Multi-level analysis: regional, state, local, tribal.
- Support to emergency managers:
 - Inform capability targets for THIRA/SPR, exercises, and EOPs
 - Real-time analysis of severe weather events
 - Prioritize areas for evacuation
 - Identify at-risk infrastructure assets
 - Helps prioritize recovery strategies



Questions/Comments?

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