

# **The Science of Where:**

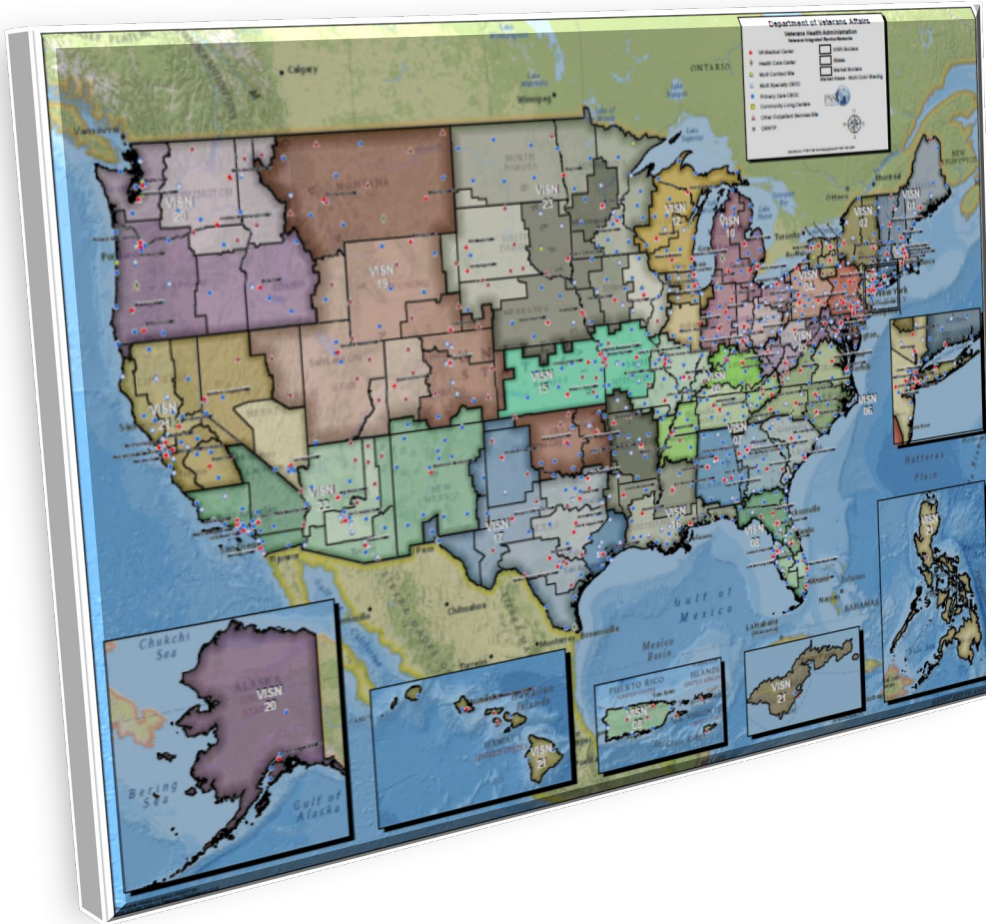
## **Utilizing Geographic Information Systems (GIS) to Improve VHA Healthcare**

# OUTLINE

- Overview of GIS
- Utilization of GIS - VHA Office of Policy & Services
- Future of GIS in VHA
- GIS data and resources

# WHAT IS GIS?

# WHAT IS GIS?



## What is GIS?

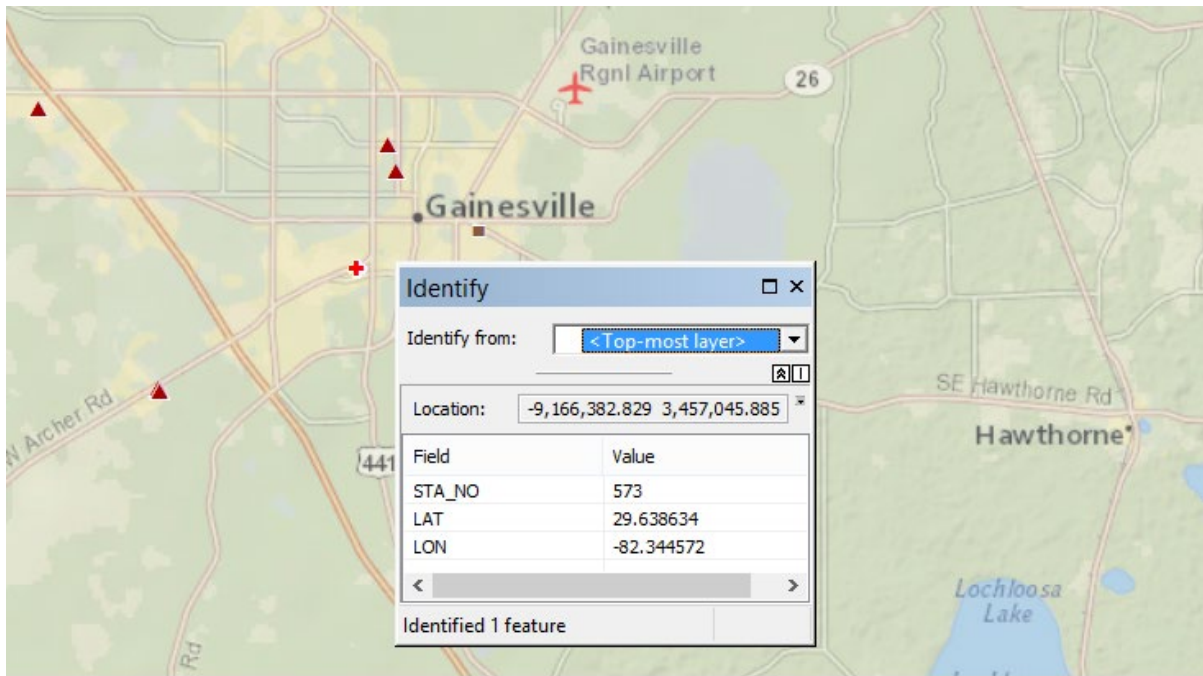
- Geographic Information System – or – Geographic Information Science
- A framework for gathering, managing, and analyzing data<sup>1</sup>

1. Source: <https://www.esri.com/en-us/what-is-gis/overview>

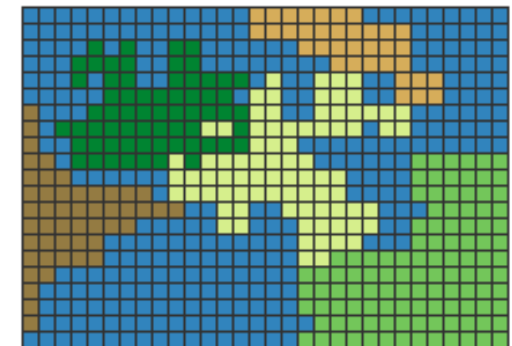
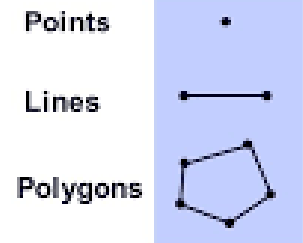
# WHAT IS GIS?

## GIS Concepts:

- A GIS stores the locations of geographic features



## Vector GIS



Raster polygon features

# WHAT IS GIS?

- The geographic features are linked to a database that can be filtered and queried

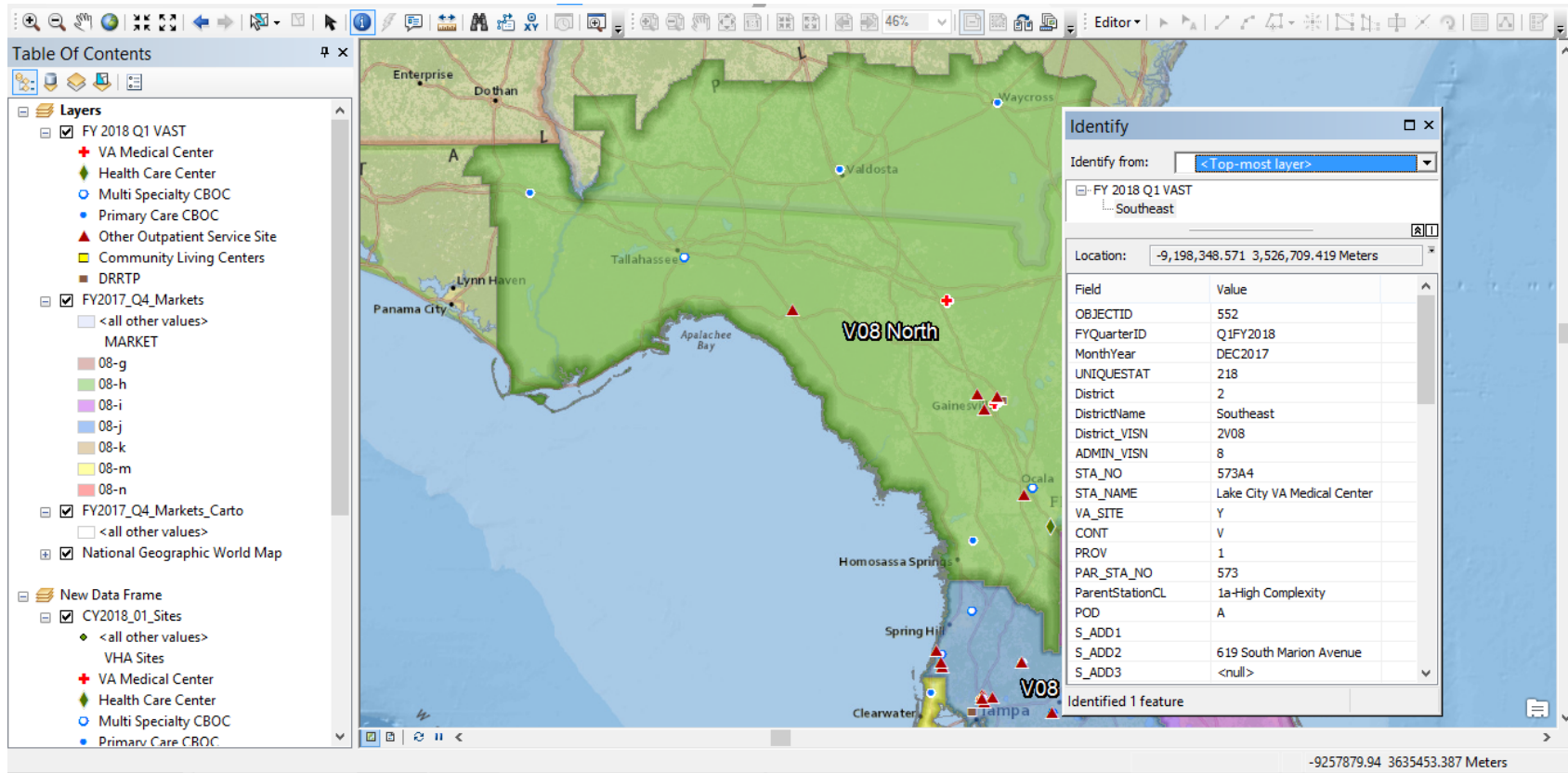
The screenshot displays the ArcMap interface with a map of Florida showing the locations of several VA medical centers. The 'Select by Attributes' dialog box is open, showing a query for 'CY2018\_01\_Sites' where 'PRIM\_SVC = 'VAMC''. The 'Table' window shows the following data:

OBJECTID*	District_VISN	STA_NO	STA_NAME	VA_SITE	PAR_STA_NO	S_ADD2	S_CITY
525	2V08	516	C.W. Bill Young Department of Veterans Affairs Medical Center	Y	516	10000 Bay Pines Boulevard	Bay Pines
534	2V08	546	Bruce W. Carter Department of Veterans Affairs Medical Center	Y	546	1201 Northwest 16th Street	Miami
543	2V08	548	West Palm Beach VA Medical Center	Y	548	7305 North Military Trail	West Palm
551	2V08	573	Malcom Randall Department of Veterans Affairs Medical Center	Y	573	1601 Southwest Archer Road	Gainesville
552	2V08	573A4	Lake City VA Medical Center	Y	573	619 South Marion Avenue	Lake City
575	2V08	672	San Juan VA Medical Center	Y	672	10 Calle Casia	San Juan
586	2V08	673	James A. Haley Veterans' Hospital	Y	673	13000 Bruce B. Downs Boulevard	Tampa
604	2V08	675	Orlando VA Medical Center	Y	675	13800 Veterans Way	Orlando



# WHAT IS GIS?

- Information about the geographic features can be obtained by selecting them and the information can be used for display or analysis

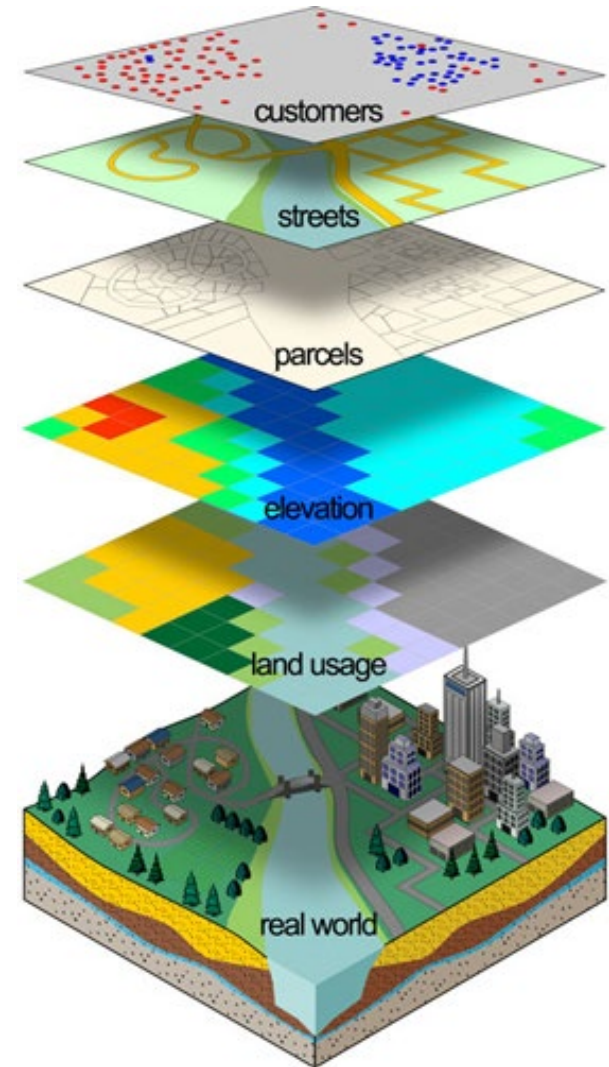


# WHAT IS GIS

A tool for integrating many types of data, analyzing spatial location, organizing layers of information, and visualizing data on a map

GIS reveals deeper insights into data, such as patterns, relationships, and situations—helping users make smarter decisions.<sup>1</sup>

1. Source: <https://www.esri.com/en-us/what-is-gis/overview>







# QUESTION

Can GIS users select map features based on more than one attribute value?

- A. Yes
- B. No

# UTILIZATION OF GIS

# UTILIZATION OF GIS – OFFICE OF POLICY & SERVICES

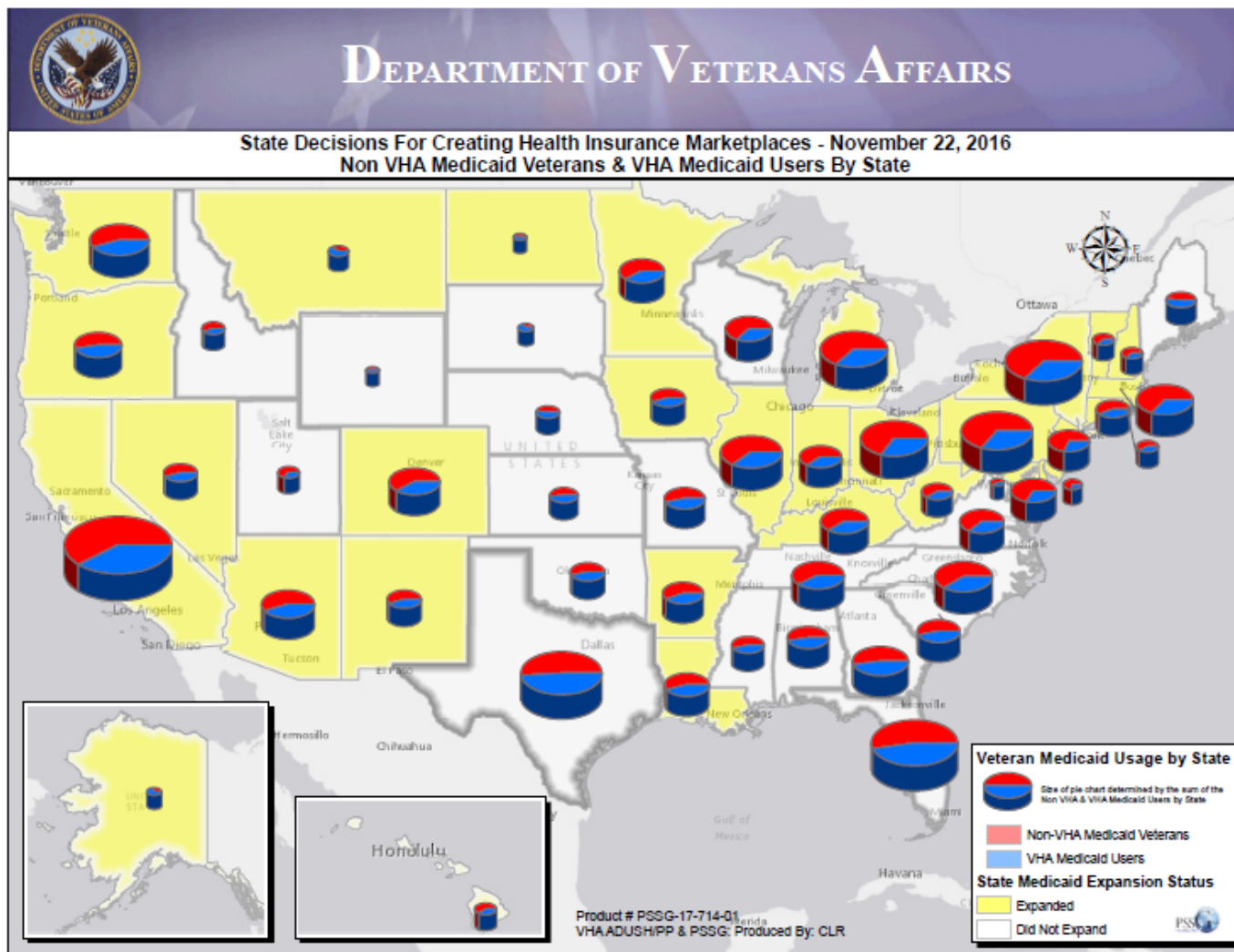


- **ArcGIS software (Desktop, Enterprise & extensions: 3D Analyst, Spatial Analyst, Geostatistical Analyst, Publisher, Network Analyst, and more**
- **ArcGIS Online & ArcGIS Online Service Credits**
- **Insights for ArcGIS Enterprise and ArcGIS Online**
- **Discount on Instructor-led Training**
- **User Conference passes**
- **Self-Paced e-Learning**
- **Authorized Technical Support Callers**

# UTILIZATION OF GIS – VHA DATA

- VA Site Tracking (VHA facilities) – Geocode and add attributes (VHA geographies, census tract, county/FIPS, urban/rural classification, and congressional district)
- Enrollment file – geocode residential location of 9+ million Veteran enrollees, and add attributes
  - Annual drive time/distance to nearest primary, secondary, and tertiary healthcare facility
- Veterans Choice Program enrollees – geocode, add attributes and calculate drive time and distance to nearest primary care facility
- VHA Geographies – built from county layer
- Urban/rural/highly rural classification – developed from Rural Urban Commuting Area (RUCA) codes

# UTILIZATION OF GIS – VISUALIZING DATA

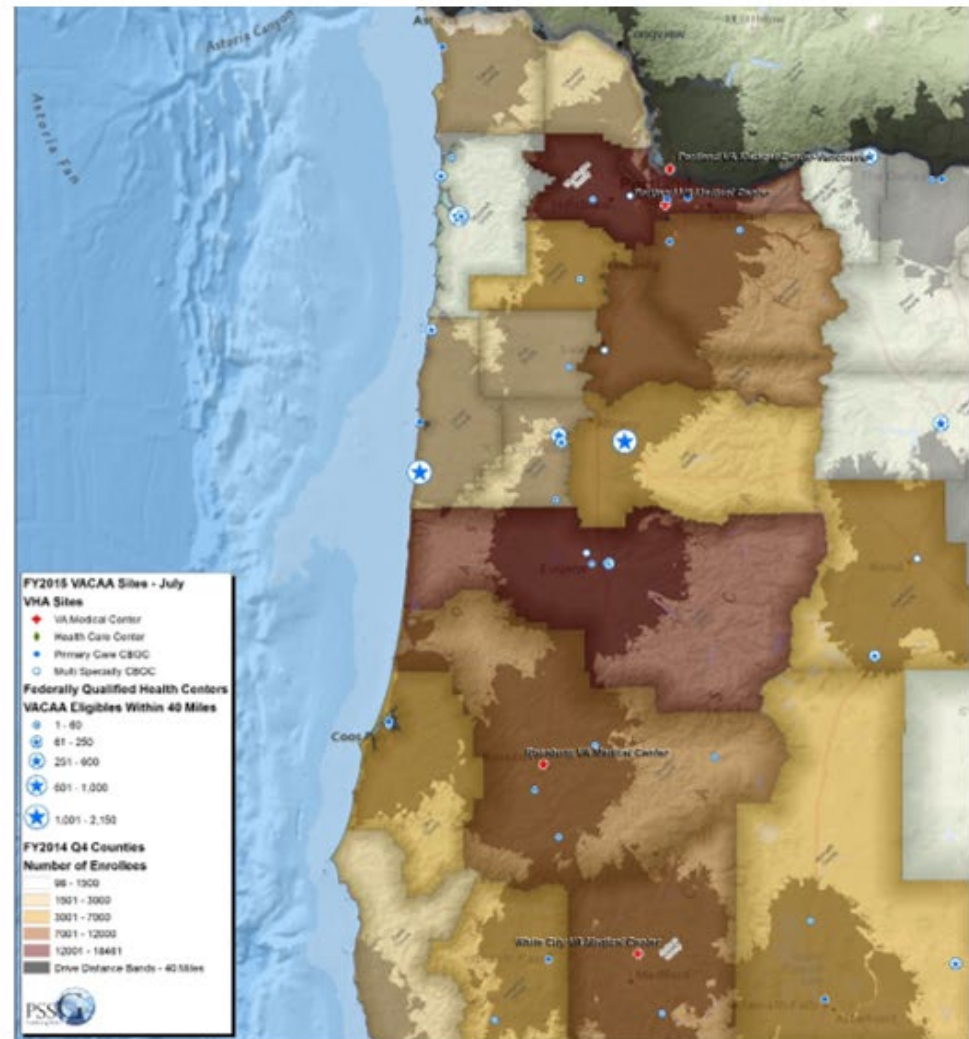




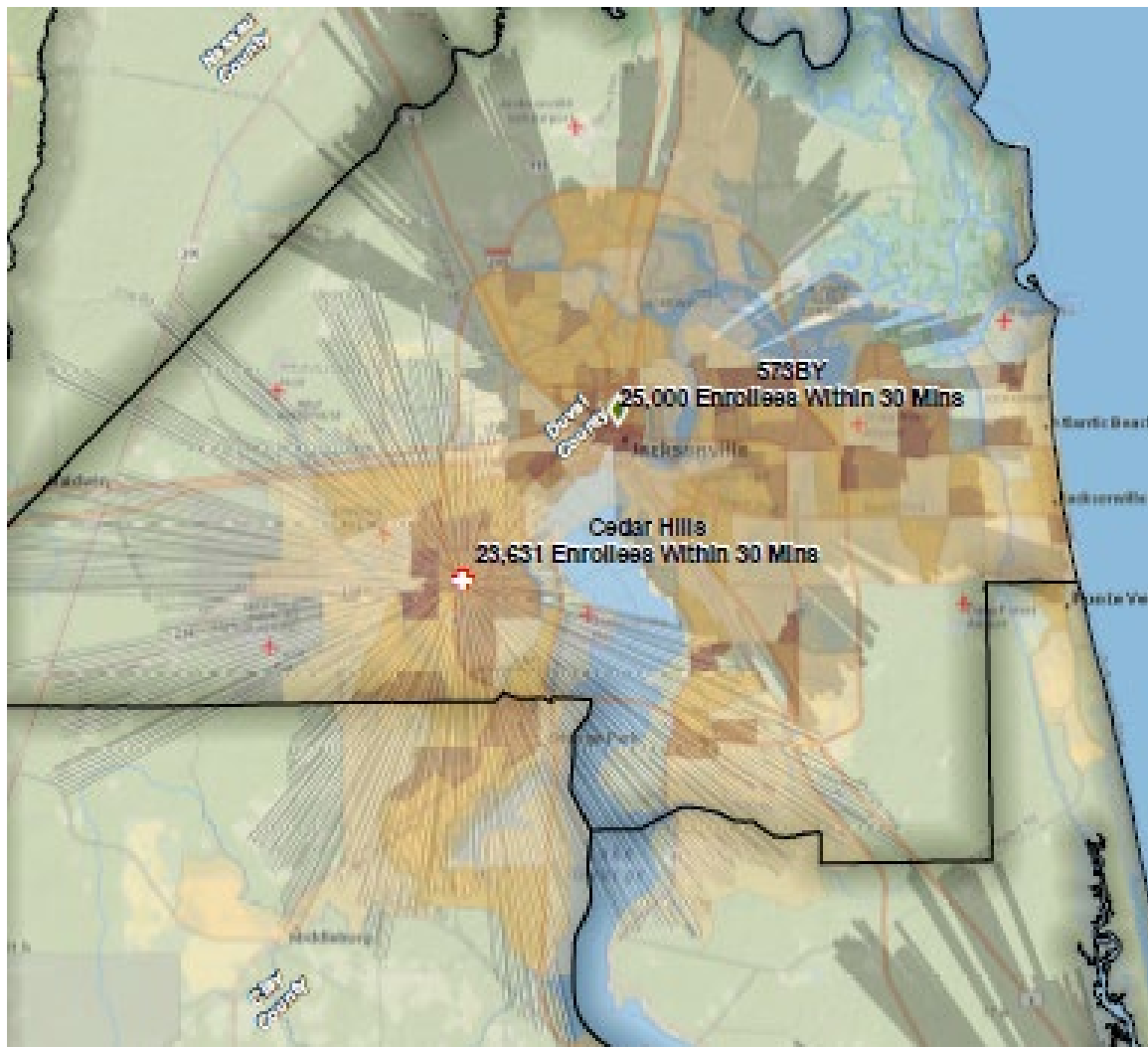
# UTILIZATION OF GIS – VETERANS CHOICE PROGRAM



Location-Allocation:  
determining an optimal  
location for one or more  
facilities that will service  
demand from a given  
set of points (enrollees)

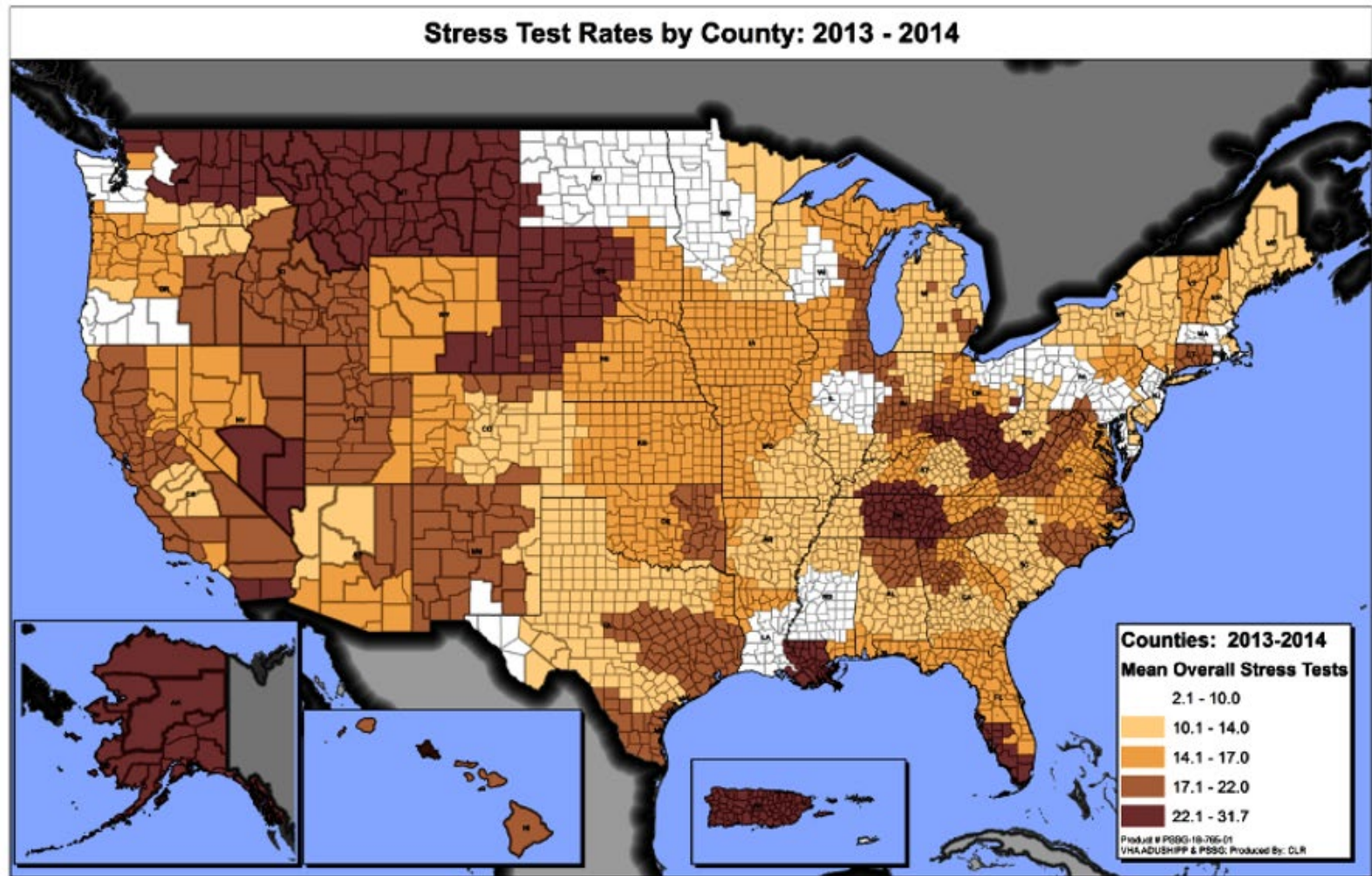


# UTILIZATION OF GIS – LOCATION-ALLOCATION



Location Allocation with capacity limits and weighted demand points.

# UTILIZATION OF GIS – RESEARCH



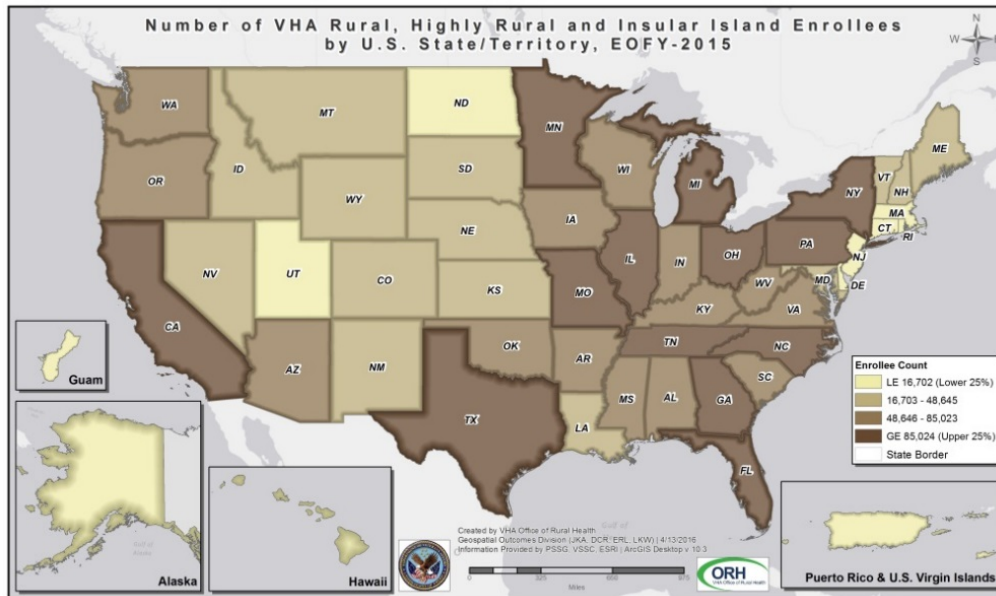


# UTILIZATION OF GIS – RURAL HEALTH (GSOD)

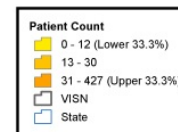
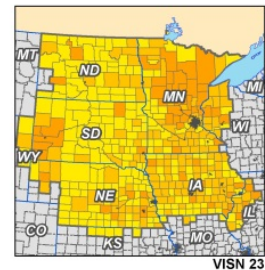
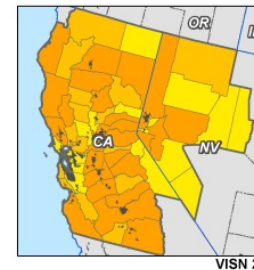
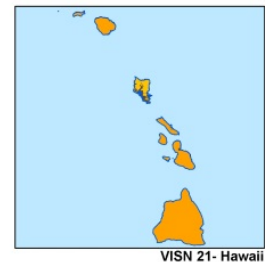
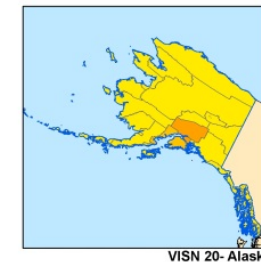
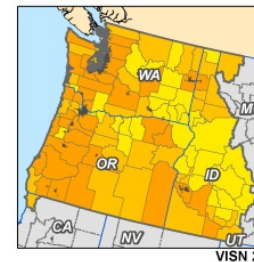
## Geo-Spatial Outcomes Division

## Rural Health Atlases

## Rural & Highly Rural Patients with Chronic Renal Failure



## Rural & Highly Rural Enrollees



Number of Rural and Highly Rural VHA Patients with Chronic Renal Failure By County FY - 2014  
Urban Areas "Shaded"

GeoSpatial Outcomes Division  
VHA Office of Rural Health

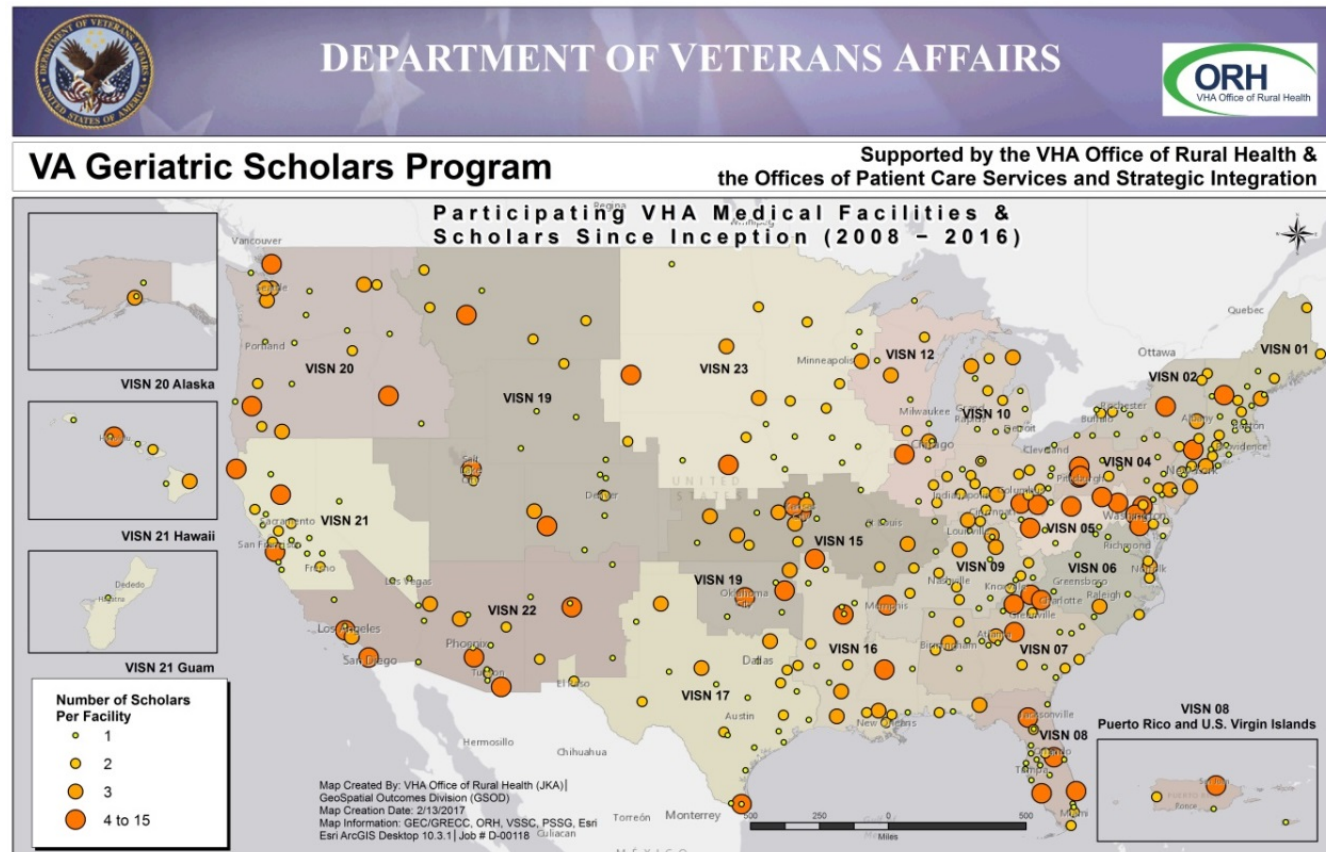
Map Created By: ORH RHRC-ER (DCR, LKW, JKA, ERL)  
GeoSpatial Outcomes Division  
(Map Creation Date: 9/2/2015)  
Map Information by: PDSG, VSSC, ESRI  
ArcGIS 10.3.x

# UTILIZATION OF GIS – RURAL HEALTH

## VA Geriatrics Scholars Program:

Shortage of geriatrics skills and knowledge in rural clinics

Scholars train clinicians



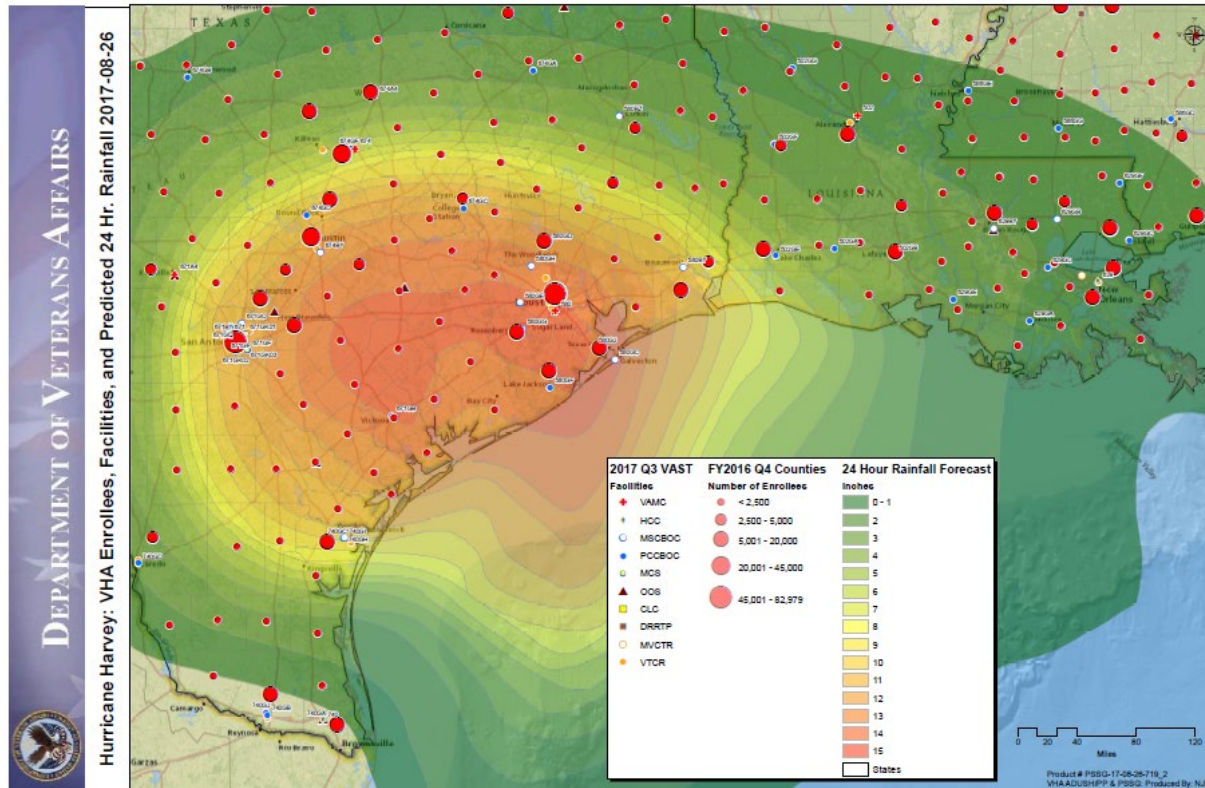
# UTILIZATION OF GIS – TELEHEALTH COLLABORATION

Communities and Community Attributes														
Full Community Name	City	ST	Enrollees	Travel Time	Miles	T Mobile - Cellular	Verizon - Cellular	US - Cellular	Sprint - Cellular	ATT - Cellular	Broadband	FQHC Grant Number	Program Type	
ABBEVILLE, SC	ABBEVILLE	SC	103	19.79	14.51	Y	Y	N	Y	Y	Y	H80CS00785	Section 330	5.71
ABERDEEN, WA	ABERDEEN	WA	652	3.51	1.38	N	Y	N	Y	Y	Y	H80CS00445	Section 330	9.11
AHOSKIE, NC	AHOSKIE	NC	328	1.60	0.77	N	Y	Y	N	N	Y	H80CS08737	Section 330	4.22
AINSWORTH, NE	AINSWORTH	NE	132	79.24	77.32	N	Y	Y	N	Y	Y	H80CS00135	Section 330	4.66
AKRON, CO	AKRON	CO	111	36.11	33.21	N	Y	N	N	N	Y	H80CS00801	Section 330	8.41
ALBA, TX	ALBA	TX	126	40.12	36.71	N	Y	N	Y	Y	Y	H80CS00675	Section 330	7.52
ALBANY, KY	ALBANY	KY	173	2.44	0.85	N	Y	N	N	Y	Y	H80CS08218	Section 330	2.03
ALLENDALE, SC	ALLENDALE	SC	123	8.43	5.52	N	Y	N	N	Y	Y	H80CS00092	Section 330	5.82
ALTO, NM	ALTO	NM	138	13.84	6.88	N	Y	N	N	N	Y	H80CS00205	Section 330	8.56
ALVA, OK	ALVA	OK	150	23.48	20.21	Y	N	N	N	Y	Y	H80CS08744	Section 330	2.09
ANDALUSIA, AL	ANDALUSIA	AL	720	23.52	18.71	N	Y	N	N	Y	Y	H80CS00376	Section 330	6.31
APALACHICOLA, FL	APALACHICOLA	FL	187	8.16	5.81	N	Y	N	N	Y	Y	H80CS00693	Section 330	5.92
ATLANTIC, IA	ATLANTIC	IA	344	60.66	59.01	N	Y	Y	Y	N	Y	H80CS00570	Section 330	4.21
AVA, MO	AVA	MO	418	1.85	0.58	N	Y	Y	N	Y	Y	H80CS00457	Section 330	4.32
BABBITT, MN	BABBITT	MN	116	29.91	24.43	N	Y	N	Y	N	Y	H80CS00706	Section 330	4.11
BANNER ELK, NC	BANNER ELK	NC	202	19.64	12.46	N	Y	N	N	Y	Y	H80CS24142	Section 330	2.73
BARBOURVILLE, KY	BARBOURVILLE	KY	280	12.58	10.10	N	Y	N	Y	Y	Y	H80CS09959	Section 330	2.62
BASIN, WY	BASIN	WY	105	59.57	55.22	N	Y	N	N	N	Y	H80CS00704	Section 330	8.16
BATESVILLE, AR	BATESVILLE	AR	213	2.16	0.83	N	Y	N	N	Y	Y	H80CS00207	Section 330	5.82
BAUDETTE, MN	BAUDETTE	MN	167	80.21	69.88	N	Y	N	N	N	Y	H80CS00706	Section 330	4.11
BAY CITY, OR	BAY CITY	OR	100	10.29	5.90	N	Y	N	Y	Y	Y	H80CS00555	Section 330	9.36
BEAVER, UT	BEAVER	UT	100	49.51	53.53	N	Y	N	Y	Y	Y	H80CS07890	Section 330	3.52
BELCOURT, ND	BELCOURT	ND	124	8.37	5.47	N	Y	N	N	Y	Y	H80CS00847	Section 330	3.31
BELHAVEN, NC	BELHAVEN	NC	197	37.31	29.85	N	Y	Y	N	N	Y	H80CS00864	Section 330	5.62
BELOIT, KS	BELOIT	KS	137	65.08	64.75	N	Y	Y	N	Y	Y	H80CS04216	Section 330	4.81
BETHANY, MO	BETHANY	MO	164	29.57	29.10	N	Y	N	Y	Y	Y	H80CS04200	Section 330	4.21

Spatial Analysis Results



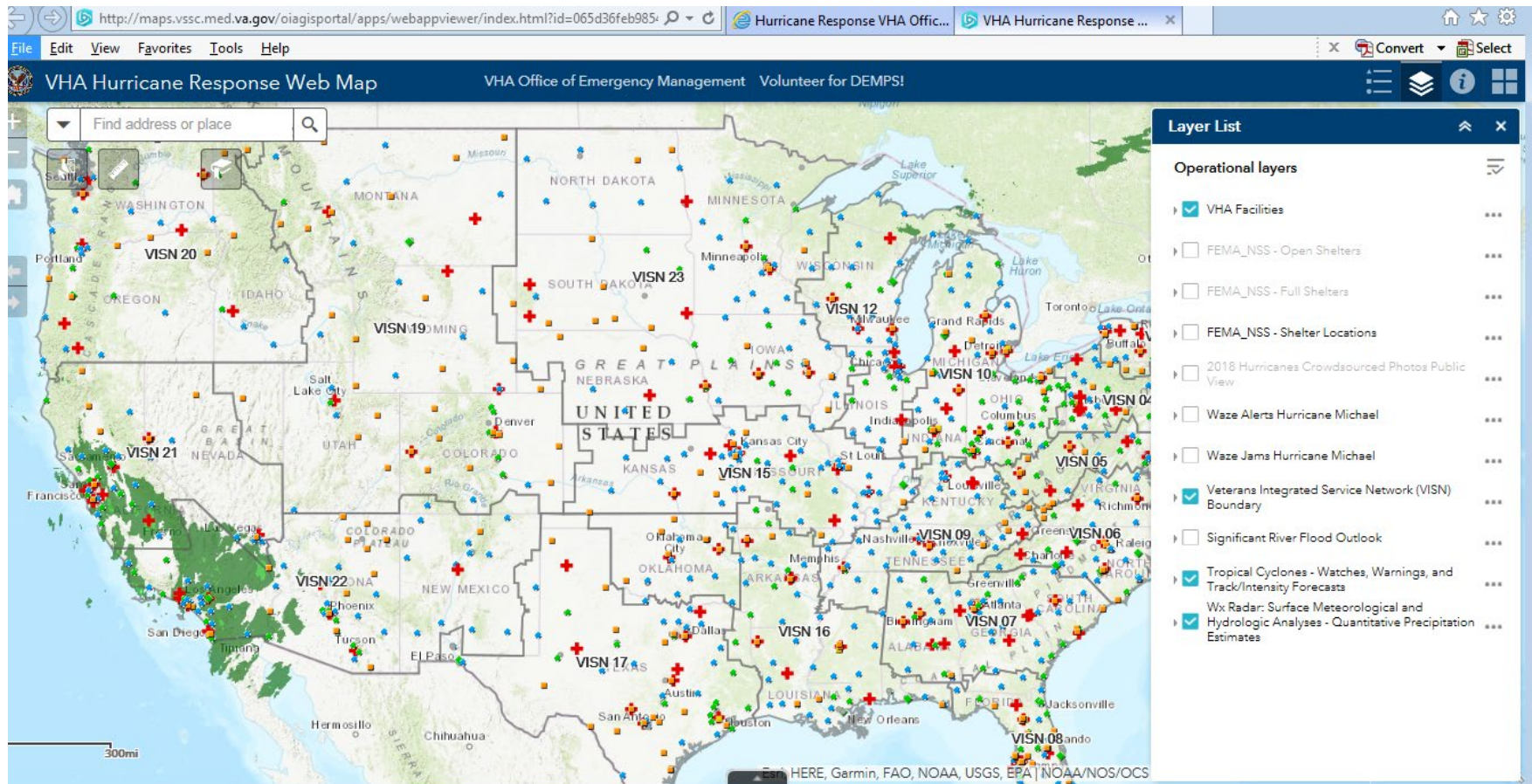
# UTILIZATION OF GIS – EMERGENCY MANAGEMENT



- Static maps for the Office of Emergency Management's situation reports
- Interactive maps to support decision making and resource deployment

Link to article in Office of Rural Health newsletter:  
[https://www.ruralhealth.va.gov/docs/news/ORH\\_Newsletter\\_Winter2019\\_FINAL.pdf#page=3](https://www.ruralhealth.va.gov/docs/news/ORH_Newsletter_Winter2019_FINAL.pdf#page=3)

# UTILIZATION OF GIS – EMERGENCY MANAGEMENT



# UTILIZATION OF GIS – POPULATION HEALTH

- **Qarma Ali Heat map: hotspot analysis of impacted service members**
  - <https://www.publichealth.va.gov/exposures/qarmat-ali/>
- **Tracking potential Hepatitis C treatment candidates - GIS used to show who was diagnosed and who still needs treatment**
- **Number of HIV Veterans **over > 65** in Care by VA Facility**

# UTILIZATION OF GIS – RAPID

## Office of Reporting, Analysis, Performance Improvement & Deployment

- Management of the ArcGIS Portal – used by all GIS offices within the Office of Policy and Services
- Home based primary care – aligning providers with patients
- Community Living Center measures
- Strategic Analysis for Improvement and Learning
- Care Coordination Service – risk scores
- Clinical Specialty Assignments
- Stroke Patient Density





# QUESTION

Which group of geospatial analysts produced the Atlases of Rural Health?

- A. PSSG (Planning Systems Support Group)
- B. GSOD (Geo-Spatial Outcomes Division)
- C. Population Health
- D. RAPID (Office of Reporting, Analysis, Performance Improvement & Deployment)



# Future of GIS in VHA

# FUTURE DIRECTION OF GIS

*With its movement to web and cloud computing, and integration with real-time information, GIS will play an increasingly important role in how we understand and address these issues and provide a means for communicating solutions using the common language of mapping.<sup>1</sup>*

- More opportunities for visualization and analysis
- More collaboration & data sharing
- Story maps
- Interactive Web Apps/Maps
- Inclusion of crowd sourcing data (pictures following hurricane landfall)
- Data mining and big data
  - Recovery rate of high elevation vs low elevation patients
  - Social determinants of health (socio-economic data)

1. Source: <https://www.esri.com/en-us/what-is-gis/history-of-gis>

# GIS Data & Resources

# GIS DATA & RESOURCES

- <https://www.esri.com/en-us/home>
- <https://www.esri.com/en-us/what-is-gis/get-started>
- <https://www.esri.com/training/>
- <https://www.esri.com/en-us/industries/health/overview>
- <https://www.cdc.gov/gis/index.htm>
- [An opioid epidemic map](#)  
(link from the Esri website)
- <https://www.cdc.gov/dhdspl/maps/gisx/resources/geospatial-data.html>
- <https://hub.arcgis.com/search?q=Health-Care>
- <https://data.hrsa.gov/>
- <https://www.census.gov/geography/maps-data/>
- <https://www.data.gov/>

# QUESTIONS

