

The Science of Where:

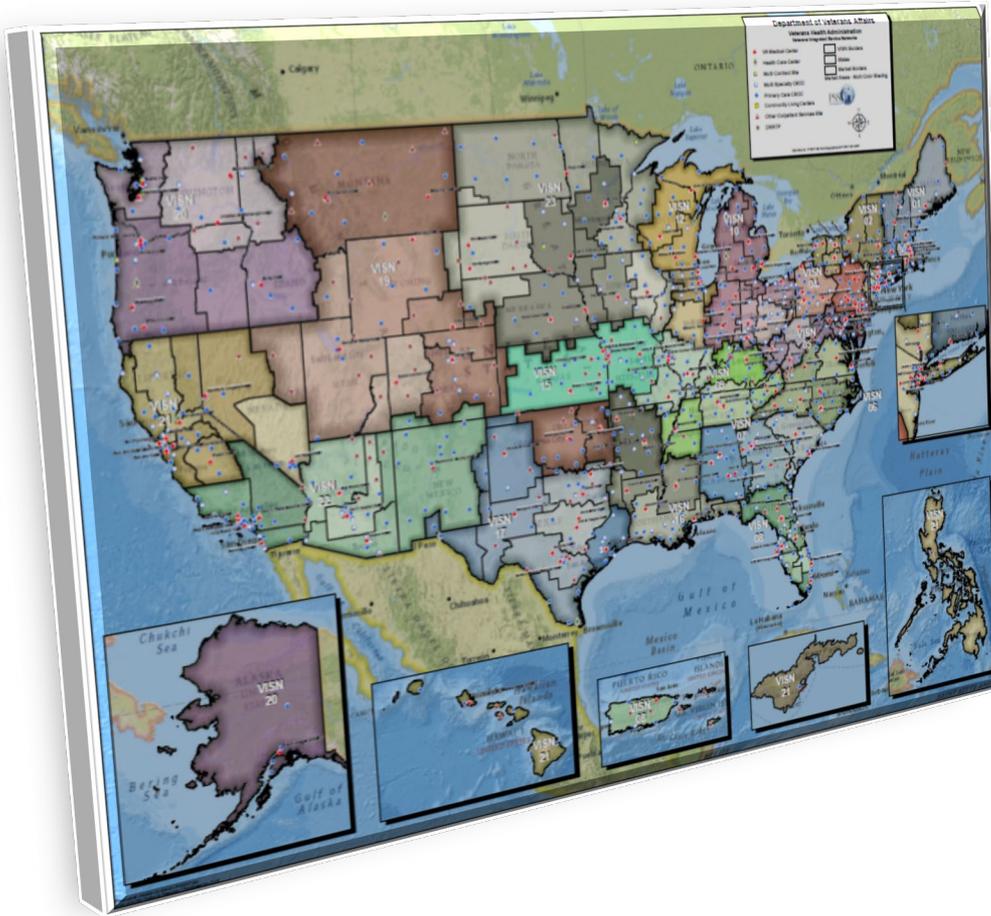
Utilizing Geographic Information Systems (GIS) to Improve VHA Healthcare

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?

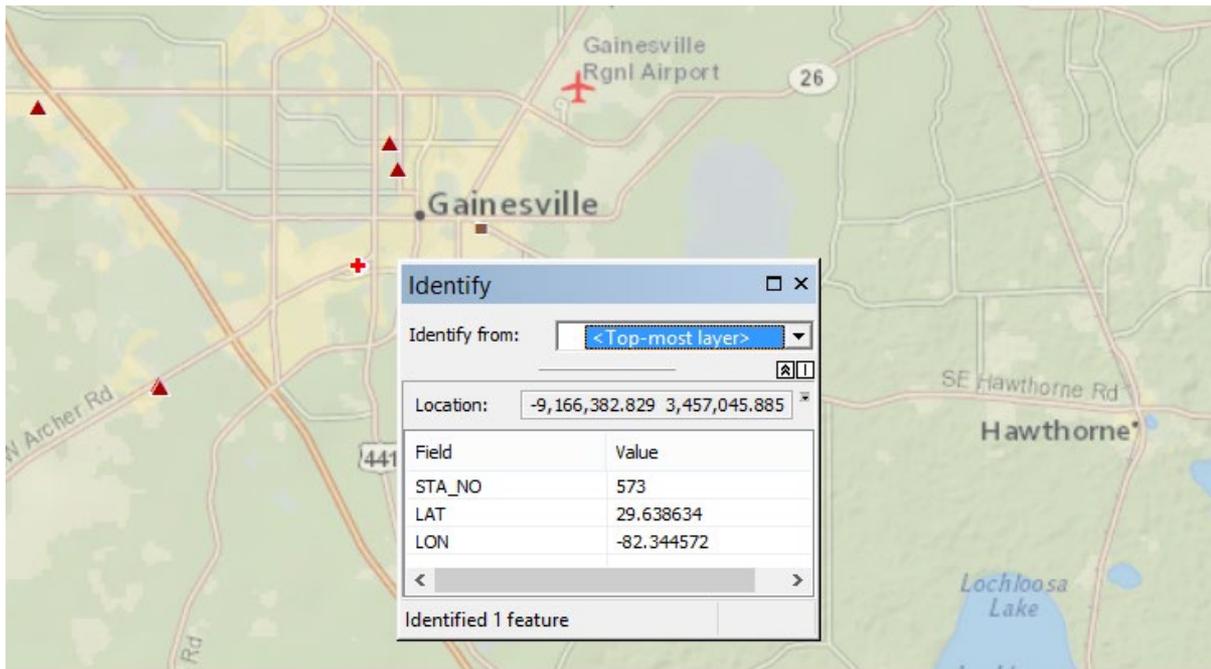
- Geographic Information System – or – Geographic Information Science
- A framework for gathering, managing, and analyzing data¹

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

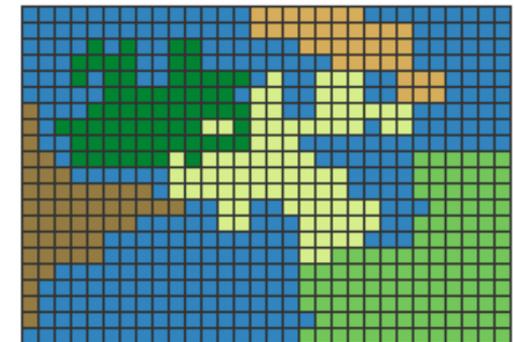
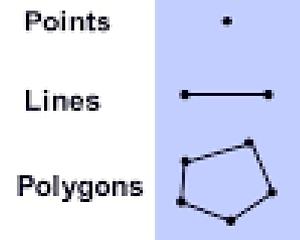
WHAT IS GIS?

GIS Concepts:

- A GIS stores the locations of geographic features



Vector GIS



WHAT IS GIS?

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

The screenshot displays the ArcMap interface for a project named 'FY18_VISN8'. The 'Select by Attributes' dialog box is open, showing a list of fields: OBJECTID, District_VISN, STA_NO, STA_NAME, and VA_SITE. The 'Method' is set to 'Create a new selection'. Below the field list, there are logical operators like '< >', '> =', '< =', '%', and '()' with buttons for 'Like', 'And', 'Or', and 'Not'. At the bottom of the dialog, a SQL query is entered: 'SELECT * FROM CY2018_01_Sites WHERE: PRIM_SVC = 'VAMC''. The 'Table' window shows a data table with the following columns: OBJECTID*, District_VISN, STA_NO, STA_NAME, VA_SITE, PAR_STA_NO, S_ADD2, and S_C. The table contains 8 rows of data, all of which are highlighted in light blue, indicating they are selected. The status bar at the bottom of the table window shows '(8 out of 121 Selected)'. The background map shows a geographic area with labels for Dothan, Waycross, and Brunswick.

OBJECTID*	District_VISN	STA_NO	STA_NAME	VA_SITE	PAR_STA_NO	S_ADD2	S_C
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

The screenshot displays a GIS application interface. On the left, the 'Table Of Contents' panel shows several layers, including 'FY 2018 Q1 VAST' and 'FY2017_Q4_Markets'. The main map area shows a green-shaded region in Florida, with a red triangle marker labeled 'V08 North' selected. An 'Identify' window is open, showing the location coordinates and a table of attributes for the selected feature.

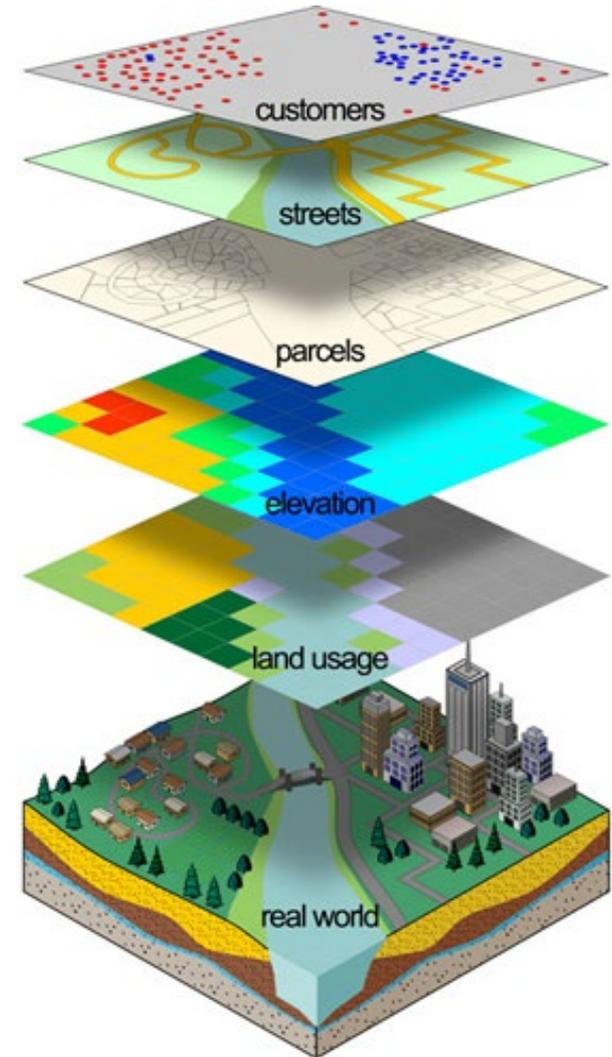
Field	Value
OBJECTID	552
FYQuarterID	Q1FY2018
MonthYear	DEC2017
UNIQUESTAT	218
District	2
DistrictName	Southeast
District_VISN	2V08
ADMIN_VISN	8
STA_NO	573A4
STA_NAME	Lake City VA Medical Center
VA_SITE	Y
CONT	V
PROV	1
PAR_STA_NO	573
ParentStationCL	1a-High Complexity
POD	A
S_ADD1	
S_ADD2	619 South Marion Avenue
S_ADD3	<null>

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.¹

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





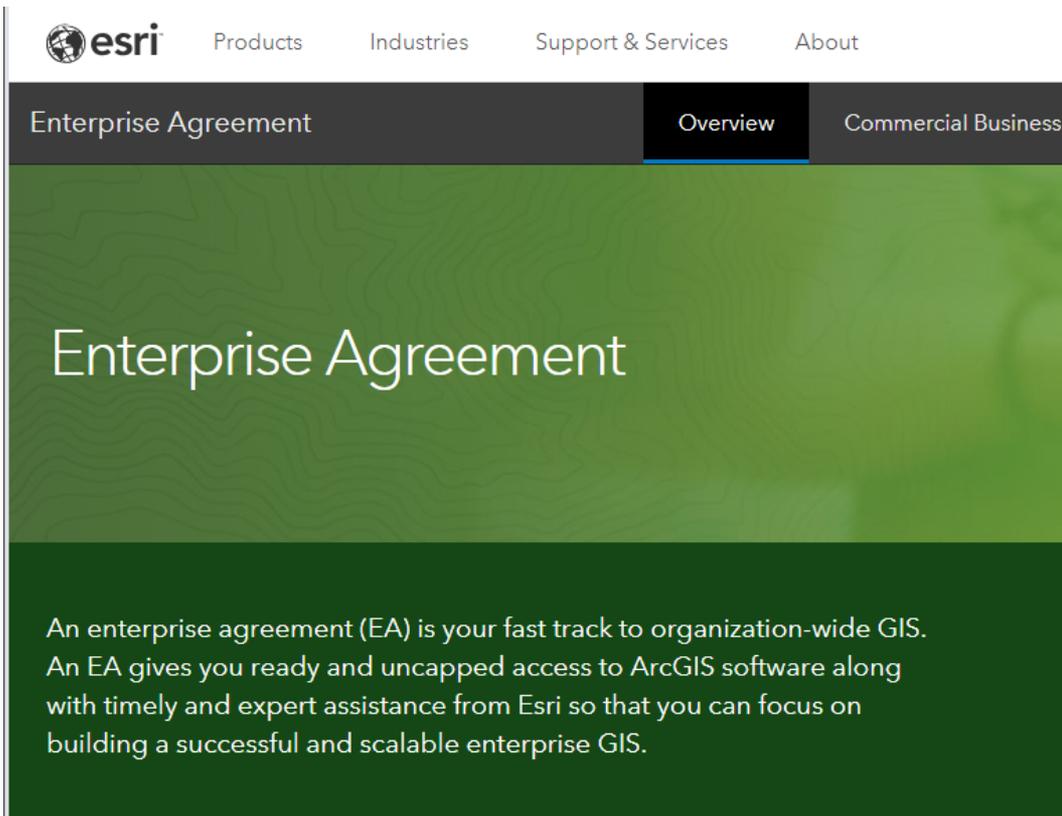
QUESTION

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



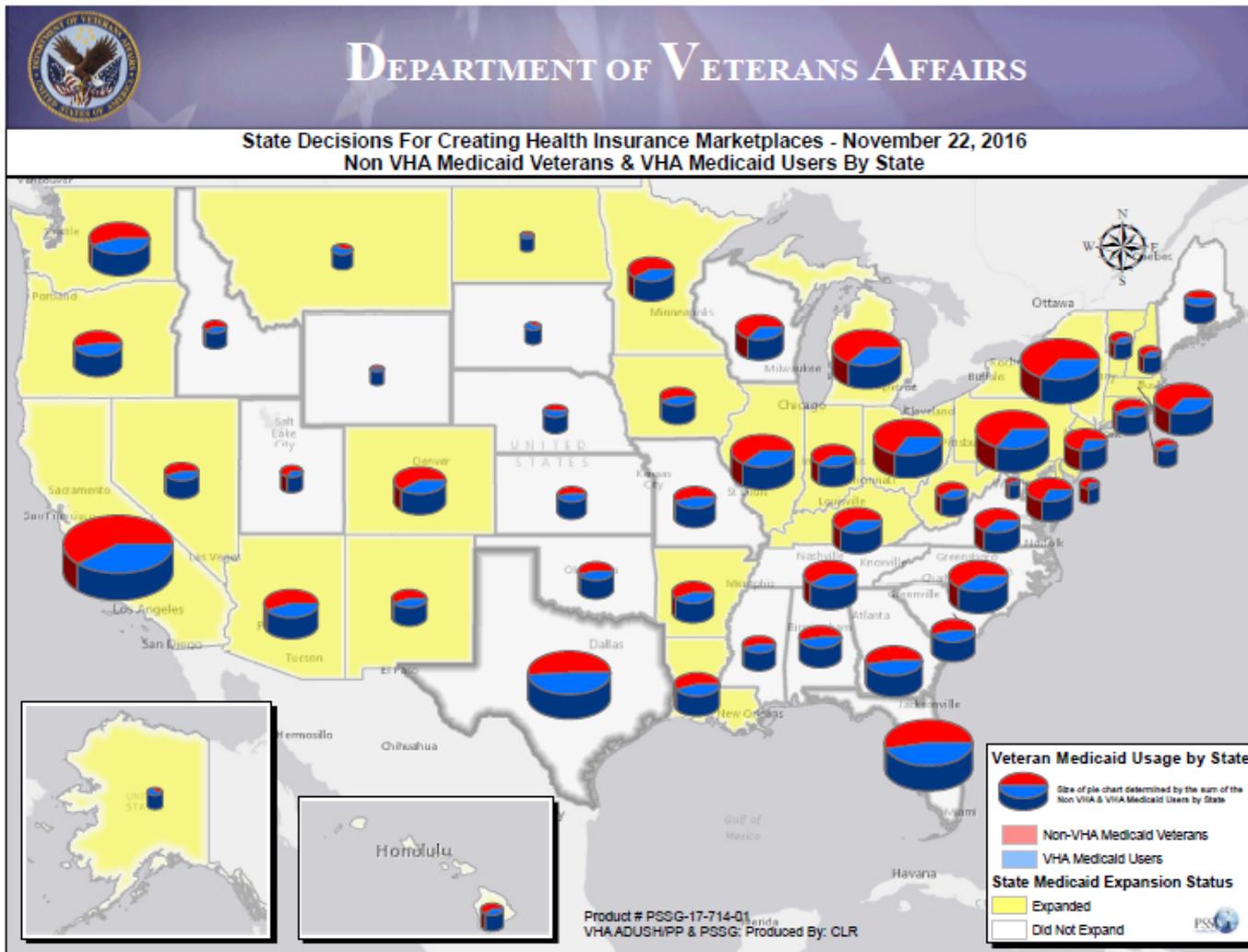
The screenshot shows the Esri website's 'Enterprise Agreement' page. The top navigation bar includes 'esri', 'Products', 'Industries', 'Support & Services', and 'About'. Below this, there are three tabs: 'Enterprise Agreement', 'Overview', and 'Commercial Business'. The main content area has a green background with the text 'Enterprise Agreement' in large white font. Below this, a paragraph explains: 'An enterprise agreement (EA) is your fast track to organization-wide GIS. An EA gives you ready and uncapped access to ArcGIS software along with timely and expert assistance from Esri so that you can focus on building a successful and scalable enterprise GIS.'

- **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

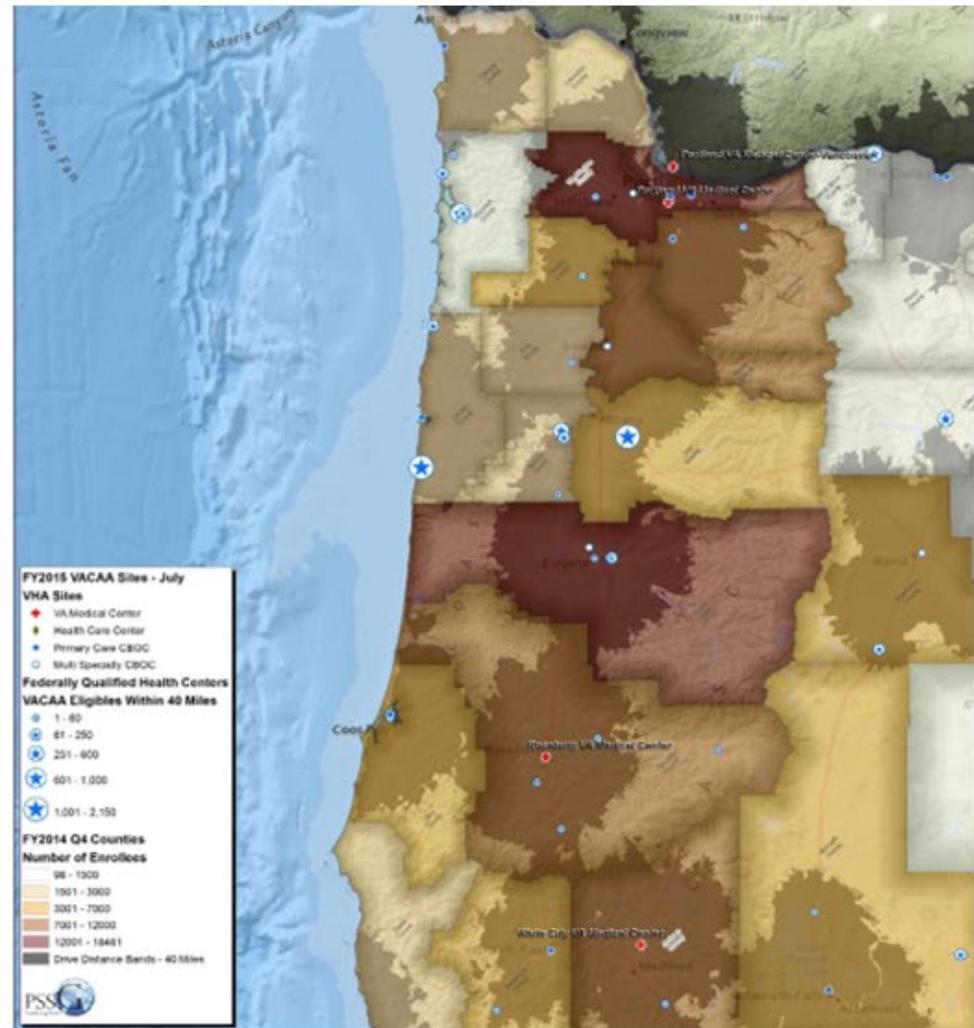
UTILIZATION OF GIS – VISUALIZING DATA



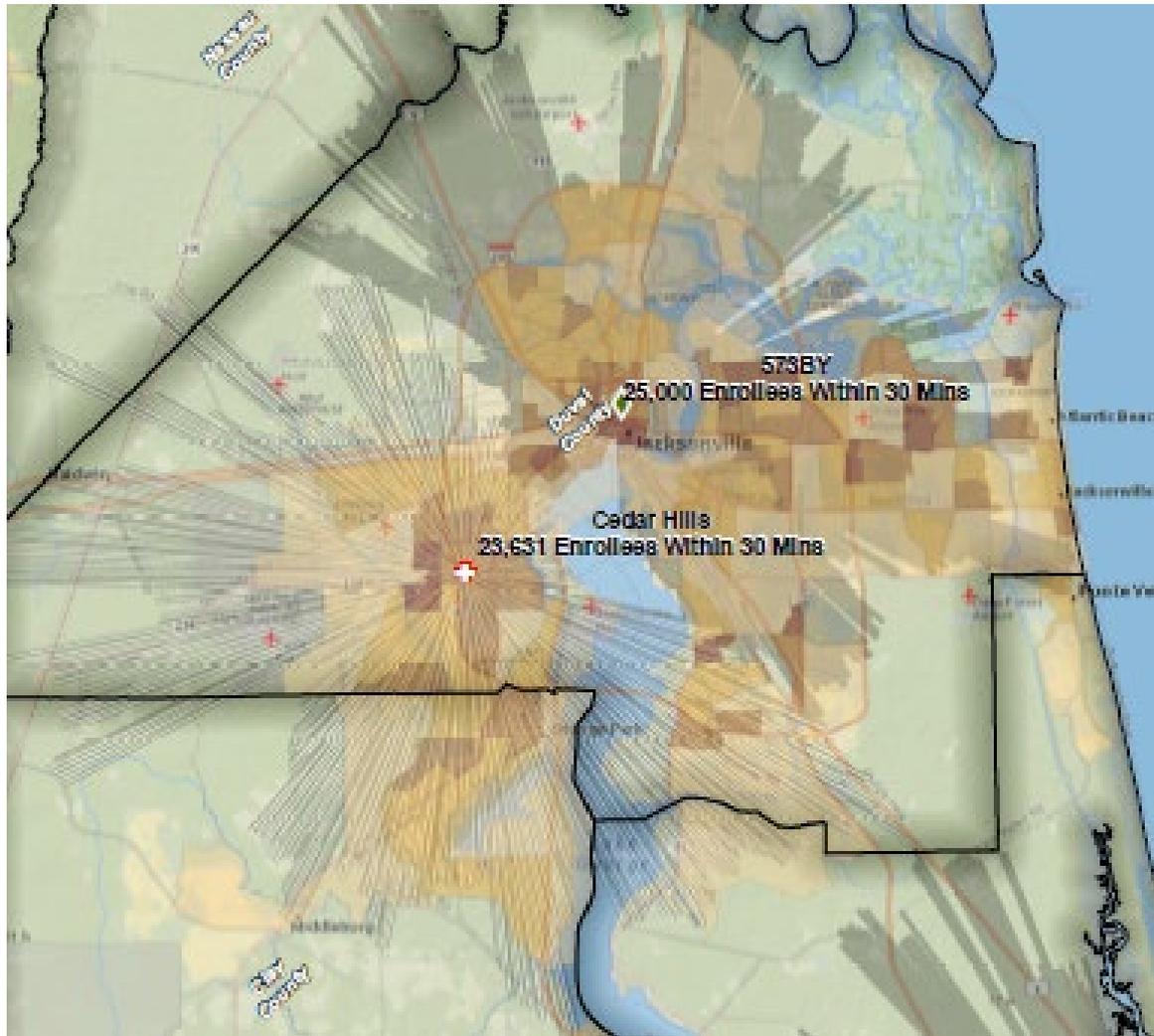
UTILIZATION OF GIS – VETERANS CHOICE PROGRAM



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

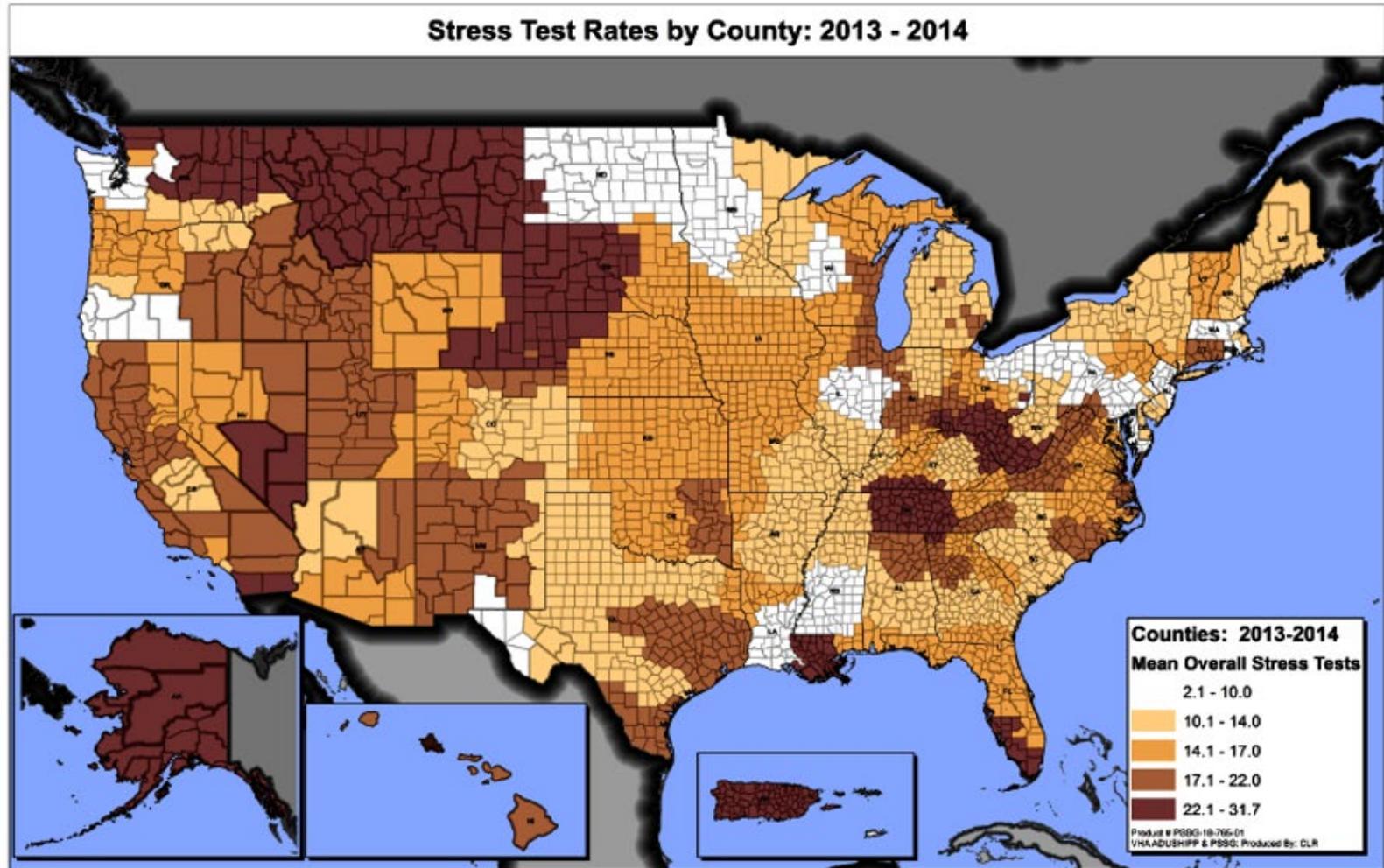


UTILIZATION OF GIS – LOCATION-ALLOCATION



Location Allocation with capacity limits and weighted demand points.

UTILIZATION OF GIS – RESEARCH

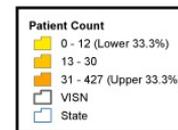
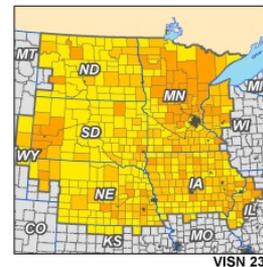
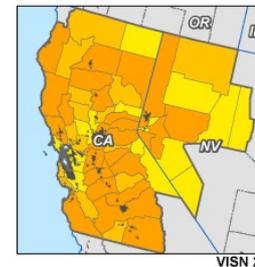
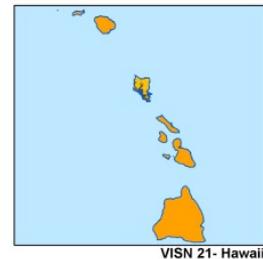
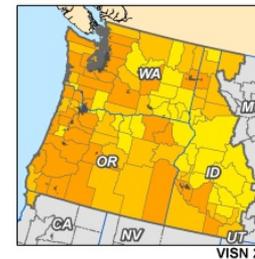


UTILIZATION OF GIS – RURAL HEALTH (GSOD)

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

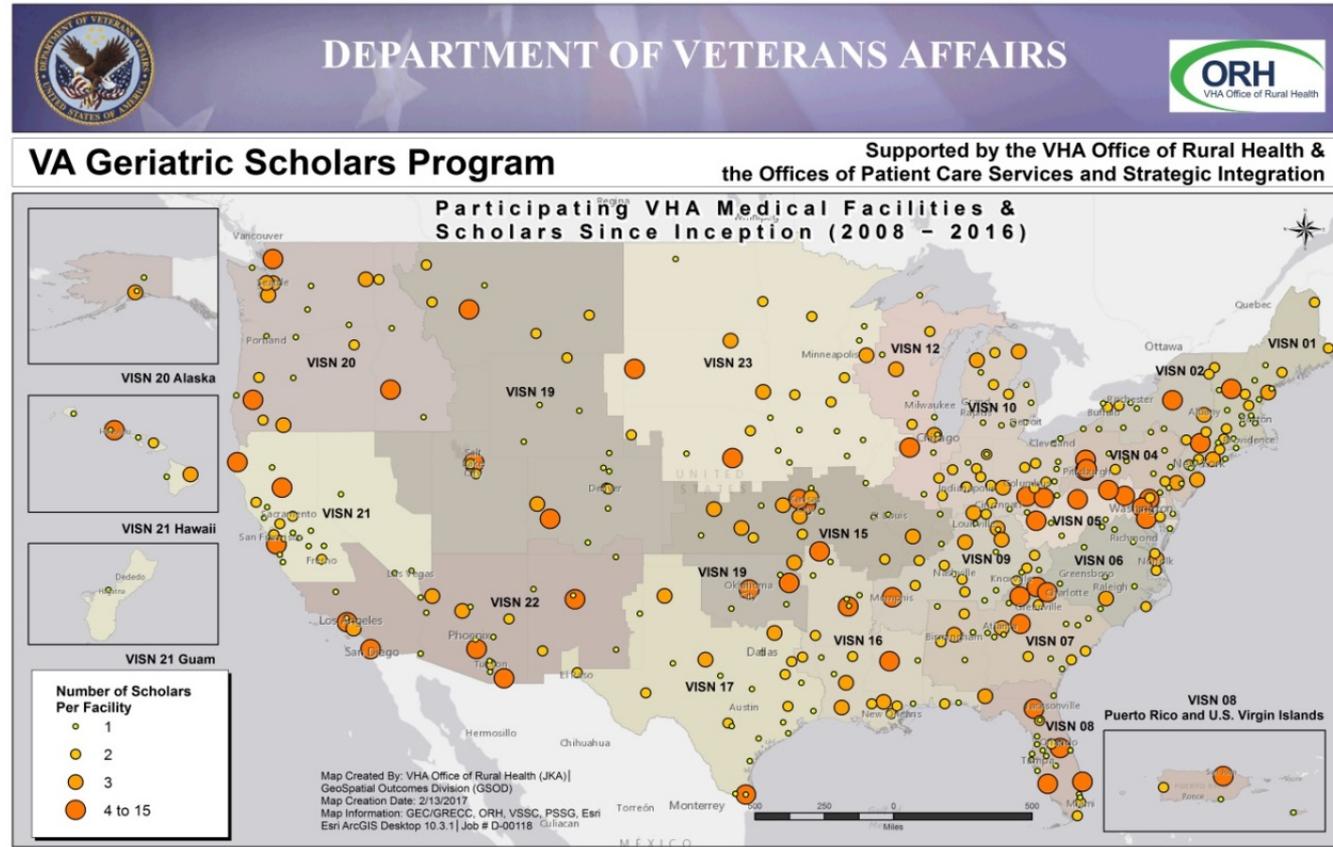
Map Created By: ORH RHRC-ER (DCR, LKW, JKA, ERL)
GeoSpatial Outcomes Division
(Map Creation Date: 9/2/2019)
Map Information by: PDSG, VBSC, ESRI
ANDR 10.2x

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

A1 : X ✓ fx Communities and Community Attributes

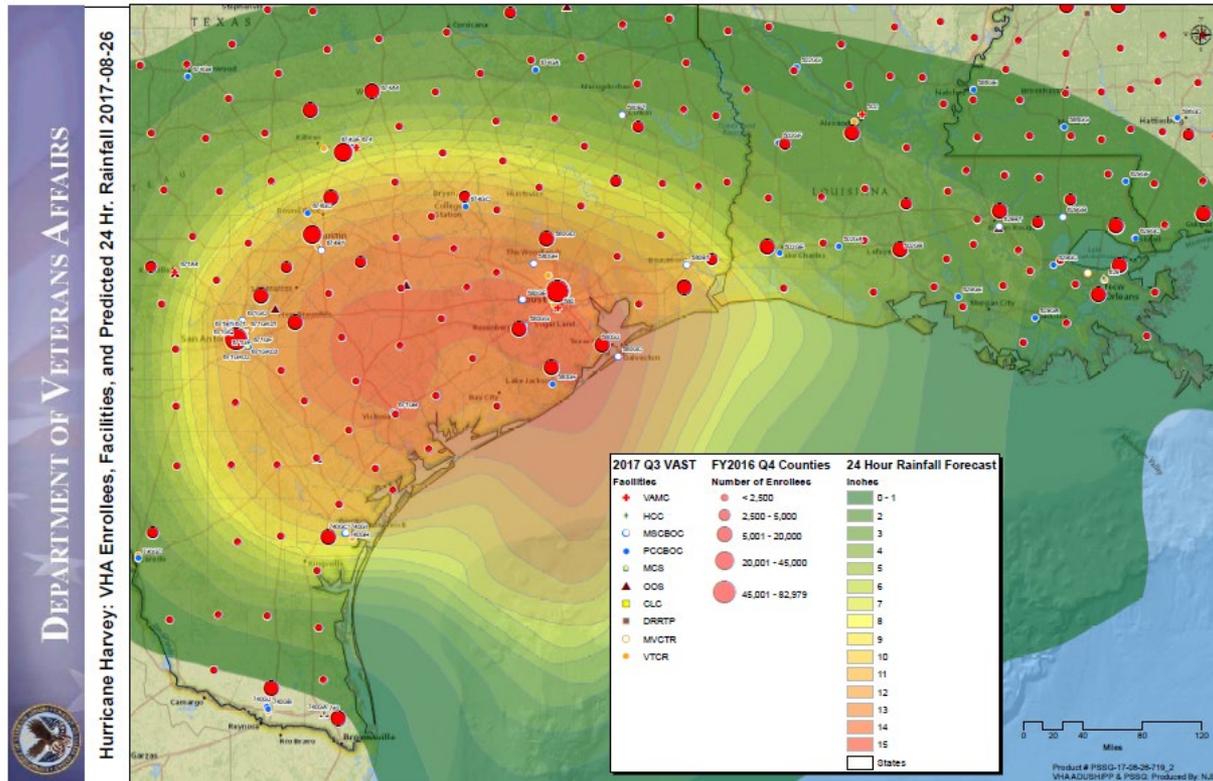
Communities and Community Attributes

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	E
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	4.68
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
ALLEDALE, SC	ALLEDALE	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	8.58
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	8.18
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	28.57	28.10	N	Y	N	Y	Y	Y	H80CS04200	Section 330	4.21

Spatial Analysis Results

Ready 75%

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

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. PSSSG (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.¹

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

- 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)

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/dhdsp/maps/gisx/resources/geospatial-data.html>
- <https://hub.arcgis.com/search?q=Health-Care>
- <https://data.hrsa.gov/>
- <https://www.census.gov/geo/maps-data/>
- <https://www.data.gov/>

QUESTIONS

