

# Fall Webinar



Image provided by FHWA



**Fall Webinar**

**November 2, 2018  
11:30 am to 1:30 pm**

**Emcee:**

**Lisa Loftus-Otway, M.P.Aff., LL.M.**, Research Engineer Scientist Associate and Attorney-at-Law,  
University of Texas at Austin - Center for Transportation Research

*Introduction to Megaregions Research*

**Presentations by:**

**Carol Lewis, Ph.D.**, Professor and Emeritus Director of Center for Transportation Training and Research (CTTR) - Texas Southern University in Houston, TX

**Gwendolyn C. Goodwin, Ph.D.**, Assistant Professor and Interim Director, CTTR

*Determining Purpose and Need for Vulnerable Communities in the Megaregion*

**Brian Wolshon, Ph.D., PE (LA, MI, FL)**, PTOE Edward A. Karen W. Schmitt Professor - Department of Civil and Environmental Engineering, Louisiana State University

*Evaluation and Analysis of Post-Disaster Re-Entry in Megaregions Project*

**Amy St. Peter**, Deputy Executive Director - Maricopa Association of Governments in Phoenix, AZ

*Partnering for Impact In Arizona's Sun Corridor*

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# WTS Introduction



## WTS SOUTHWEST REGION

- WTS stands for Women's Transportation Seminar, which was how it was named when founded in 1977 when women couldn't get subsidized for association memberships unless they were educational.
- 40 years later – International organization
- More than 6,500 members (including women and men) and 79 chapters
- Network of 40,000 transportation professionals
- Local chapters generate professional development and networking
- Across the United States, Canada, and the United Kingdom
- We fulfill our Mission to advance the Transportation Industry and women in it by:
  - Providing access to top leaders in the industry
  - Development & leadership programs
  - Networking & shared knowledge base
  - Mentoring & career centers
  - Annual & technical conferences
  - Scholarships & student chapters

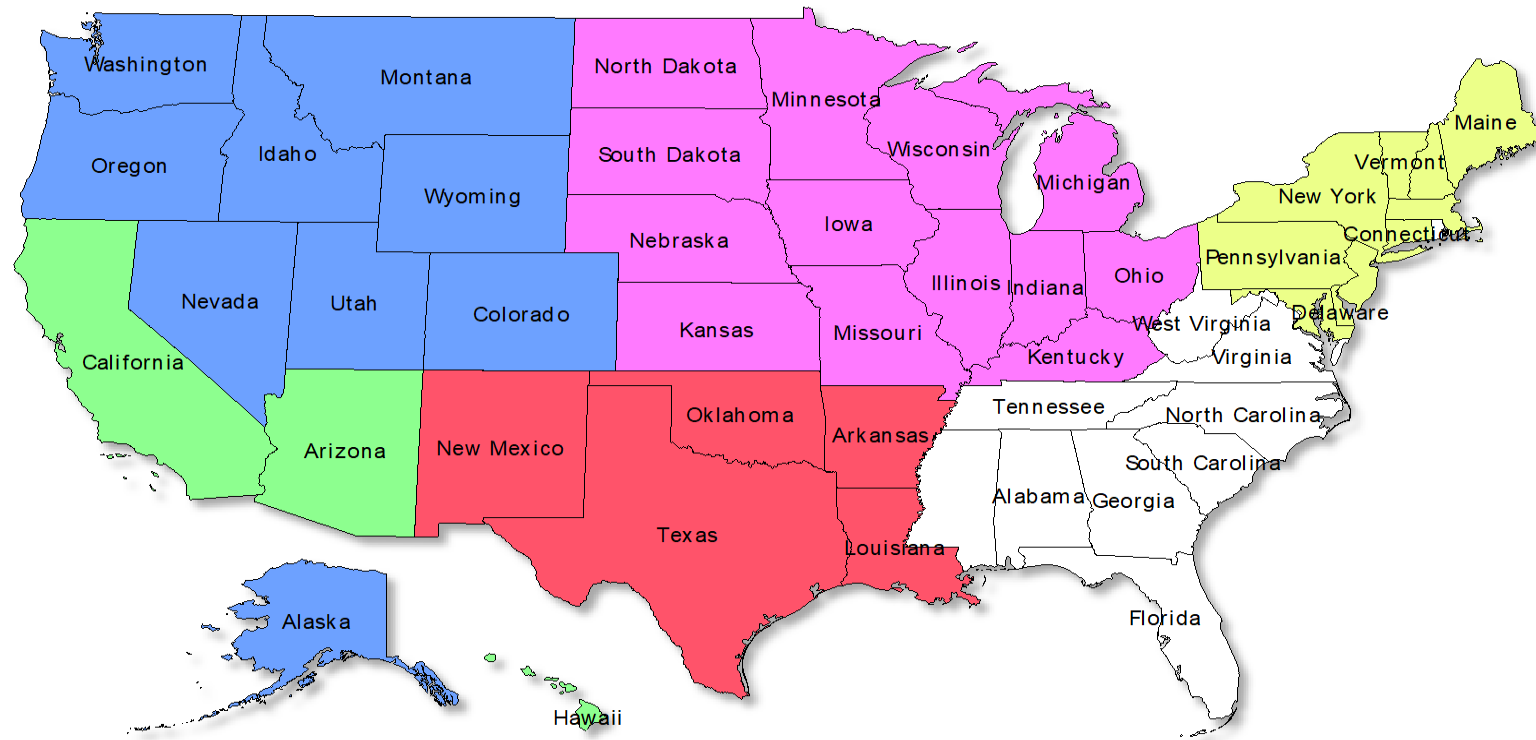


# WTS Regions by State



## WTS SOUTHWEST REGION

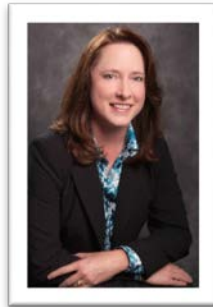
Central Region (2013); Northwest (2014); Northeast (2015); Southwest (2016); Southeast (2018); Pacific West (2018)



# WTS Southwest Region Council 2017-2018



## WTS SOUTHWEST REGION



**Chair**  
Laura Weis  
Dallas-Fort Worth



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# WTS Chapter Highlights DALLAS/FORT WORTH

WTS SOUTHWEST REGION

**November 27<sup>th</sup>** – Annual Diversity Luncheon

**December 13<sup>th</sup>** – Annual Holiday Celebration (partnering with RHCA and COMTO)

<http://www.wtsinternational.org/greaterdallas>



**WTS**  
SOUTHWEST REGION

# WTS Chapter Highlights HEART OF TEXAS



## WTS SOUTHWEST REGION

**November 5<sup>th</sup>** – November Luncheon:  
Randy Clarke, Capital Metro CEO

**January 22<sup>nd</sup>** – Annual Business  
Luncheon

**February 20<sup>th</sup>** – Luncheon

<http://www.wtsinternational.org/heartoftexas>



# Introducing Lisa Loftus-Otway

## WTS SOUTHWEST REGION

Lisa Loftus-Otway, Attorney at Law (New York Licensed) is a Research Scientist at the [Center for Transportation Research](#) at the University of Texas at Austin, and as is the Assistant Director for Research at the [Center for Cooperative Mobility for Competitive Megaregions](#) a Tier 1 USDOT University Transportation Center. Prior to arriving in the U.S, she worked in the public and private sector in the UK and South Africa. Lisa's education background includes a LLB in Law, Masters in International Environmental Law from the University of Nottingham and a Masters in Public Affairs from the LBJ School of Public Policy at UT-Austin. Lisa is an active member of the Women's Transportation Seminar (WTS). She is currently a board member of WTS International. She served as the Heart of Texas Chapter's president in 2013-2014, and was the 2016 Woman of the Year. Lisa also served on the Texas Exes Advisory Council for 5 years and was the LBJ Austin Alumni Association President.

Lisa's research portfolio focusses on the intersection of transportation law and policy, freight planning, railroad preservation and protection, megaregions and inter-regional planning, the law of automated and connected vehicles, environmental and land use policy and environmental justice. She has led teams on over forty research projects for clients including FHWA, USDOT, TRB, DHS and in Texas for TxDOT, NCTCOG and the City of Austin. She has presented her research and moderated panels at South by Southwest, APA, TRB, NASCO, FRA, Class I Railroads Annual Legislative Affairs Conference, Association of Pacific Ports, Association of Transportation Law Professionals and many others.



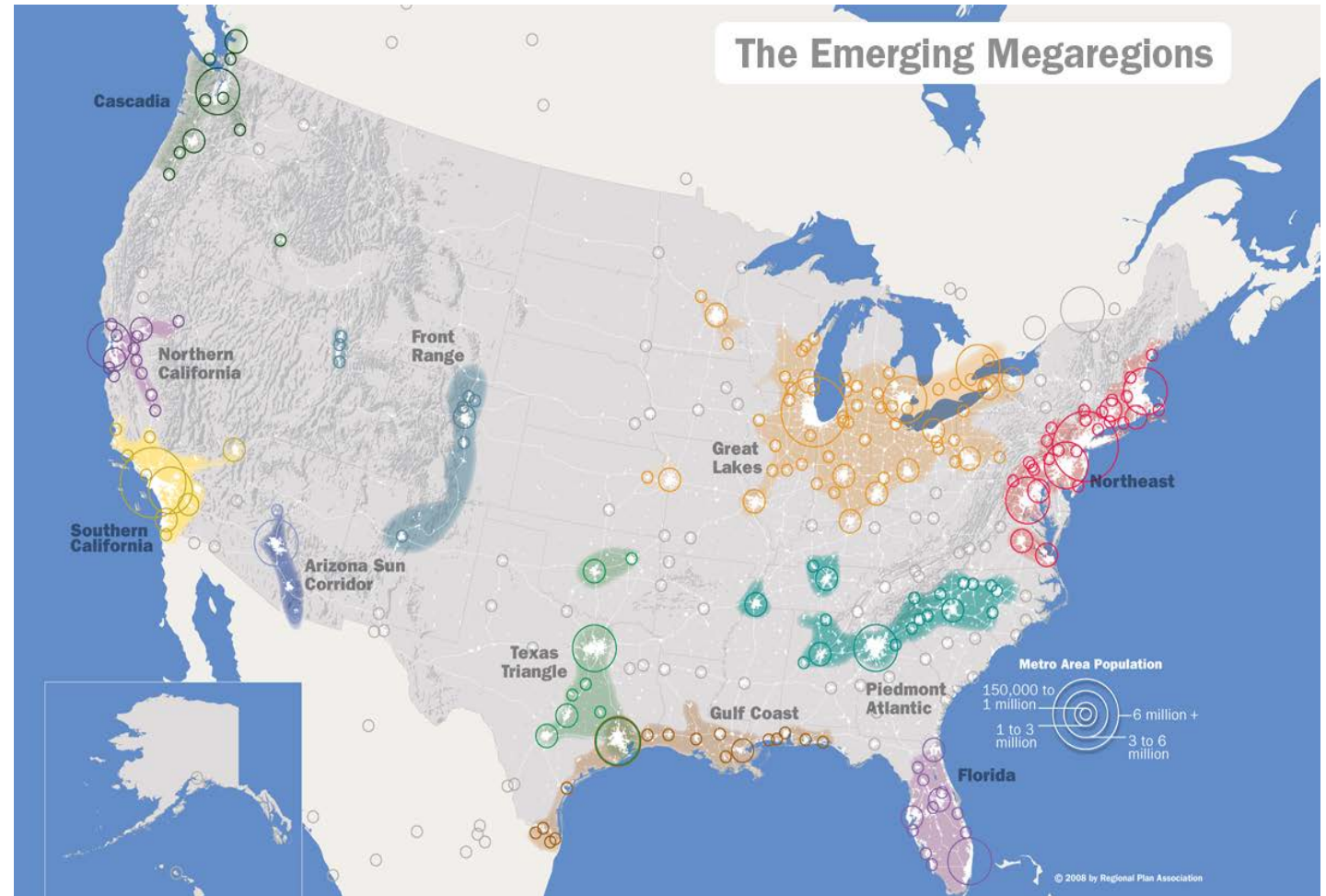


# A Quick Introduction to Megaregion Theory!

*Lisa Loftus-Otway*  
*November 2, 2018*

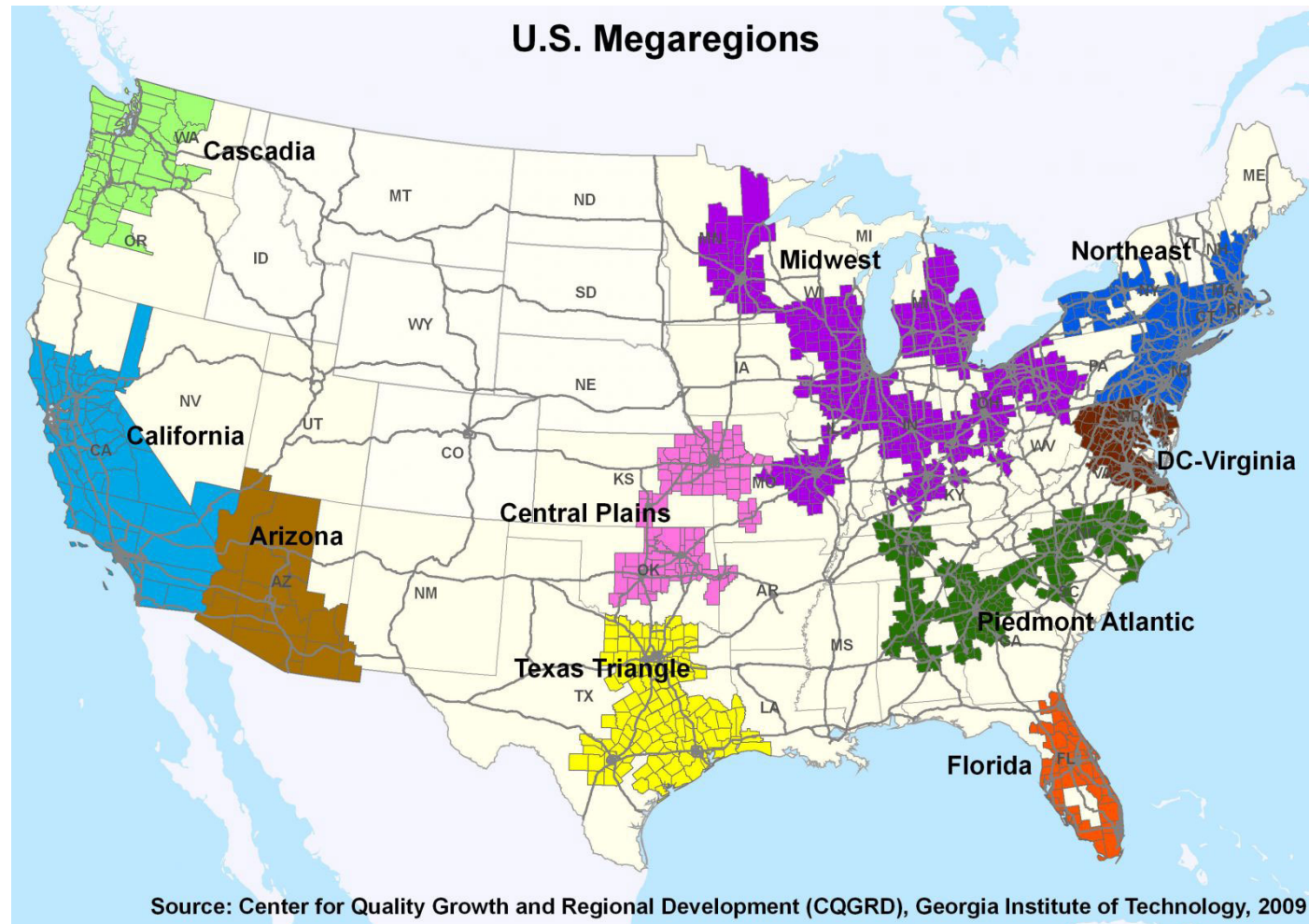
# What is a megaregion?

- Defined by relationships of:
  - Environmental systems and topography
  - Infrastructure systems
  - Economic linkages
  - Settlement patterns and land use
  - Shared culture and history
  - Freight flows



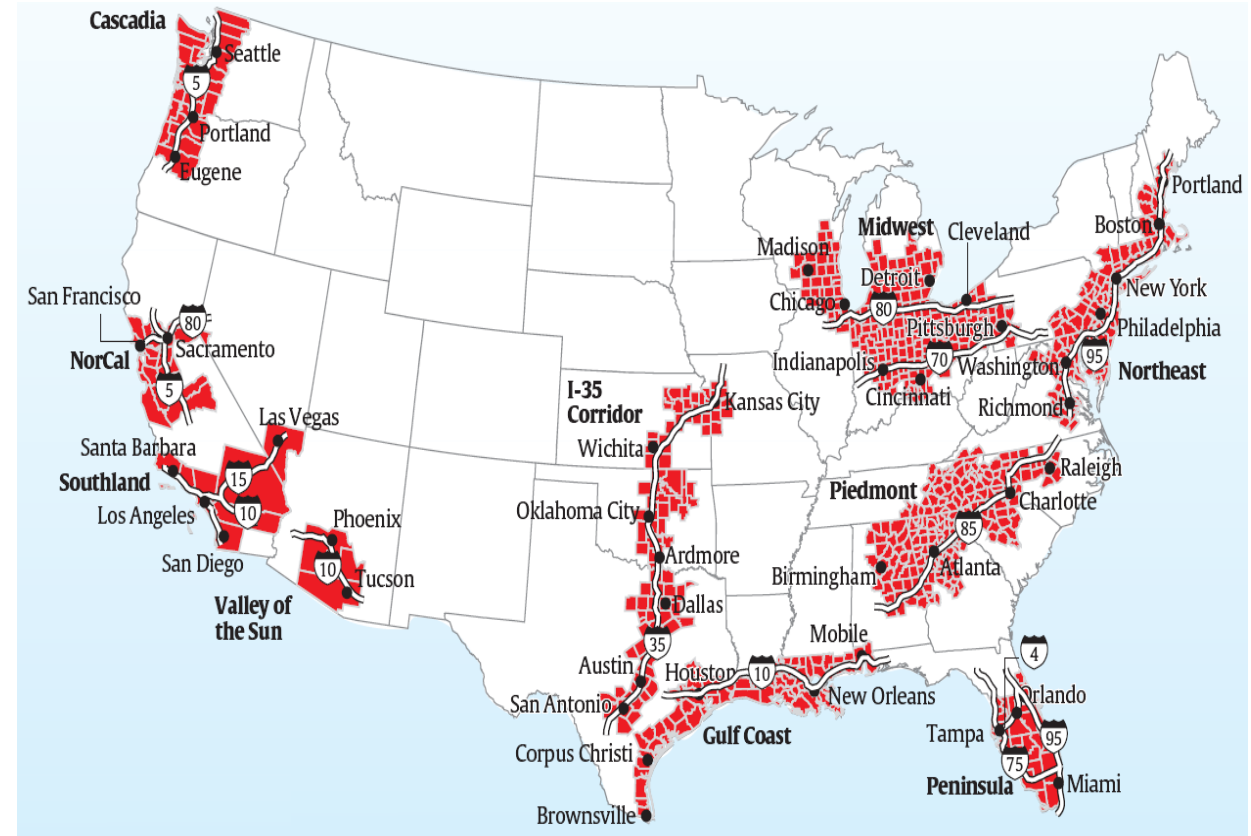
Source: America 2050

# Catherine Ross Definition of Megaregions



# Different Delineations of Megaregions

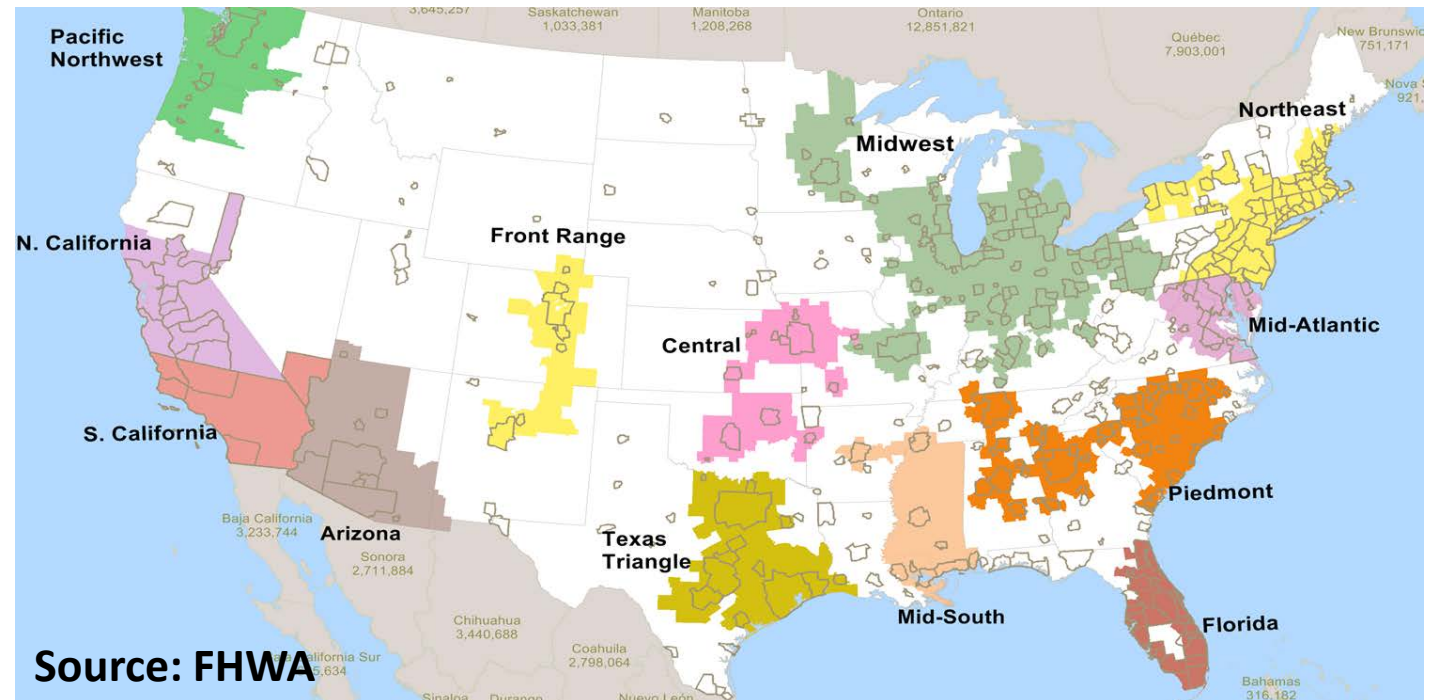
- Combines at least two metropolitan areas
- Projected population of at least 10 million by 2040
- Derives from continuous metropolitan and micropolitan areas
- Constitutes an organic cultural region with a distinct history and identity
- Occupies a roughly similar physical environment
- Links large centers through major transportation infrastructure
- Forms a functional urban network via goods and service flows
- Creates a usable geography that is suitable for large-scale regional planning
- Lies within the U.S.
- Consists of counties as the most basic unit



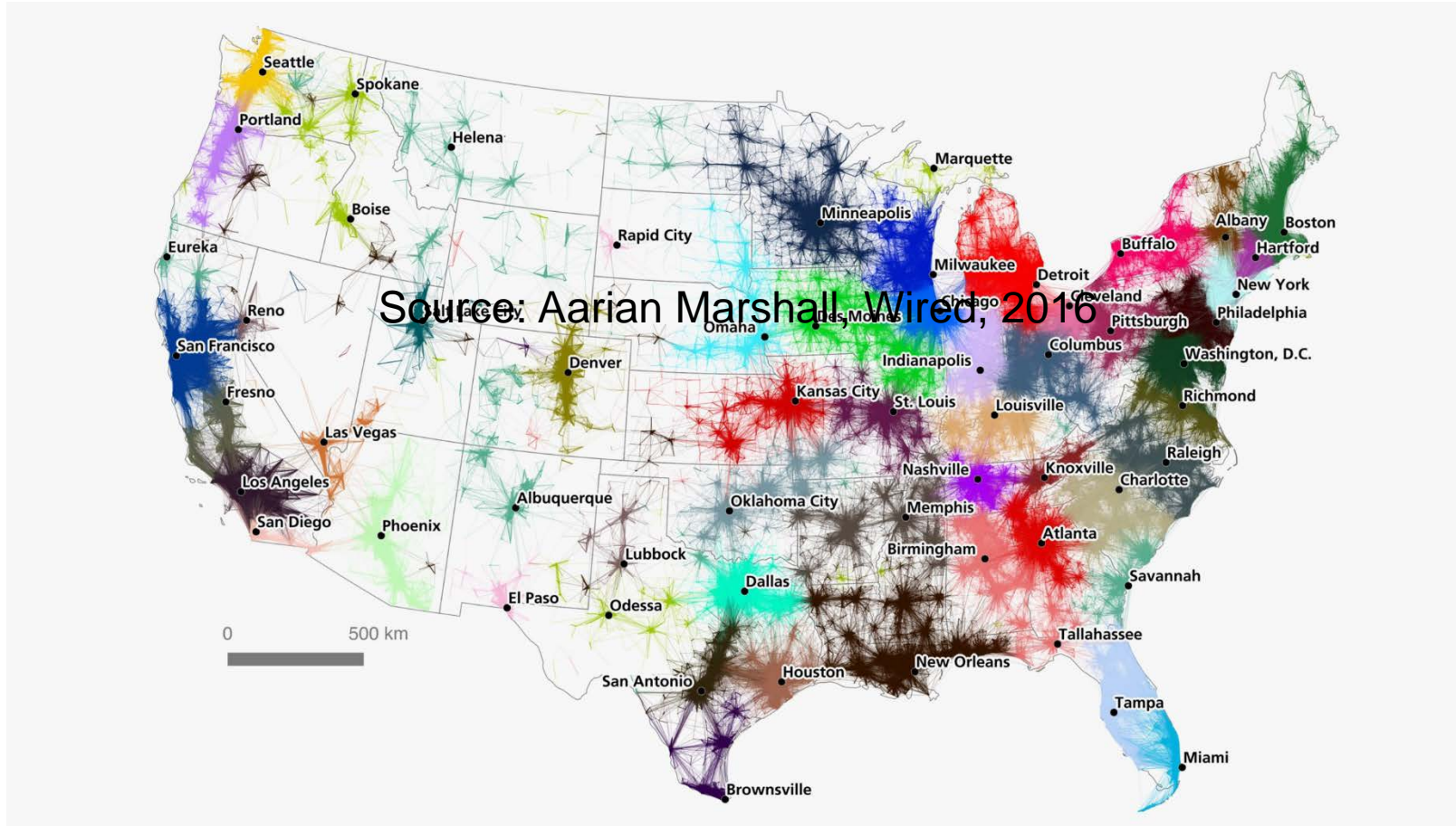
Source: Lang and Dhaval (Virginia Tech, 2007)

# FHWA Identified Megaregions

- Networks of metropolitan centers and surrounding areas spatially and functionally linked by these elements:
  - Economic
  - Environmental
  - Social
  - Infrastructure

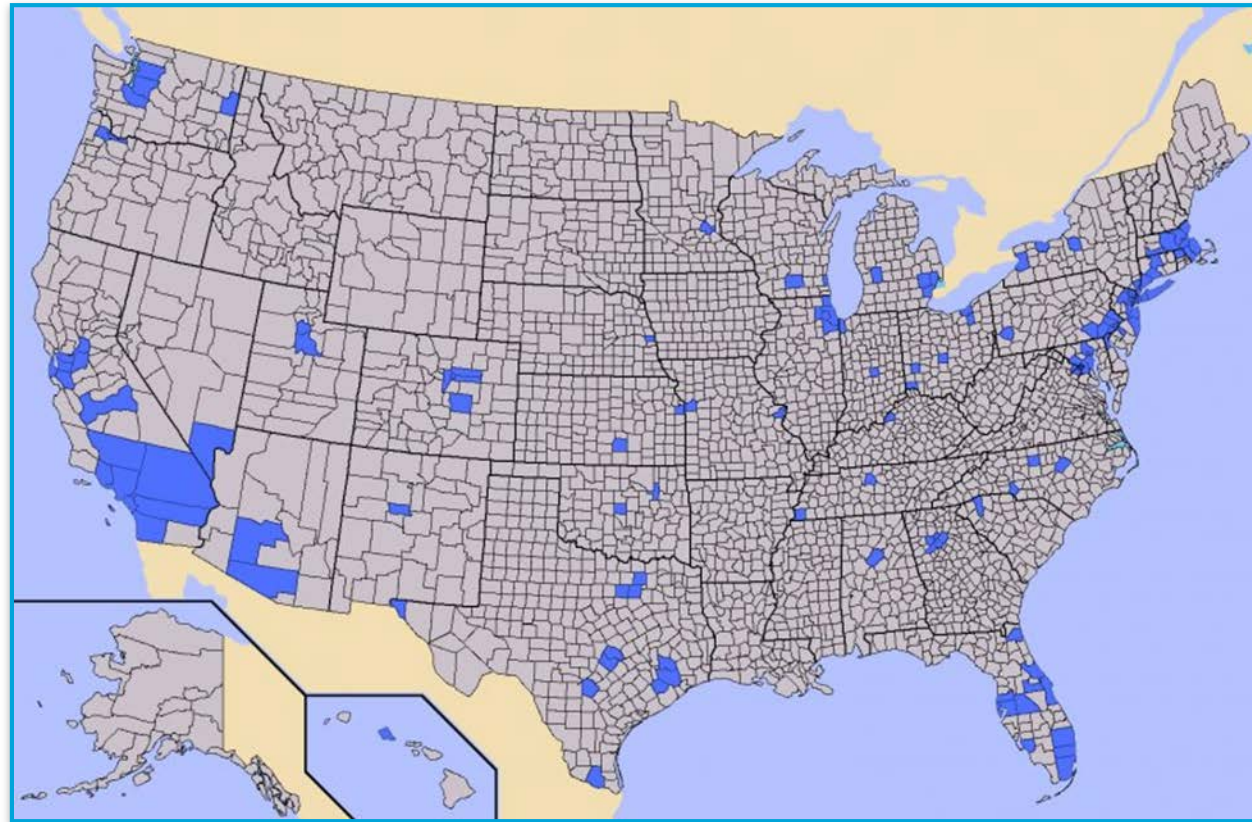


# Commuting maps show we are living in megaregions



Source: Aarian Marshall, Wired, 2016

# Half the US Population Lived in 146 Counties as at 2013



Source: Walter Hickey and Joe Weisenthal, Business Insider, September 2013

<https://www.businessinsider.com/half-of-the-united-states-lives-in-these-counties-2013-9>

# Why CM<sup>2</sup>

- Partnership of institutions and entities that have been at the front-edge of conducting megaregion work and analysis.



- Our Goal: Advance research, education, and technology transfer initiatives to improve the mobility of people and goods in urban and rural communities of megaregions
- Expected Outcomes:
  - Offer advice to the federal, state, and local governments on strategic transportation planning, smart infrastructure investments, and informed policy-making.
  - Promote multimodality ranging from high-speed rail to slow-moving transportation such as walking and bicycling for diverse populations and communities.
  - Facilitate public-private partnership for freight mobility planning and operation efficiency.

# WTS Chapter Highlights HOUSTON



**WTS**  
SOUTHWEST REGION

## WTS SOUTHWEST REGION

**November 15<sup>th</sup>** – Annual Diversity Luncheon: Small Business, Big Impact

**December 11<sup>th</sup>** – Holiday Reception: Ousie's Table

<http://www.wtsinternational.org/houston>



# WTS Chapter Highlights SAN ANTONIO

## WTS SOUTHWEST REGION

**November 9<sup>th</sup>** – November Leadership Latte featuring Andrés Andujar, Hemisfair Park CEO

**December 6<sup>th</sup>** – WTS Reads – Drop the Ball: Achieving More by Doing Less (by Tiffany Dufu)

**December 13<sup>th</sup>** – Mega Mixer – Multi-Organization Holiday Networking Event!

<http://www.wtsinternational.org/sanantonio>



# Introducing Dr. Carol Lewis

## WTS SOUTHWEST REGION

**Dr. Carol Lewis** - is a Professor in Transportation Studies and Emeritus Director of the Center for Transportation Training and Research at Texas Southern University (TSU). She educates students in fundamentals of transportation and urban transportation issues, as well as conducts operational and policy related transportation research. Among the areas of current research are improving demand estimation for intercity rail systems and policy and operational implications of automated vehicles. Lewis is also engaged in defining need and planning parameters for multijurisdictional (megaregions) transportation planning. Since joining TSU in 1992, Lewis has conducted research for the US Departments of Transportation (DOT) and Homeland Security (DHS), Texas Department of Transportation, Metropolitan Transit Authority of Harris County and with private transportation consultants. Lewis spent 15 years as manager and director of planning at the Metropolitan Transit Authority of Harris County.

Lewis was honored to be named as the Transportation Research Board's recipient of the 2016 Sharon D. Banks Humanitarian award at the annual meeting. She is a member of USDOT's Transit Research Advisory Committee and Chairs the Transportation Research Board's Inclusion and Diversity Committee. She is a member of the local Transportation Advisory Council at the Houston Galveston Area Council, a board member of the Gulf Coast Rail District and co-chair of the Transportation Advocacy Group (TAG). Lewis also chairs the Houston Exponential Connectivity Committee that promotes excellent transportation proximate to the city's proposed Innovation District. She is honored to have served Board appointments under four City of Houston mayors and Governor Rick Perry. Lewis holds a Ph.D. from the University of Houston and M.A. and B.A. degrees from the University of Iowa.



# Introducing Dr. Gwendolyn Goodwin

## WTS SOUTHWEST REGION

Gwendolyn C. Goodwin is an Assistant Professor and Director with Texas Southern University's Center for Transportation Training and Research (CTTR). She has over 30 years of experience in project management and policy planning. At CTTR, Goodwin is responsible for conducting research, developing and implementing surveys, developing and conducting training, preparing publications and transferring findings into the public domain. Goodwin's research also seeks to find sustainable and safe solutions to transportation and mobility issues for seniors, teens and pedestrians. Goodwin's dissertation included an analysis of senior driver crashes and walkability in urban and suburban areas. Goodwin conducted a walkability assessment of several communities in the Greater Houston area for her dissertation. Environmental Justice and public involvement are two areas of study for Dr. Goodwin. Her work with the Houston-Galveston Area Council was helpful in the identification and assessment of EJ communities in nine counties. Dr. Goodwin's work for the United Way of Greater Houston resulted in changes to medical transportation programs. She coordinates public involvement, meeting logistics, and media activities for Center projects. She is certified by the International Association of Public Participation (IAP2). Dr. Goodwin also supervises all research conducted by the Graduate Research Assistants. As an Assistant Professor, she teaches in the Maritime Studies undergraduate program, the General Studies undergraduate program, and the Transportation Management and Policy graduate program. Prior to working at CTTR, Goodwin worked for the City of Austin and Houston. Her areas of expertise involved analysis of census data for various reports and projects for the City of Houston. She also worked for the U.S. Census Bureau where she worked with cities, counties and councils of governments to prepare for the Census. Her duties also included working with agencies to extract data for analysis.



# EVOLVING CHALLENGES IN REGIONAL AND MEGAREGIONAL PLANNING

WTS – Southwest Region Webinar

November 2, 2018



Carol Abel Lewis, Ph.D.  
Professor & Emeritus Director,  
CTTR

Gwen Goodwin, Ph.D.  
Interim CTTR Director

Jermaine Potts & Brandon  
Rogers, Graduate Students





Advance research, education, and technology transfer initiatives to improve the mobility of people and goods in urban and rural communities of megaregions

*Increase access to opportunities that promote equity in connecting regions and communities, including urban and rural communities*

Develop recommendations for roles, requirements, and responsibilities for transportation planning agencies/scaling up regional planning agencies

# Determining Purpose and Need for Vulnerable Communities in the Megaregion

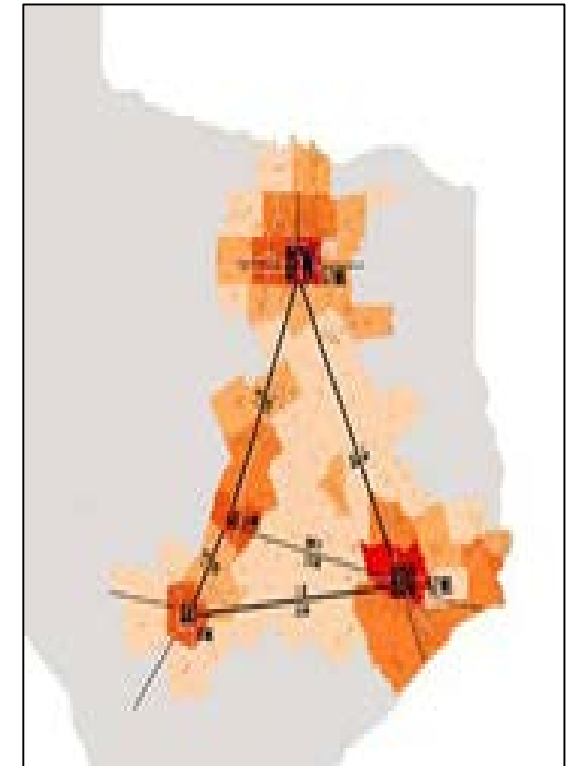
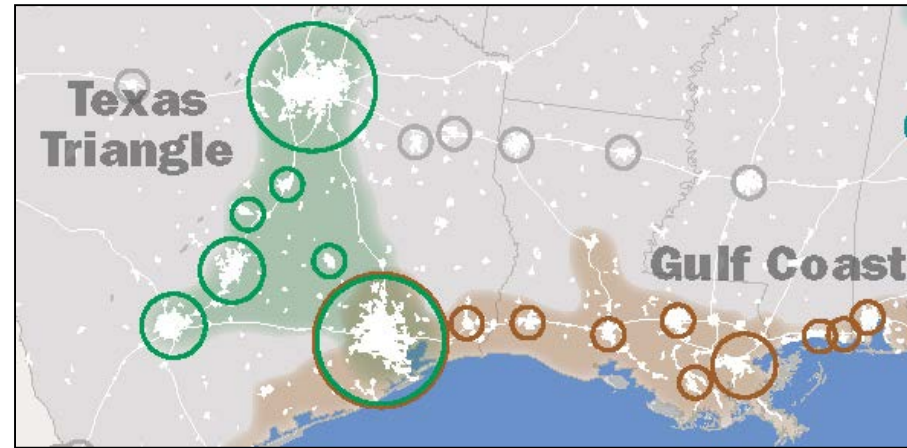
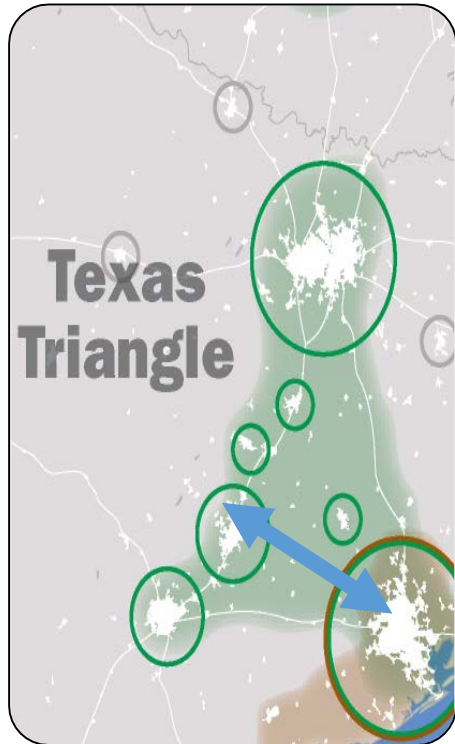
All EISs must contain a statement of purpose and need in accordance with [40 CFR § 1502.13](#).

Be specific enough to generate alternatives that may potentially yield real solutions to the problem.

Concisely focus on the primary transportation challenges that need to be addressed.

# Research Question

Are there vulnerable communities with a need for increased travel opportunities into the urban areas from the interstices in the US 290 megaregion corridor?



# Research Objective

## Formulate a rubric styled tool for planners

Craft purpose and need statements that will support development of transportation projects for vulnerable populations

- + Public Involvement
- + Interagency Coordination
- + Purpose and Need
- + Alternatives
- + Impacts
- + Mitigation

# US 290 Corridor Interstices (Excepting Harris and Travis)

Counties within 5 miles of US 290

Centerline

Austin

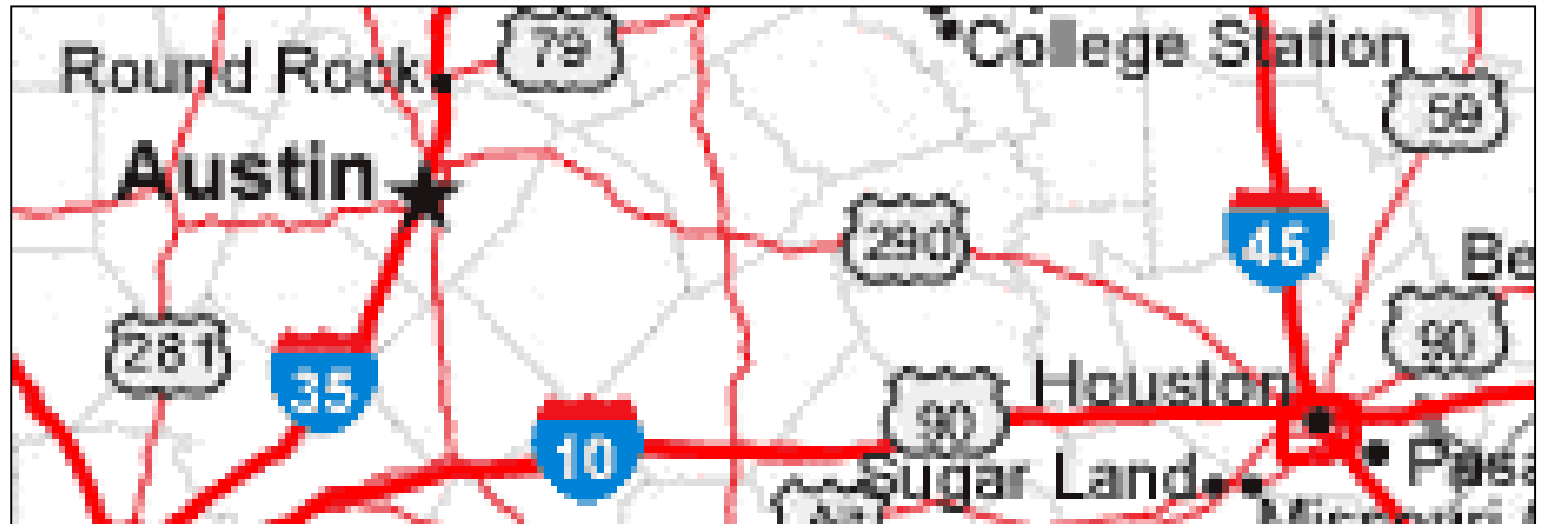
Bastrop

Lee

Waller

Washington

Fayette



# Why It Matters: Who Cares

## Beyond Traffic 2045

- Increasing numbers of fringe low income, ethnic and senior residents.
- Importance of existing & future challenges of planning across jurisdictional boundaries (US DOT).

## Opportunities to Increase Mode Choice

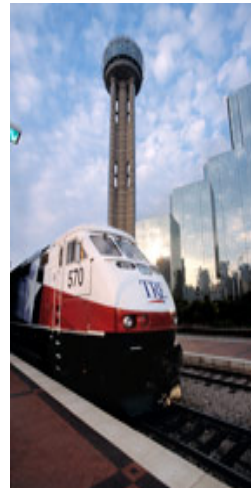
- Texans use automobiles at or above 91 percent or more for commutes, which exceeds the national average of 86 percent (USDOT, FHWA, 2018).

## Seamless Intercity and Intracity Connections Are Important

- Metropolitan areas have the potential to merge into a relatively continuous stretch of urbanization (Ross, 2009).
- Reconsidering the geographic boundaries has potential to improve life quality for some individuals (Fainstein and Fainstein, 2009).

# Livability & Access to Opportunities

- Jobs
- Transportation Options
- Health Care and Maintenance
- Recreation and Entertainment
- Social Contacts



# Access to Economic Centers

*Table 1: GMP in the Four States and in Some of the Largest MSAs in the Greater Texas Region.*

State	2015 GMP (million \$)	US Share	MSA	2015 GMP (million \$)	US Share
Arkansas	118,677	0.66%	Little Rock-North Little Rock-Conway, AR	37,213	0.21%
Louisiana	238,075	1.33%	Lake Charles, LA	15,353	0.09%
			New Orleans-Metairie, LA	78,478	0.44%
Oklahoma	188,011	1.05%	Lawton, OK	4,957	0.03%
Texas	1,611,189	8.99%	Houston-The Woodlands-Sugar Land, TX	503,311	2.81%
			Dallas-Fort Worth-Arlington, TX	485,683	2.71%
			Austin-Round Rock, TX	119,949	0.67%
			San Antonio-New Braunfels, TX	108,879	0.61%
<b>US Total</b>	<b>17,925,143</b>	<b>100.00%</b>	<b>US Total</b>	<b>17,925,143</b>	<b>100.00%</b>

*Source: Bureau of Economic Analysis 2015*

# Methodology

- Review literature for state-of-the-practice methodology to determine vulnerable populations.
- Collect data for US 290 Corridor block groups and identify the relevant vulnerable areas based on variables consistent with that methodology.
- Review type and level of existing service.
- Begin conversation with providers to assist with identification of gaps.

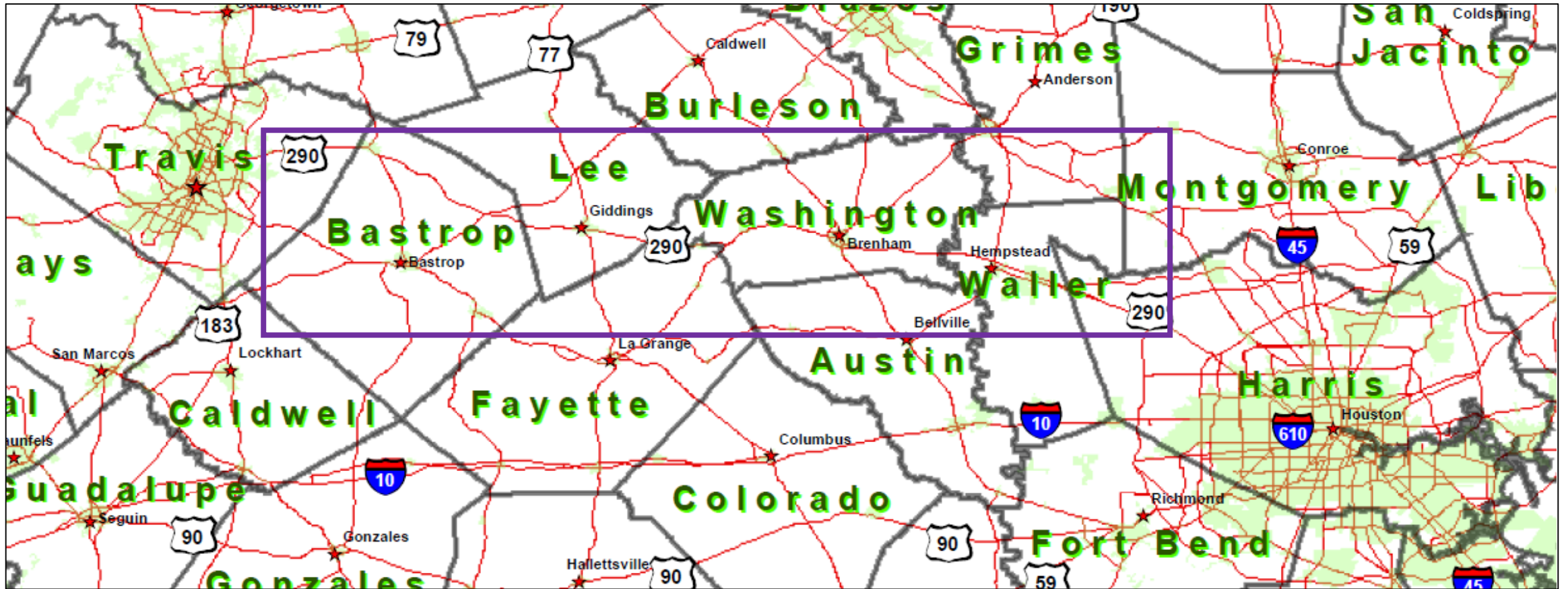


# US 290 Corridor Counties

County	Population	Employment	Poverty Rate
<i>Interstices</i>			
Austin	29,107	13,410	14.5
Bastrop	78,286	32,589	13.6
Fayette	24,909	11,484	10.8
Lee	16,754	7,645	14.8
Waller	47,049	20,418	19
Washington	34,544	14,677	14.4
<i>Anchors</i>			
Harris	4,590,000	2,200,000	16.6
Travis	1,200,000	672,575	12.3
Texas	28,304,596	13,286,314	15.9

[https://datausa.io/profile/geo/\(county name\)-county-tx/](https://datausa.io/profile/geo/(county name)-county-tx/)  
<https://www.census.gov/quickfacts/tx>

# Six (6) county study area along US 290



76 block groups (BGs)

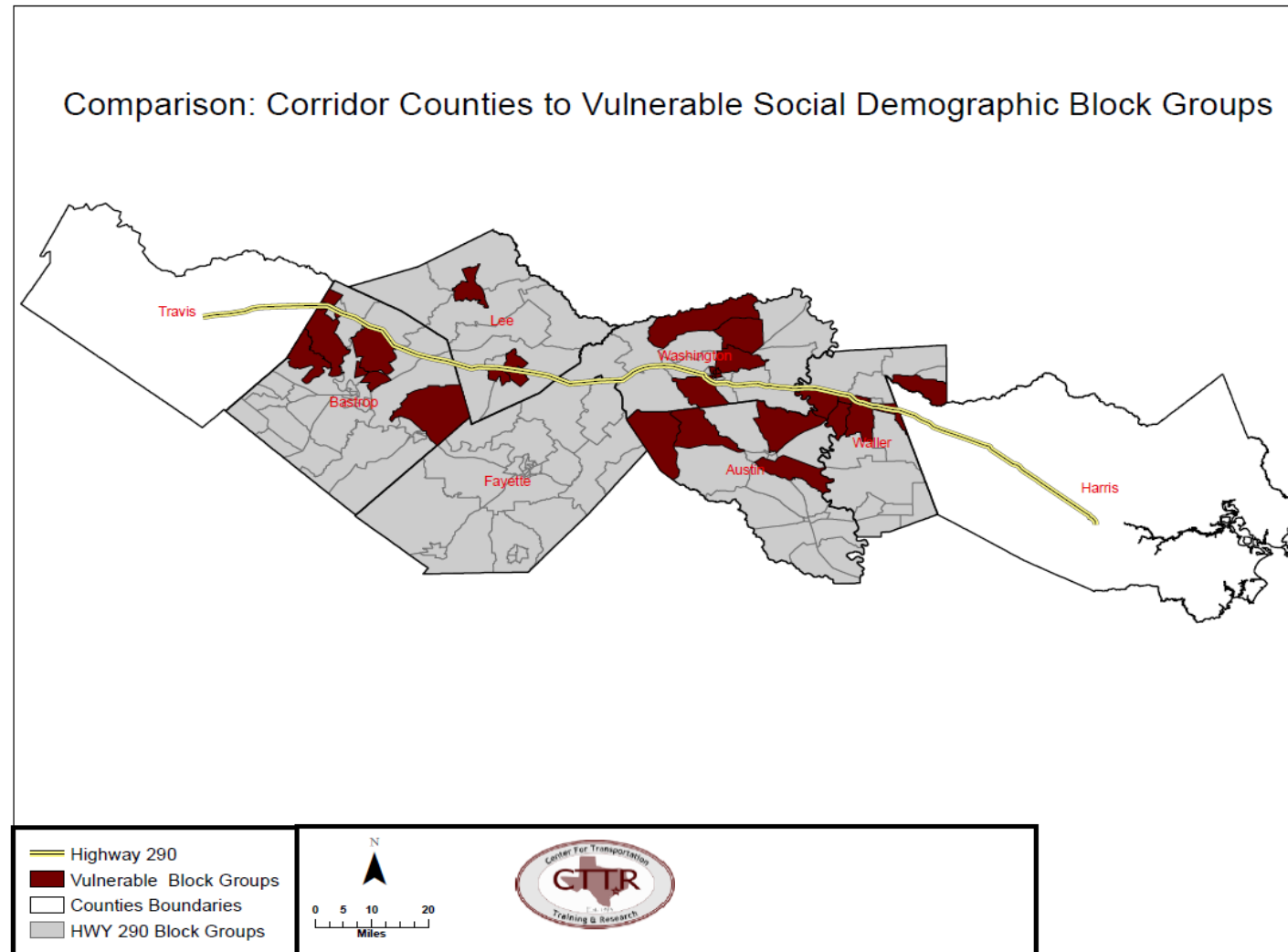
# Key Variables and Definitions

<b>Variables</b>	<b>Definition</b>
Minority Population	African Americans, American Indians, Asians, Native Hawaiians , and Hispanics or Latinos
Low-Income Population	Total income in the past 12 months below poverty level
Senior Population	Persons 65 years and older.
Zero Automobile Ownership	Households with zero automobiles available.
Female Headed Households	Households with more than one person, in which no male head of household is present.
Language Proficiency	Households that speak English less than very well.

# The results were not interesting at first glance

- Nothing really significant
- Fayette County – none factor
- Applied a filter for block groups (BGs) with poverty  $\geq 16\%$  (Texas poverty rate)
- Yielded 34 BGs

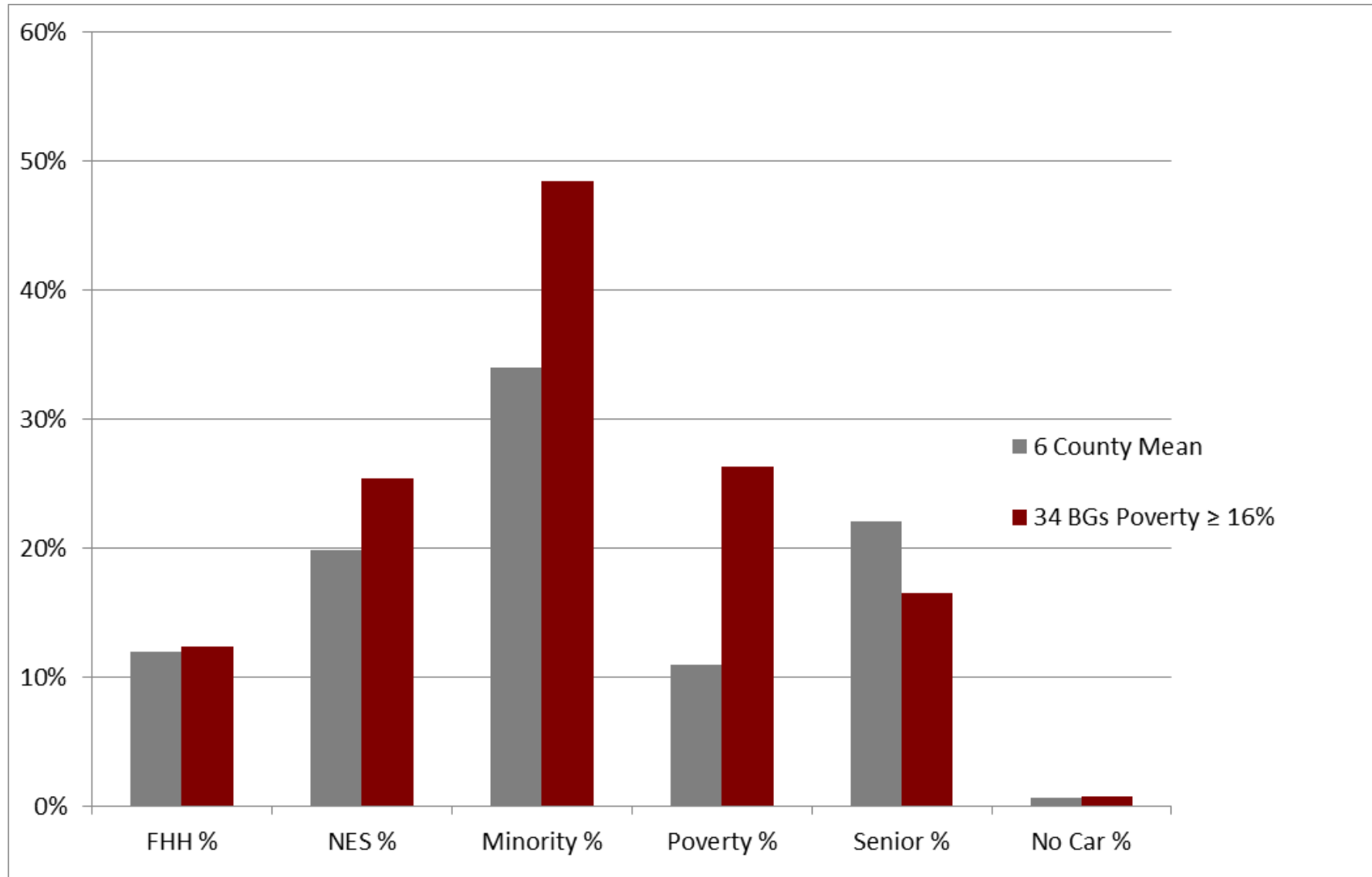
# Locations: 34 Vulnerable Block Groups within 5 miles of US 290 Centerline



# Example Vulnerable Block Groups

County (block group)	Percent Poverty	Percent Minority	Percent Elderly	Percent No. Auto
Waller	25	63	11	4
Waller	20	67	6	4
Bastrop	25	67	13	8
Lee	20	59	0.2	4
Austin	26	50	15	2
Austin	22	37	18	7
All Vulnerable	25	48	17	0.8
Texas	16	55	19	*

# Comparison: 6 County Mean to 34 Vulnerable Block Groups



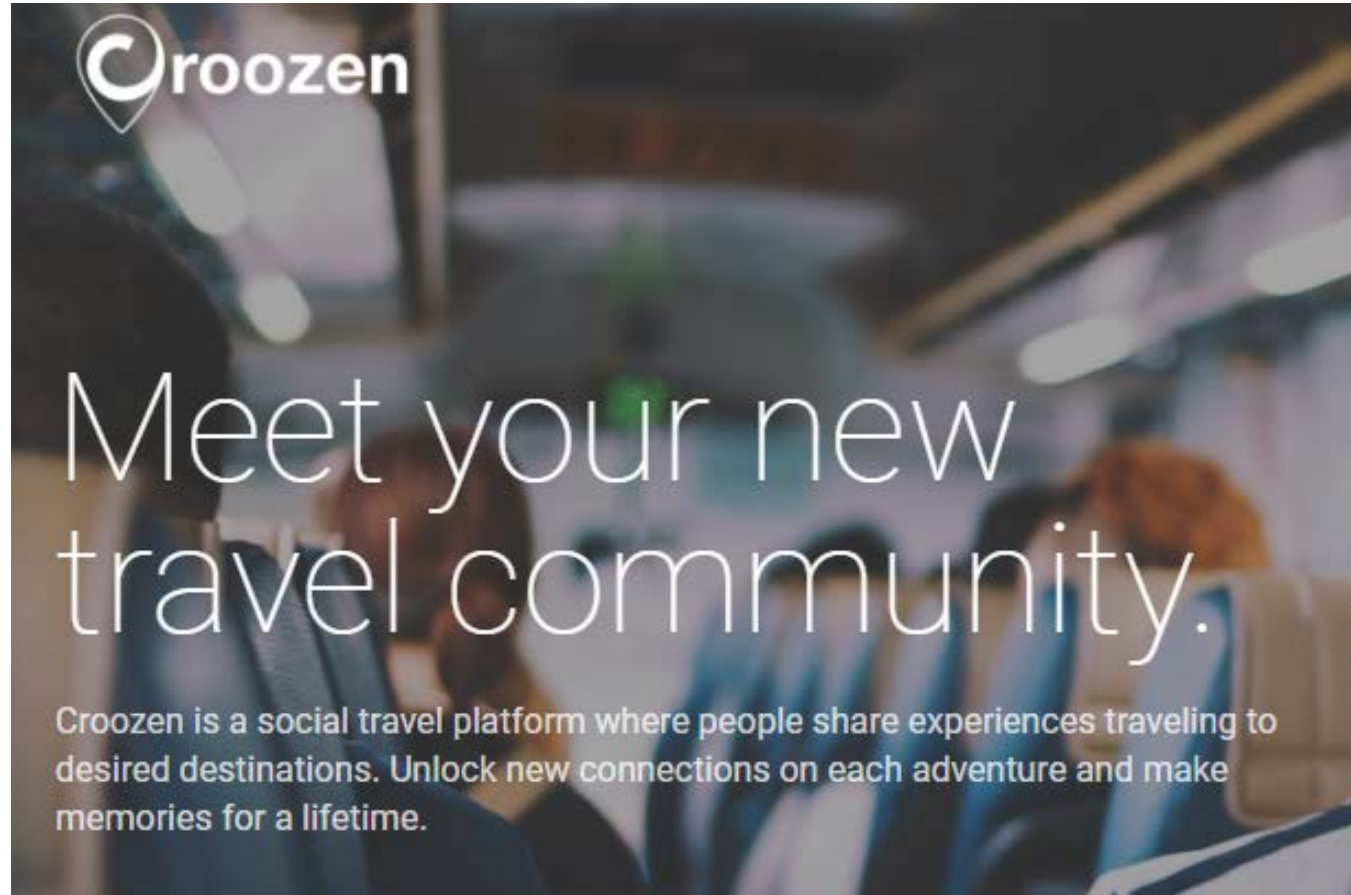
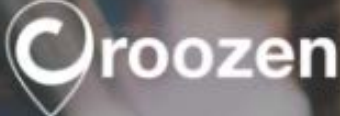
# Expect the Unexpected!

- Seniors but not poor seniors
- Most people have cars but what if...
  - Car breaks
  - Someone uses the car – no ride to work
  - Senior that no longer drives
  - Need medical treatment

# Barriers to Transportation for Vulnerable Communities and the Interstices

- Costs associated with car ownership
- Accessibility to work, food, and recreation
- Unbanked – not financially prepared to handle an emergency
- Internet/Web Access is limited

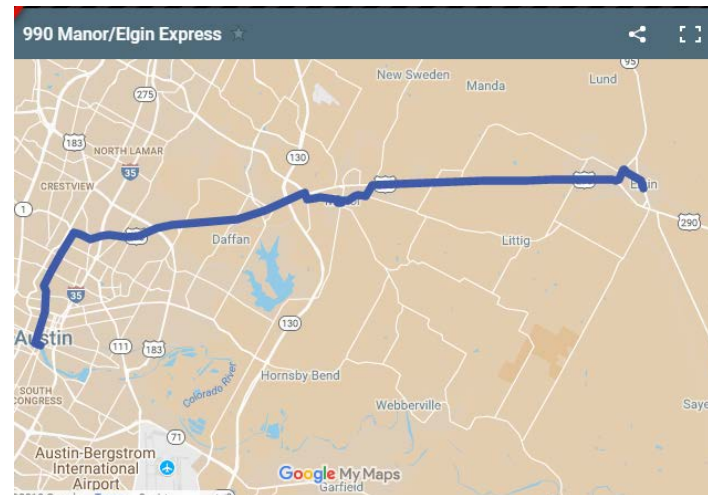
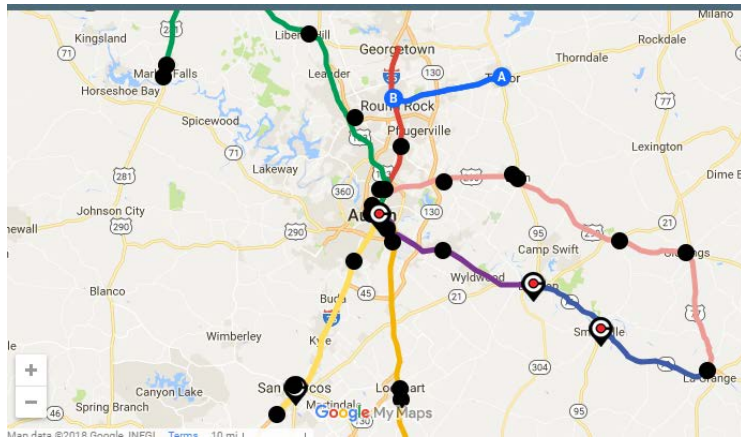
# Go Croozen



Meet your new  
travel community.

Croozen is a social travel platform where people share experiences traveling to desired destinations. Unlock new connections on each adventure and make memories for a lifetime.

# Rural Transit – Capitol Area Rural Transit (CARTS)



# Megabus and Luxury Bus

- **Direct service Houston to Austin**
- **No service to rural communities**



# Gaps and Opportunities

- Currently no transit service in Waller County
- Need for increased ambulatory medical
- Interstice MPO has inadequate resources for planning and policy
- Advantage to bifurcating the age for seniors
- Look at transportation spending as percentage of income
- Examine performance measures and vernacular across MPOs
- Link vulnerable block group designation with measurable void in accessibility
- Expand to other Megaregion corridors



Determining Purpose and Need for Increased  
Travel Options in the Megaregion for  
Vulnerable Communities

*Transportation Solutions to Enhance Economic  
Prosperity and the Quality of Life*

**Thank You**



# WTS Chapter Highlights LOUISIANA



## WTS SOUTHWEST REGION

**November 14<sup>th</sup>** – Coffee &  
Conversation

**November 29<sup>th</sup>** – 3<sup>RD</sup> Annual Awards  
Banquet, Keynote address by: Dr.  
Shawn Wilson, LA DOTD Secretary

**December 12<sup>th</sup>** – Luncheon

<http://www.wtsinternational.org/louisiana>



# WTS Chapter Highlights GREATER NEW ORLEANS



**WTS SOUTHWEST REGION**

**Welcome our newest chapter to our region!**

**They are busy planning an exciting calendar of events. Details coming soon!**



# Introducing Dr. Brian Wolshon, PE, PTOE

## WTS SOUTHWEST REGION

Dr. Brian Wolshon is the Edward A. and Karen Wax Schmitt Distinguished Professor of Engineering in the Department of Civil and Environmental Engineering at Louisiana State University (LSU). He has served on the faculty of LSU since January 1997. Prior to this appointment he worked in private practice for engineering consulting firms in California and Michigan and, as part of his doctoral program, was appointed as a Graduate Research Fellow at the United States Department of Transportation's Turner-Fairbank Highway Research Center in McLean, Virginia.

Over the years, Dr. Wolshon's research program has grown into an internationally recognized and award winning source of emerging knowledge and technical expertise. His work has led to significant advances in the understanding, analysis, planning, and management of mass evacuations. His work as a researcher and consultant has earned support from numerous federal, state, and local agencies as well as national laboratories and scores of private firms. His research results are frequently cited by both researchers and practitioners and his expertise is highly sought after by news and media organizations throughout the world.

Throughout his career Dr. Wolshon has had a consistently increasing level of leadership positions and professional responsibility. At LSU he served as the Department of Civil Engineering's Coordinator of Undergraduate Programs and, since 2008, as the Director of the *Gulf Coast Center for Evacuation and Transportation Resiliency*. Outside of LSU, he has also served in leadership positions for numerous national organizations and programs, including as the Founding Chair of ABR30 the Transportation Research Board's Committee on Emergency Evacuation and of the biannual *National Evacuation Conference*, several other national conference events, and research journals.





# ***Modeling and Analysis of Evacuations in Megaregions***

***Zhao Zhang – Beihang University, China  
Nelida Herrera, Scott Parr, Katherine Spansel, &  
Brian Wolshon  
Louisiana State University***



***Gulf Coast Center for Evacuation and  
Transportation Resiliency***

***WTS Southwest Region Webinar***

***November 2, 2018***



# **Megaregion-Level Evacuation Research**

## **Need**

- *It has been suggested that emergency response planning is always focused on “fighting the last war”*
- *Today, Federal Interagency Operations Planning (FIOP) focuses on how communities at all levels build, sustain, and deliver the core capabilities within the National Preparedness Goal. This FIOP focuses on “maximum of maximum” conditions while being flexible and adaptable for the full range of threats that face the nation*



# ***Megaregion-Level Evacuation Research***

## **Why?**

- ***Evacuation history of LA and TX shows that demand moves both east and west***
- ***Weather history also shows hurricanes could and have threatened full coastline***
- ***What would that look like?***
- ***What would the traffic look like?***
- ***Could something be done to prepare?***



# **Megaregion-Level Evacuation Research**

## **What have we assessed?**

- ***Travel conditions, including:***
  - *Clearance times*
  - *Travel speeds*
  - *Travel distances*
  - *Areas of congestion*
- ***Effect of traffic management strategies and evacuation phased orders***
- ***Impact of “shadow evacuation”***
- ***Conditions of post-event re-entry***



# ***Megaregion-Level Evacuation Research***

## ***How did we do it?***

***Evacuation traffic simulation model of the entire  
Gulf Coast region from New Orleans to Houston***



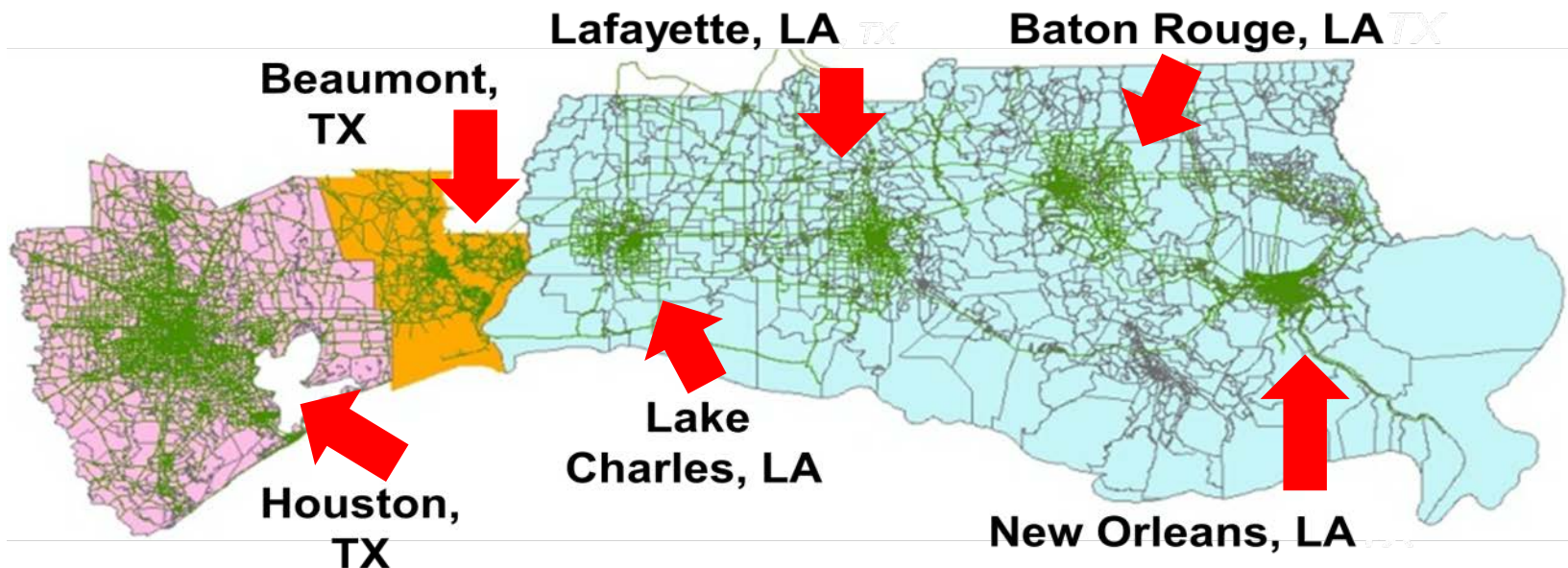
- ***Network topology***
- ***Evacuee behavior***
- ***Travel demand***
- ***Meso-scale simulation***
- ***Quantitative and qualitative output data***
- ***Assess and evaluate***



# Model Development

## *TRANSIMS Simulation System*

*“Base Model” regional road network calibrated to reflect 2005 Hurricane Katrina and 2008 Hurricane Gustav evacuations*

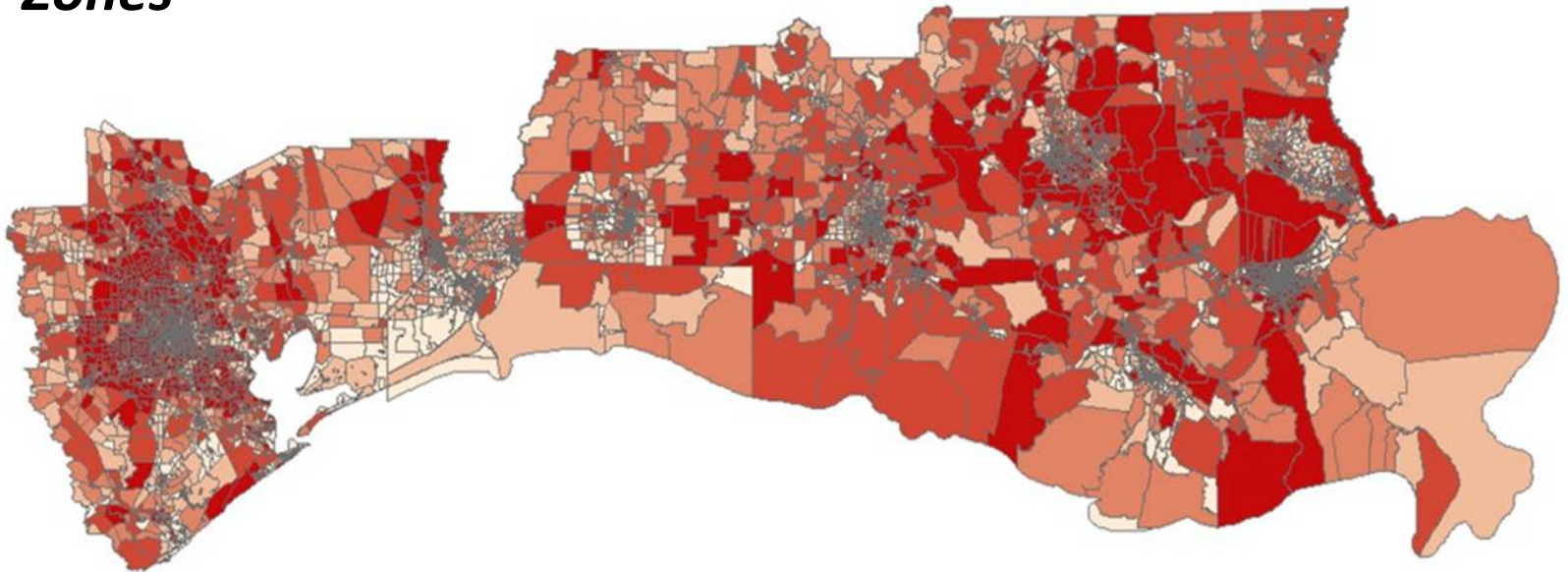




# ***Evacuation Demand***

## ***Forecasting Process***

***An Auto-Based Time Dependent Sequential Logit Model was developed from 2010 US Census Travel Analysis Zones***



***Key Factors: risk level of an area; actions by authorities; type of housing; perception of personal risk; and storm-specific factors***

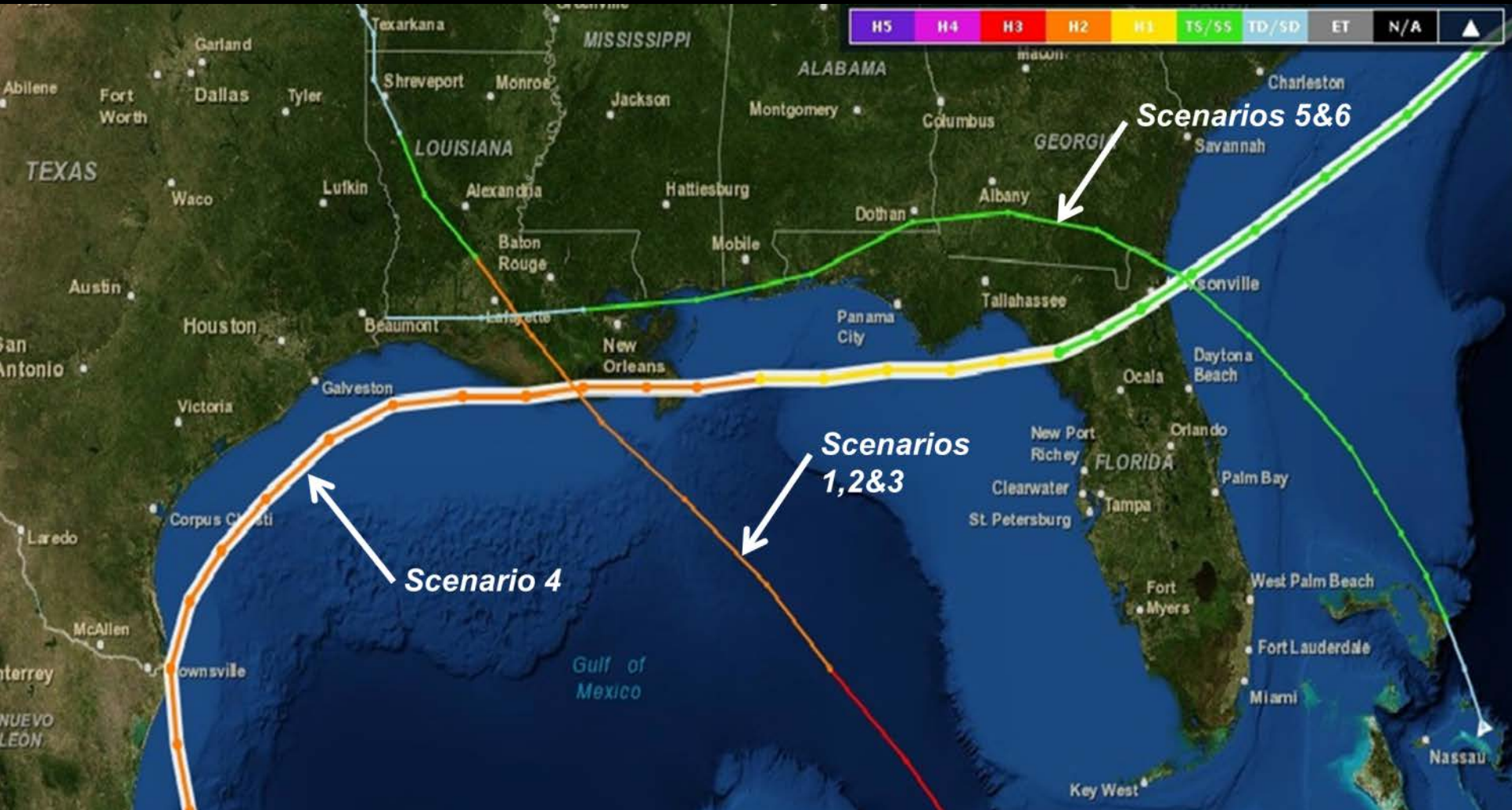
# *Scenario Development*

## *Storm Scenario*

*Based on theoretical hazards-response conditions. Run model for each and extract performance measures*

<b>Scenario 1</b>	<b>Hurricane Gustav in 2008</b>
<b>Scenario 2</b>	<b>Hurricane Gustav increased to Category 4 strength</b>
<b>Scenario 3</b>	<b>Hurricane Gustav increased to Category 5 strength</b>
<b>Scenario 4</b>	<b>Category 4 storm based on an 1867 unnamed hurricane with a forecast uncertainty</b>
<b>Scenario 5</b>	<b>Category 4 storm based on a 1914 unnamed hurricane, traveling east to west with a forecast uncertainty</b>
<b>Scenario 6</b>	<b>A Category 5 version of the Scenario 5 event</b>

# Storm Tracks





# Participation Rates

*Logit model was applied to scenarios to predict the departure locations and times and routing for each metropolitan area*

Scenario	New Orleans	Baton Rouge	Lafayette	Lake Charles	Beaumont	Coast1	Coast2	Houston
1	65.2%	50.2%	41.0%	38.3%	51.5%	96.7%	99.9%	0.0%
2	82.9%	66.2%	56.4%	53.3%	58.2%	100.0%	100.0%	0.0%
3	93.0%	81.2%	72.7%	67.0%	70.5%	97.6%	97.9%	0.0%
4	93.6%	90.7%	76.1%	93.8%	93.8%	86.6%	86.4%	95.5%
5	70.9%	58.1%	50.0%	47.1%	38.7%	56.1%	46.6%	0.0%
6	77.7%	67.2%	60.0%	54.6%	47.6%	62.4%	53.8%	0.0%



# **Results**

## **Evacuation Travel Conditions**

- ***Evacuation participation increased as threat increased***
- ***Departure urgency and participation was larger in Scenario 1 than in Scenario 2***
- ***Average travel distances and speeds were not appreciably different among the scenarios***
- ***Clearance times tended to be shorter on second days, as travel was taking place after initial demand surge***
- ***Network inefficiencies evident in Scenario 4 as routes to the east were underutilized***

Scenario	Time	Total Trips	Tot Vehicle Hours	Tot Vehicle Miles	Ave Travel Time (min)	Ave. Travel Speed (m/h)	Ave. Trip Length (m)	Vehicles Removed	Contraflow Plan
1	Day1	417,808	1,287,164	52,916,443	3:04	51.6	126.7	13,765	Plan1
	Day2	548,878	1,714,707	61,970,935	3:07	48.1	112.8	9,193	
	Total	966,686	3,001,871	114,887,378	3:06	49.9	119.7	22,958	
2	Day1	580,370	2,385,837	74,755,968	4:06	43.1	128.8	103,673	Plan1
	Day2	549,154	1,261,835	56,460,951	2:19	49.0	104.0	10,672	
	Total	1,129,524	3,647,672	131,216,919	3:13	46.1	116.4	114,345	
2	Day1	580,370	2,176,945	74,540,040	3:45	44.7	128.4	77,841	Plan2
	Day2	549,154	1,093,388	57,285,191	2:00	53.7	105.6	21,735	
	Total	1,129,524	3,270,332	131,825,230	2:52	49.2	117.0	99,576	
2	Day1	580,370	2,155,501	75,136,114	3:42	45.7	129.5	60,526	Plan3
	Day2	542,714	1,093,388	57,285,191	2:00	53.7	105.6	21,735	
	Total	1,123,084	3,248,888	132,421,305	2:51	49.7	117.5	82,261	
3	Day1	715,991	2,819,686	87,345,490	4:03	40.6	125.7	97,377	Plan2
	Day2	499,919	945,549	50,033,944	1:54	54.8	100.9	14,289	
	Total	1,215,910	3,765,235	137,379,434	2:58	47.7	113.3	111,666	
3	Day1	715,991	2,853,408	88,190,921	4:06	39.0	126.9	84,895	Plan3
	Day2	499,919	945,549	50,033,944	1:54	54.8	100.9	14,289	
	Total	1,215,910	3,798,957	138,224,865	3:00	46.9	113.9	99,184	
4*	Day1			0	0:00	0.0	0.0		Plan3
	Day2	1,009,552	2,102,544	75,831,492	2:04	48.0	75.1	211,754	
	Total	1,009,552	2,102,544	75,831,492	1:02	48.0	75.1	211,754	
5	Day1	344,280	999,179	48,919,898	2:54	53.2	142.1	22,306	Plan3
	Day2	559,037	1,753,492	77,686,720	3:08	50.7	139.0	125,558	
	Total	903,317	2,752,672	126,606,618	3:01	52.0	140.5	147,864	
6	Day1	551,807	1,696,479	75,854,501	3:04	51.6	137.5	113,855	Plan3
	Day2	660,000	2,174,490	89,863,937	3:19	50	137	237,304	
	Total	1,211,807	3,870,968	165,718,438	3:11	50.7	137.4	351,159	

# Results

## Computational Limitations

*\*Note: Scenario 4 never fully executed full simulation prior to failure*



# **Results**

## **Traffic Management Strategies**

- ***Use of c/f on the second day significantly improved traffic flow under Scenario 1***
- ***Significant improvements from c/f were observed, but incremental benefit diminished over time as demand decreased***
- ***Scenario 3 c/f yielded marginal benefits (even with an additional 8 hrs of use) because system was saturated (ave. travel time, speed, and trip length improved less than one percent)***
- ***Results suggested that Scenario 3 reached system capacity even with c/f***



# Results

## *Impact of “Shadow Evacuation”*

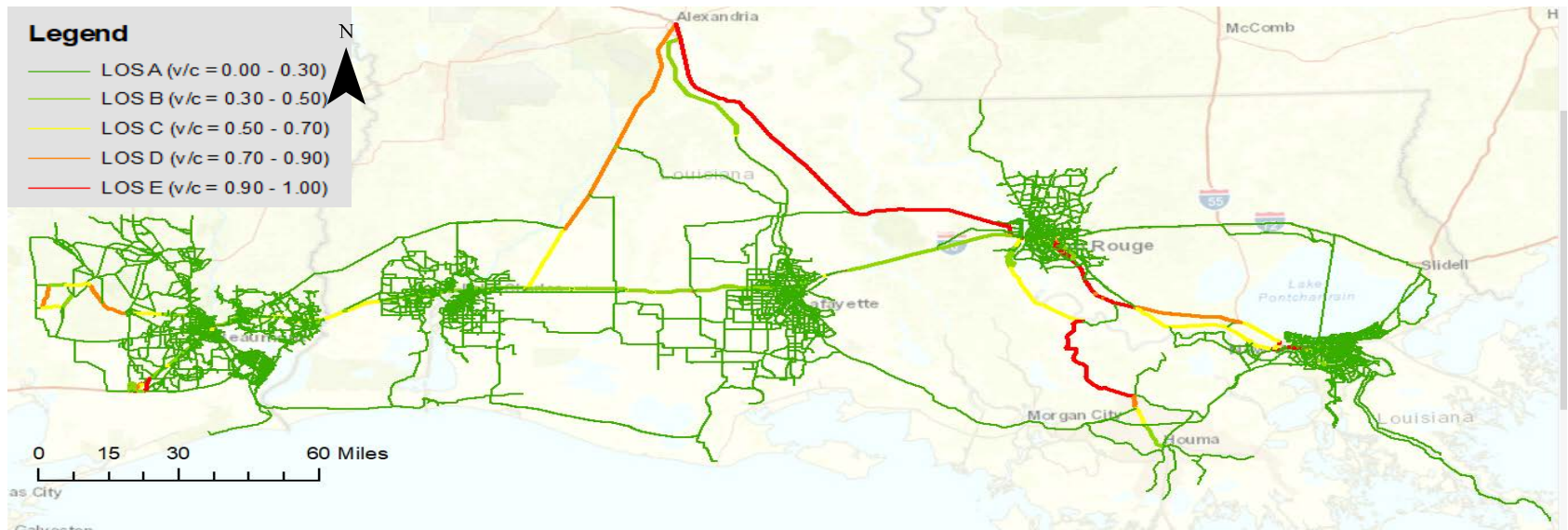
- *Large shadow evacuations can significantly congest networks if they are not able to exit main evacuation critical routes before mandatory evacuees reach them*
- *These delays did not immediately impede the mandatory evacuees*
- *The finding that the 90 and 100 percent clearance times were not impacted does not suggest that no impact had occurred, only that the impact was not felt toward felt by the last 10 percent of evacuees*



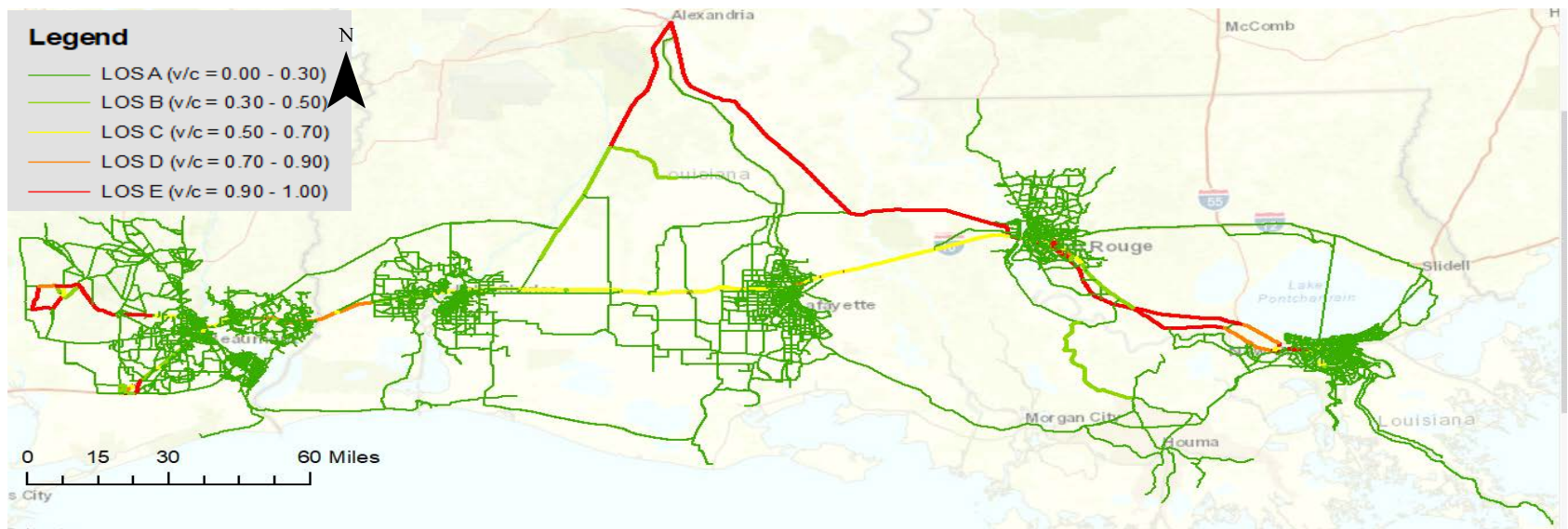
# **Results**

## **Post-Event Re-Entry**

- ***Reentry traffic processes behave similar to, but in the reverse direction, of evacuations***
- ***However, network performance during the reentry process was consistently better than that of the evacuations that created them***
- ***Heterogeneity of the distribution of traffic is a primary factor that determined network performance under all Scenarios***
- ***The more that links are evenly utilized, the more efficient the network operation***



**FIGURE 1 (a) Megaregion Volume to Capacity Ratio and LOS for Scenario 3**



**FIGURE 1 (b) Megaregion Volume to Capacity Ratio and LOS for Scenario 6**



# ***Broad Conclusions***

- ***Demonstrate ability to model megaregion level traffic patterns on a microscopic level***
- ***Demand models can be scaled up and adapted to reflect simultaneous multi-city travel activities***
- ***There are practical limitations of current technology to simulate megaregion-level evacuation (model “crashes” and vehicle removals)***
- ***Adaptable to evaluate other locations with different road networks, populations, transportation assets, and hazard threats***
- ***Of interest to other locations in US and Worldwide***



# ***Questions?***

***Brian Wolshon, Ph.D., P.E.  
Edward A. and Karen Wax Schmitt Distinguished Professor  
Gulf Coast Center for Evacuation & Transportation Resiliency  
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email: [brian@rsip.lsu.edu](mailto:brian@rsip.lsu.edu)***

# WTS Chapter Highlights OKLAHOMA



**WTS SOUTHWEST REGION**

**November 29<sup>th</sup> – Holiday Party & Silent Auction**

<http://www.wtsinternational.org/oklahoma>



# Introducing Amy St. Peter

## WTS SOUTHWEST REGION

Amy St. Peter is the Deputy Executive Director of the Maricopa Association of Governments (MAG), the regional planning agency for the Greater Phoenix region. In this role, she coordinates diverse priorities and perspectives in the development of solutions that strengthen the vitality in one of the fastest growing areas in the country.

Ms. St. Peter earned a Master's of Public Administration degree from Arizona State University in 2004 and graduated cum laude with a Bachelor's degree in Sociology and Writing from Loyola College in 1994. Ms. St. Peter serves on the Arizona Council for Transportation Innovation and the national steering committee for the Rural Age-Friendly Community Network. Her areas of expertise include organizational development, economic development, aging, transportation, and civil rights.

MAG is the council of governments and metropolitan planning organization for an area greater than 10,000 square miles and 4.1 million people. The agency conducts regional planning in the areas of transportation, environmental quality, economic development, socioeconomic data analysis and visualization, and human services.

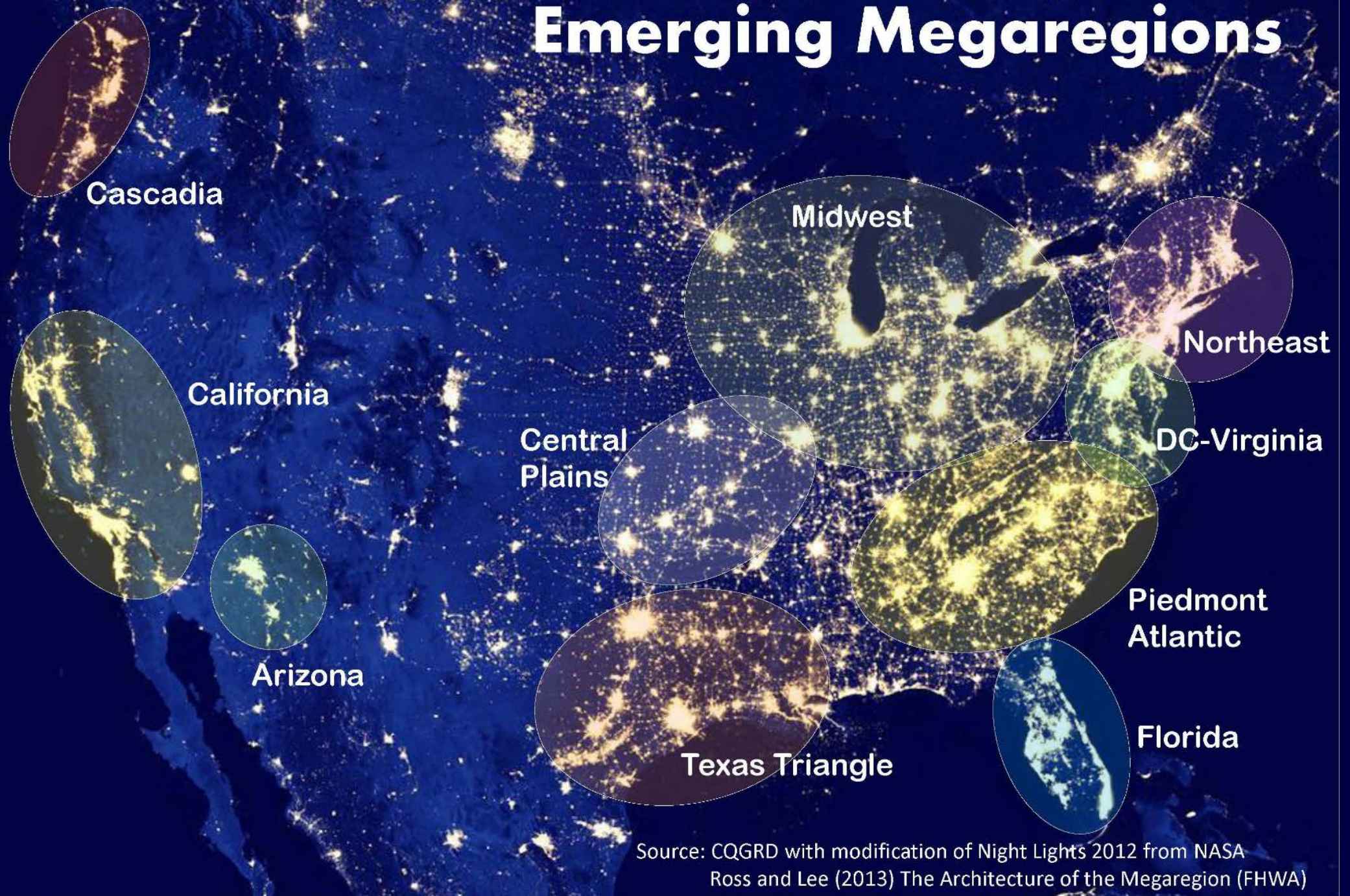




# Partnering for Impact in Arizona's Sun Corridor

Amy St. Peter, MPA  
Deputy Executive Director  
Maricopa Association of Governments

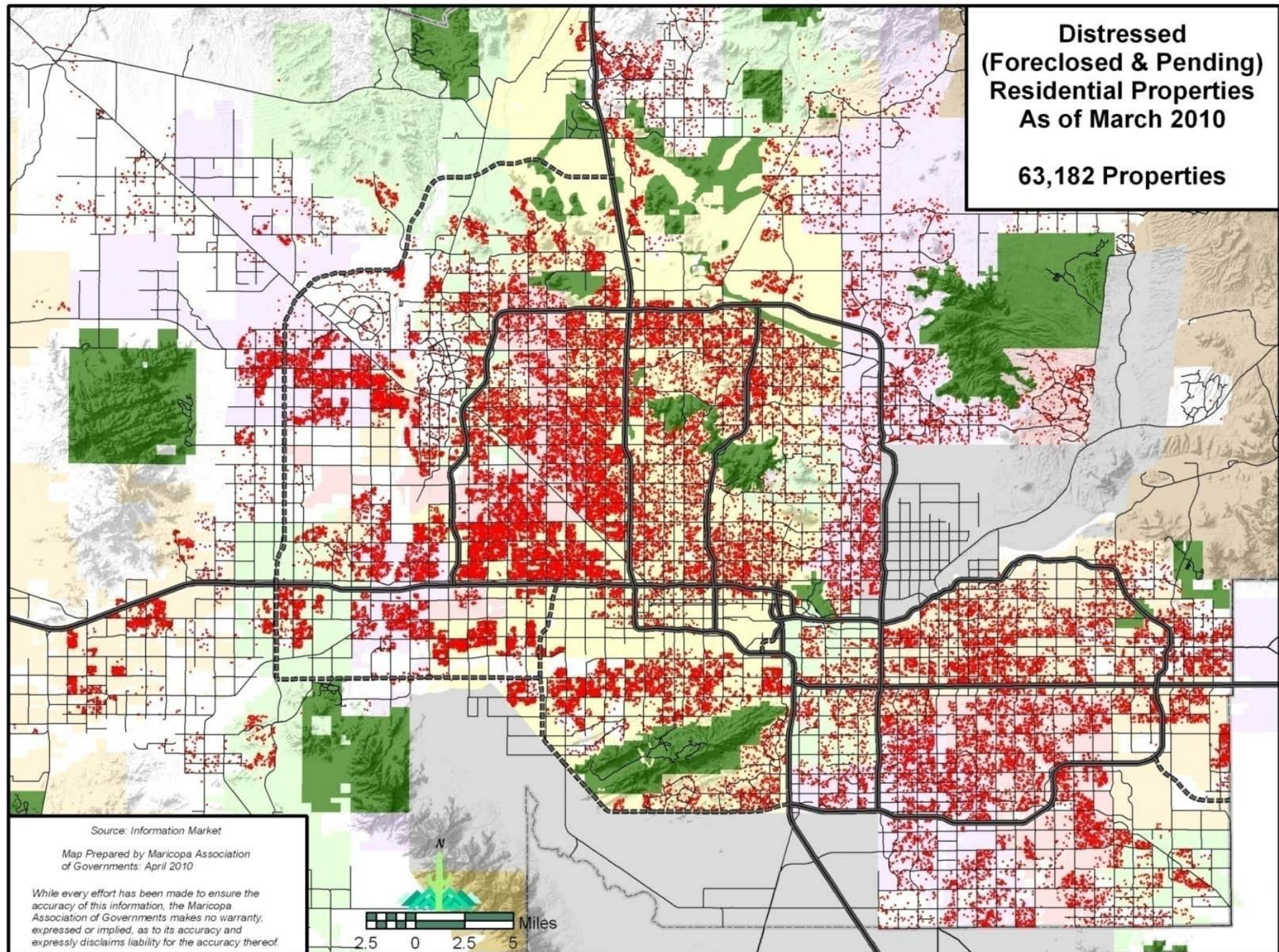
# Emerging Megaregions



Source: CQGRD with modification of Night Lights 2012 from NASA  
Ross and Lee (2013) The Architecture of the Megaregion (FHWA)

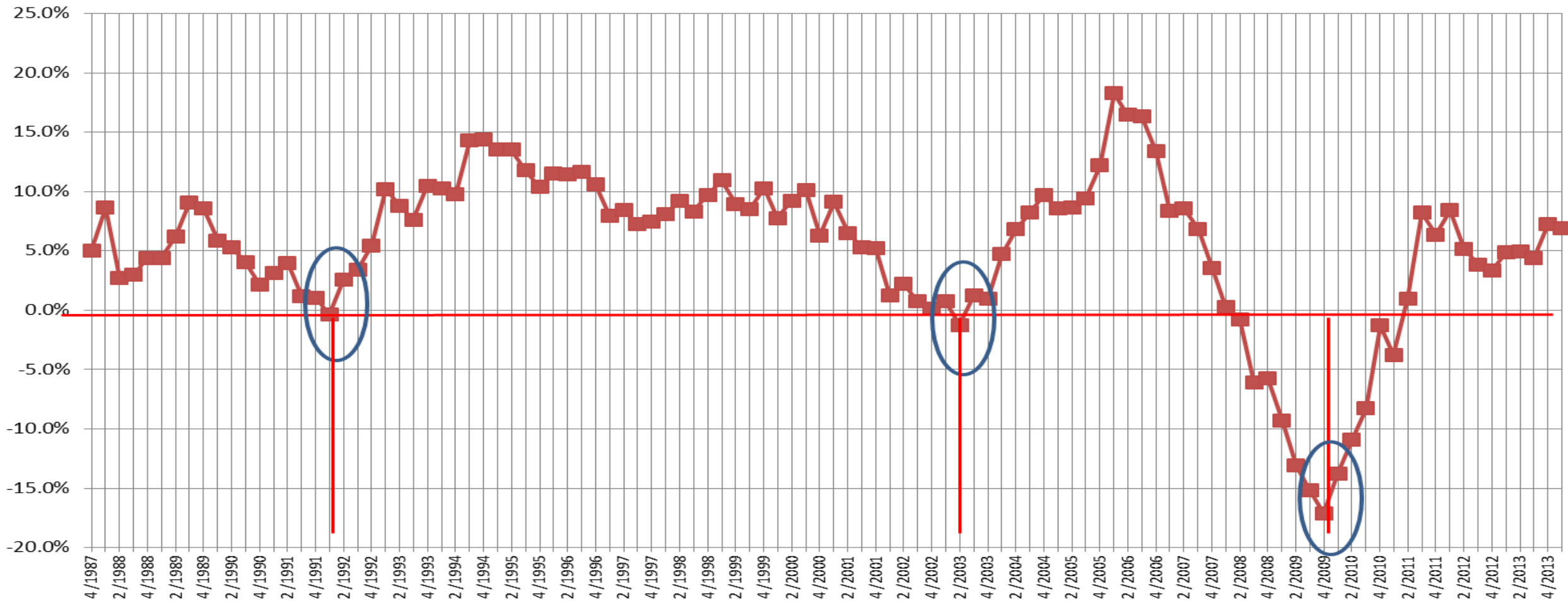
# Distressed Residential Properties: March 2010

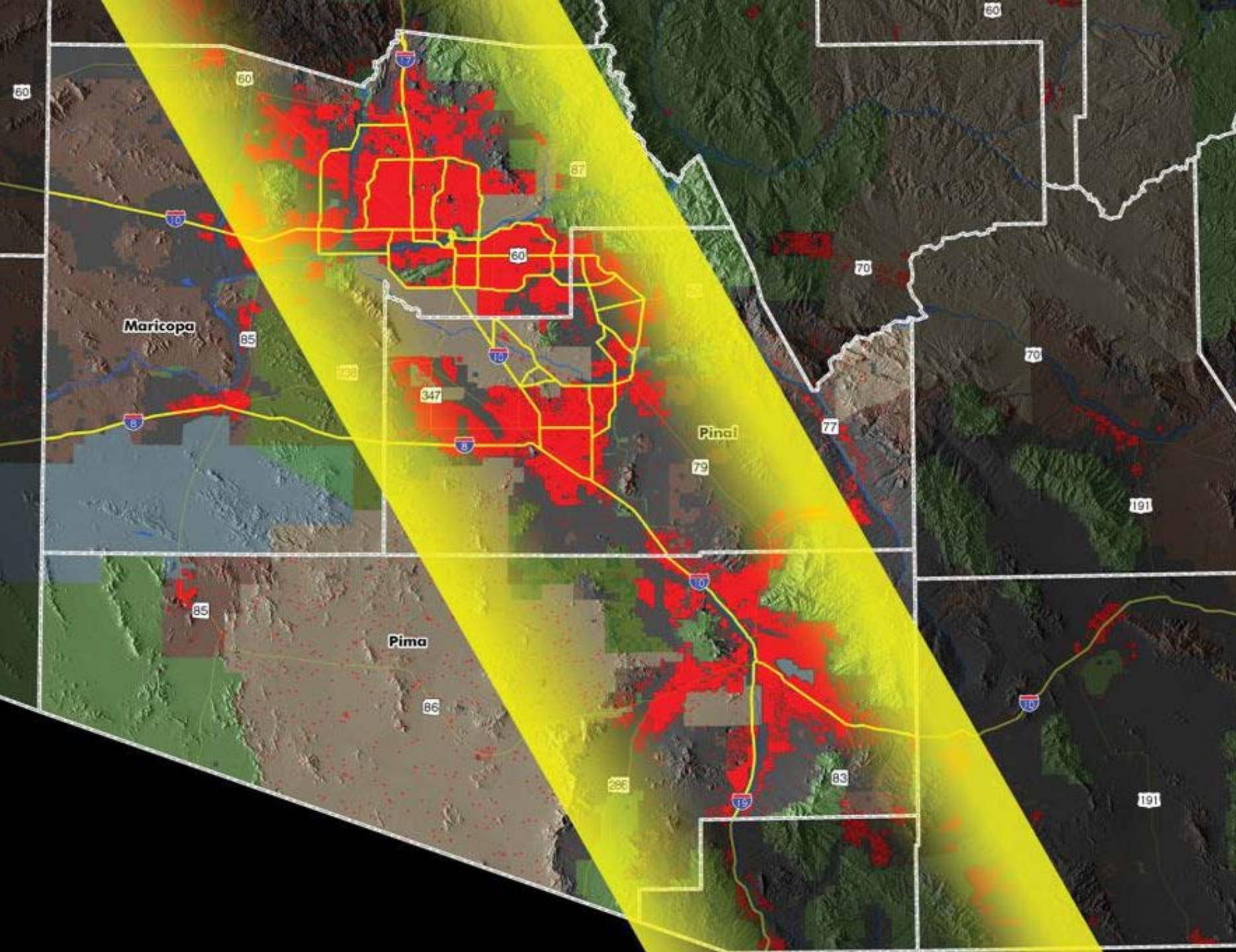
## Second Worst in the Country



# Annual Percentage Change in Quarterly Transportation Sales Tax Revenues

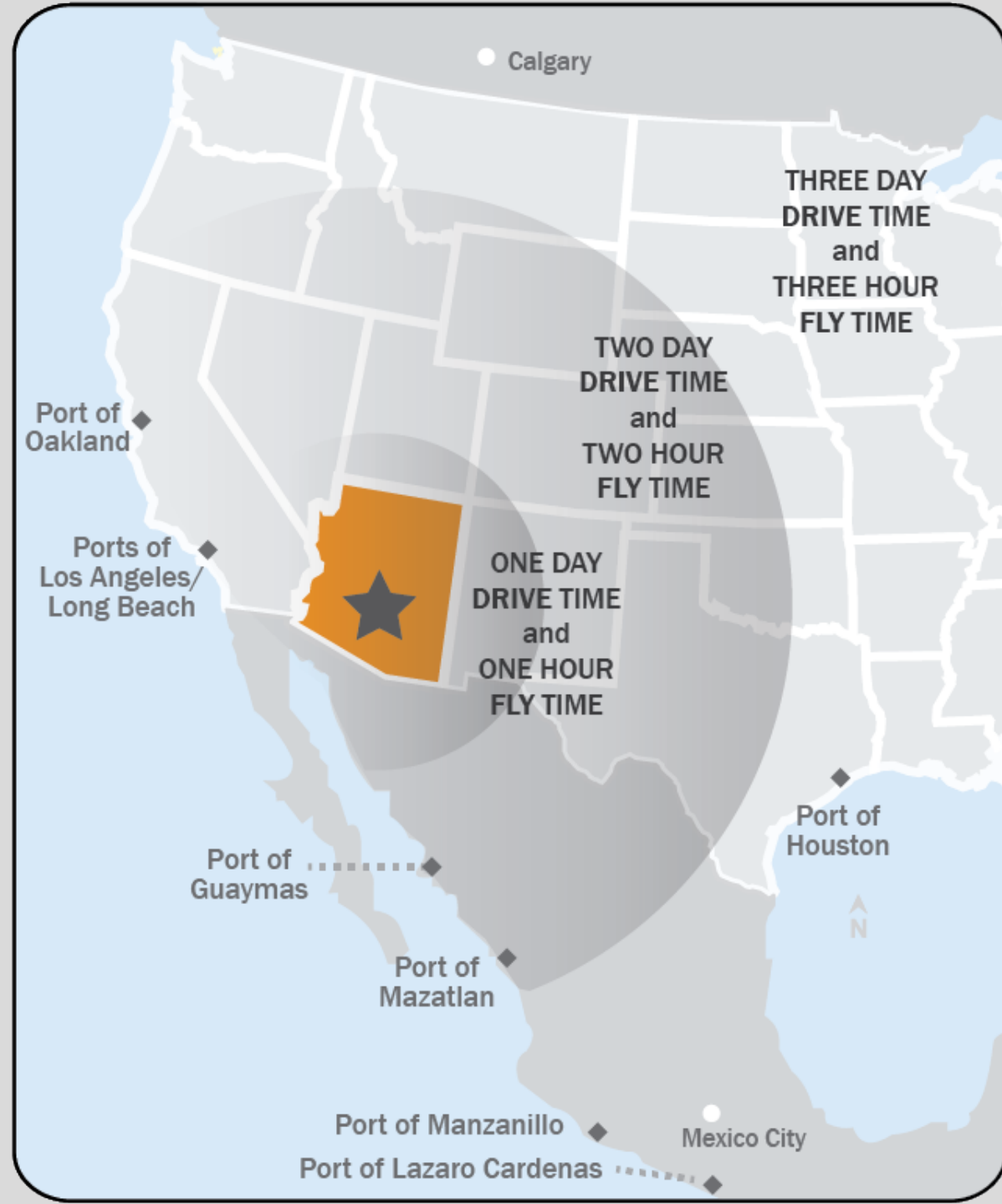
Fiscal Year Quarter / Same Quarter Previous Fiscal Year






**84%**  
population

**87%**  
tax base



## Sun Corridor:

- Strategic access to key markets.
- Close proximity to major economies.
- Top ten consumer markets in country.



## Examples of Megaregion Initiatives:

- University Memorandum of Understanding
- Joint Planning Advisory Council
- Economic Development for the Global Economy
- Ari-Son
- Sun Cloud Data Portal





**Joint Planning Advisory Council  
Connects Partners in the Sun Corridor.**



# SUN CORRIDOR edge

Economic Development for the Global Economy

Exporting drives the megaregion economy

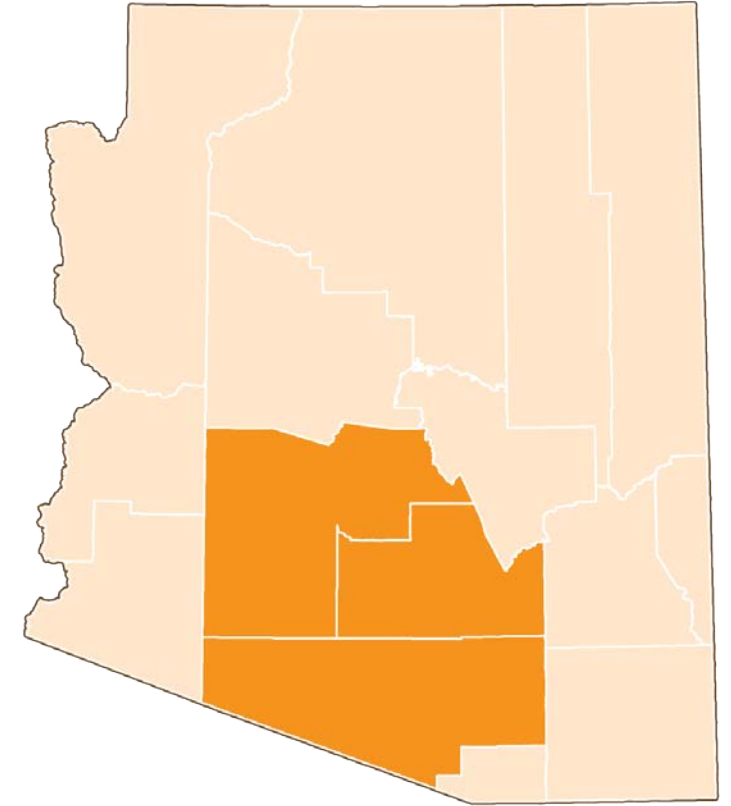
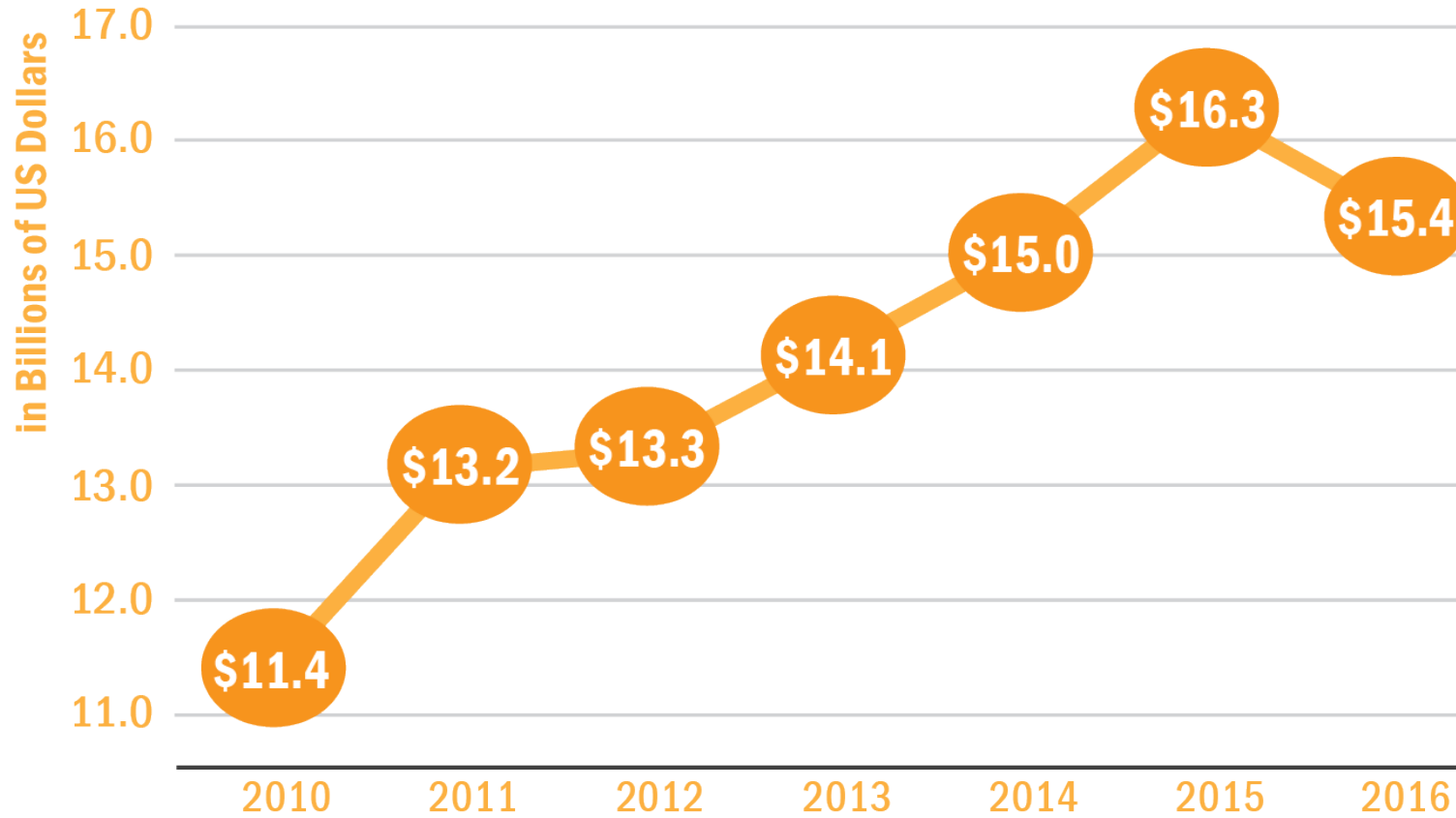


Joint Planning Advisory Council Partners



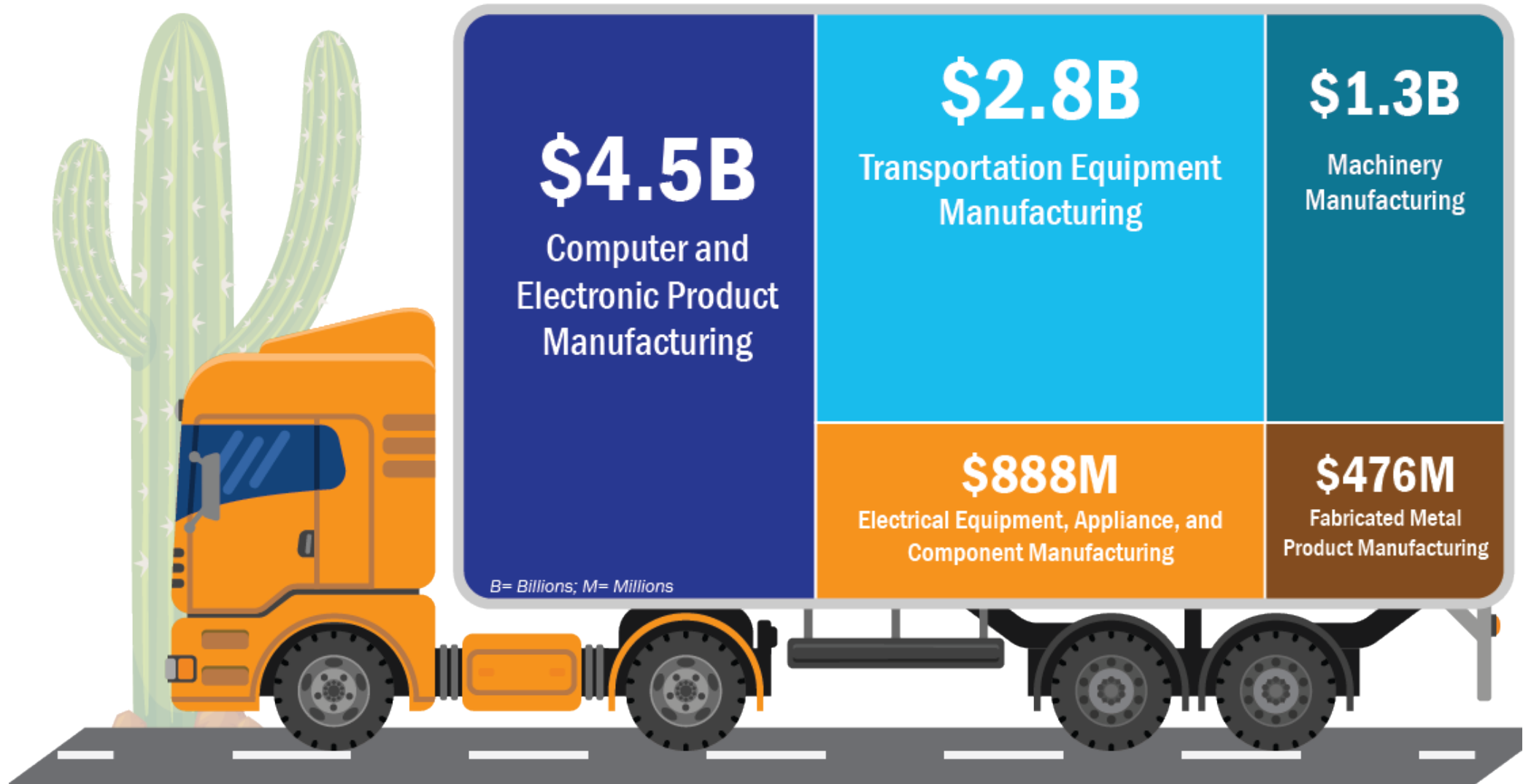
Sun Corridor Export Recognition Program Partners

## Sun Corridor Total Exports by Year (Billions of Dollars)



Source: International Trade Administration

# Top 5 Exports from the Sun Corridor



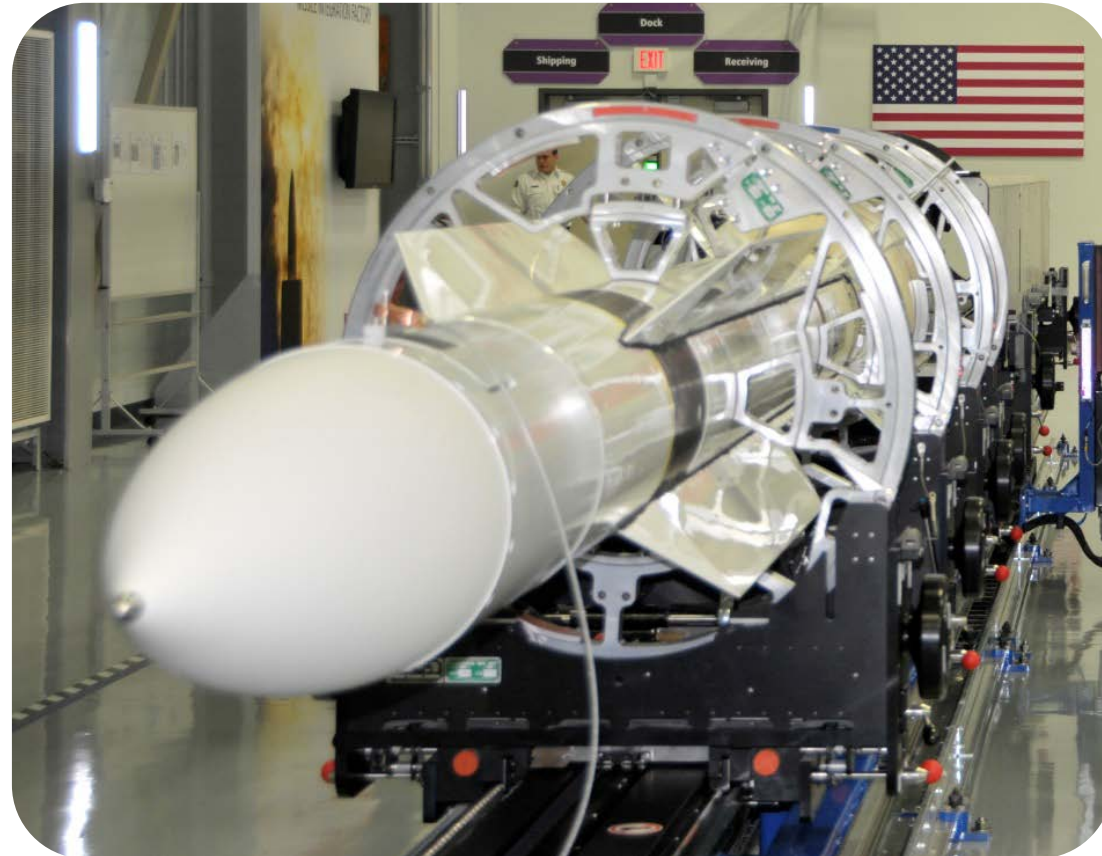
# What is an export?



# What is an export?



# What is an export?



# What is an export?



# What is an export?





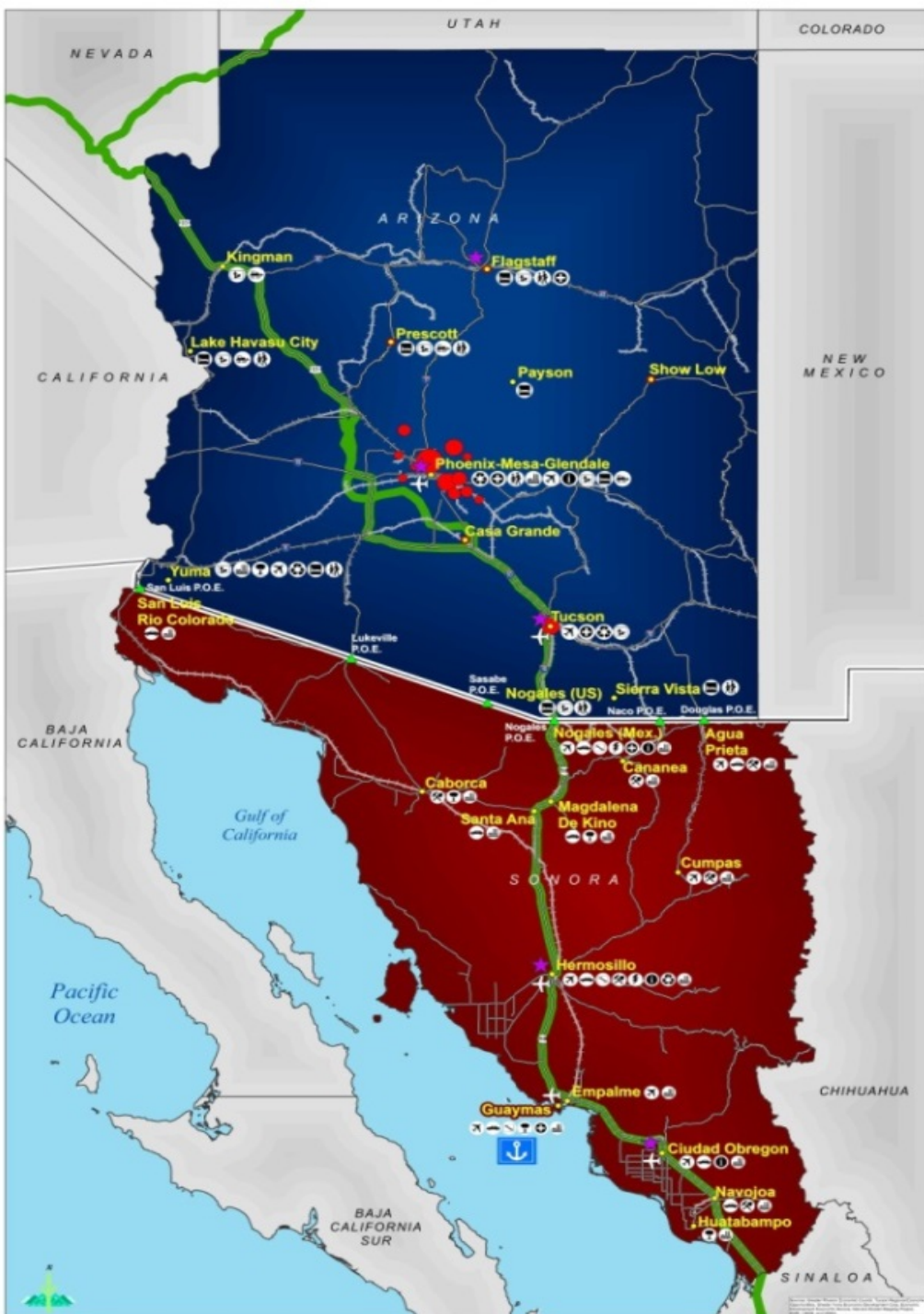
# ARI-SON MEGAREGION

Population: 9,781,401

Mexico:  
Arizona's Top Trading Partner

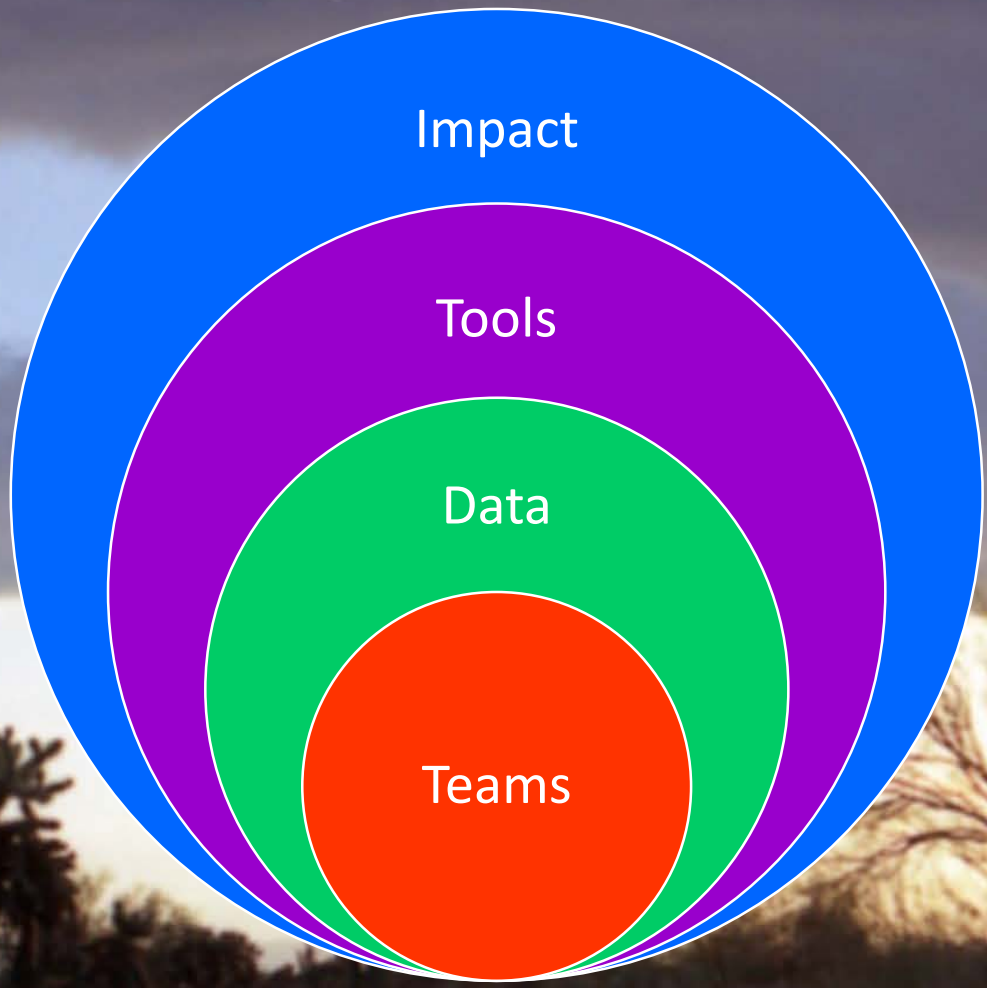
AZ Exports \$8.3 Billion

AZ Imports \$7.5 Billion









Elements of Sun Cloud

**ADOT**

**MARICOPA ASSOCIATION of GOVERNMENTS**

**PAG**  
Pima Association of Governments

**SunCorridor**  
Metropolitan Planning Organization

**MPO**  
Sierra Vista Metropolitan Planning Organization

**SEAGO**

**ARIZONA**  
COMMERCE AUTHORITY



15<sup>th</sup>  
largest  
economy

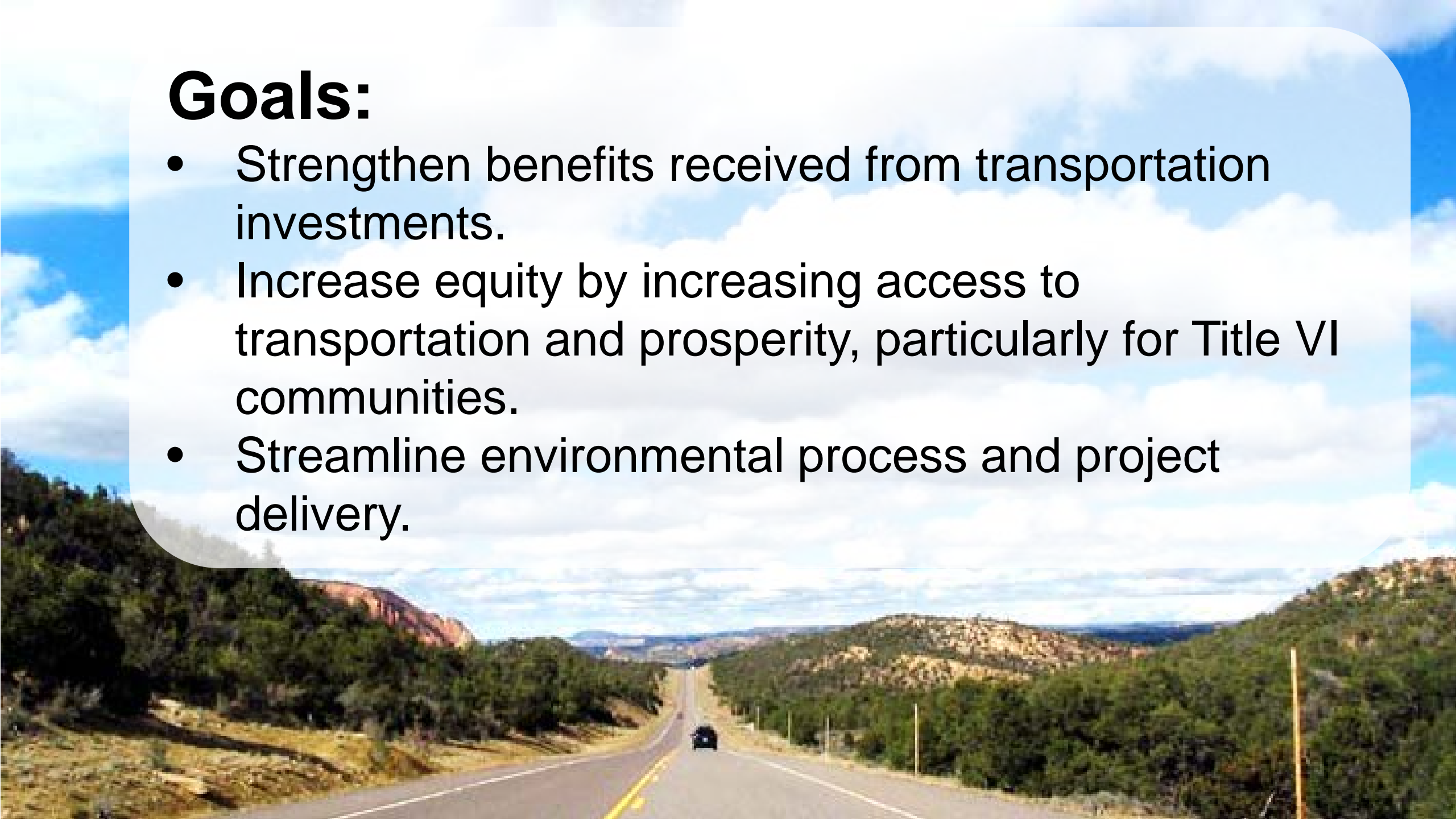
\$15.8  
billion

# Infrastructure Matters



# Goals:

- Strengthen benefits received from transportation investments.
- Increase equity by increasing access to transportation and prosperity, particularly for Title VI communities.
- Streamline environmental process and project delivery.



# Impact

- One megaregion data portal with statewide elements.
- Shared protocols to share and analyze high quality, consistent data.
- Streamlined project identification and delivery.
- A framework to begin developing a statewide unified transportation plan.
- Improved collaboration and assessment of collective impact.



# Lessons from the Sun Corridor

- Respect differences.
- Build bridges.
- Add value.
- Stay active.

# Megaregion Benefits

- Better vehicle for coordination.
- More globally competitive and prosperous.
- Increased grant funding and business attraction.
- More economic diplomacy.
- Higher quality data and analysis.
- Stronger relationships.

An aerial night photograph of a city, showing a dense grid of streets and buildings illuminated by warm yellow and white lights. The lights create a glowing pattern against the dark background of the city.

For More Information

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[astpeter@azmag.gov](mailto:astpeter@azmag.gov)

[www.azmag.gov](http://www.azmag.gov)

## **QUESTIONS AND ANSWERS**

**To avoid background noise, please submit questions to the chat box and our hosts will field them while we have time.**

**Please complete our brief survey – we want your feedback!**

<http://www.wtsinternational.org>

# Thank You



**WTS SOUTHWEST REGION**

**To all of our speakers**

**And to our technical sponsor:**



**We hope you have enjoyed our presentation and thank you for your participation.**

<http://www.wtsinternational.org>

