Center for Accelerating Innovation

U.S. Department of Transportation
Federal Highway Administration

On-Ramp to Innovation
every day counts





# Reducing Rural Roadway Departures

## Every Day Counts Round 5

# The Rural RwD Component of Fatalities

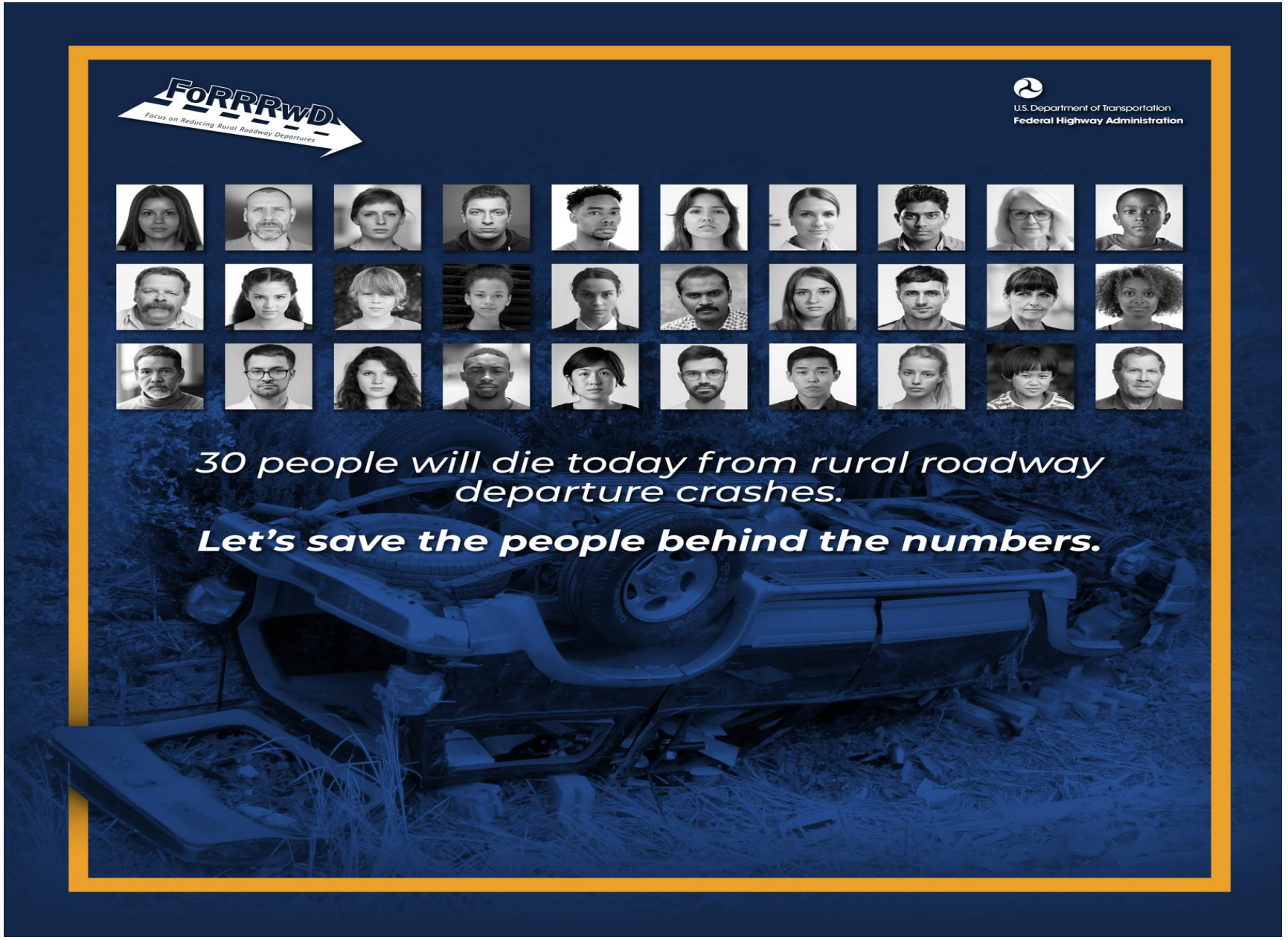

## What is a Roadway Departure (RwD)?

FHWA Definition: A crash in which a vehicle crosses an edge line, a center line, or otherwise leaves the traveled way.

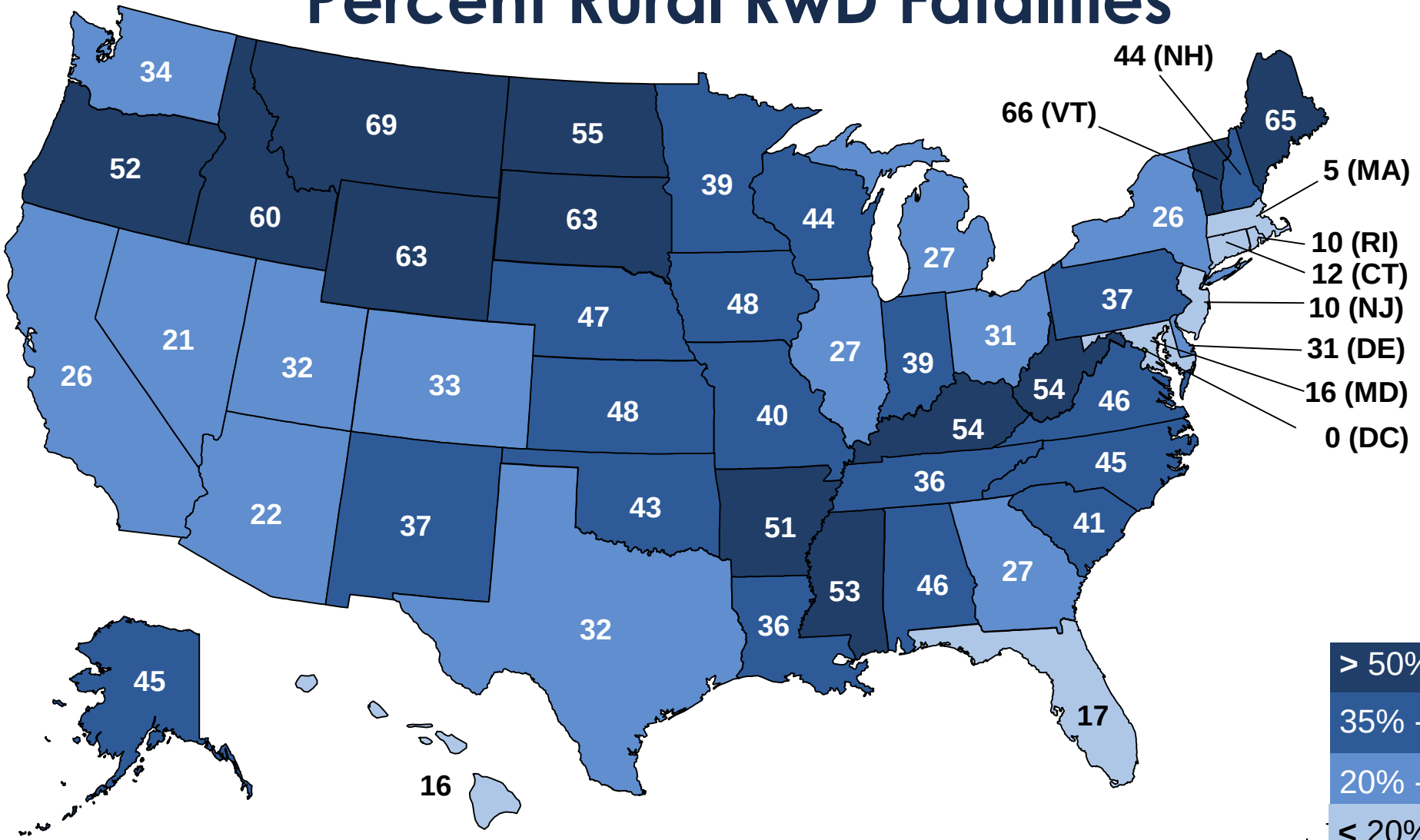

Photo credit: Oregon State Police



Source: NHTSA FARS (2014 – 2016 Annual Average)


FoRRRwD
Focus on Reducing Rural Roadway Departures
U.S. Department of Transportation
Federal Highway Administration
30 people will die today from rural roadway departure crashes.
Let's save the people behind the numbers.

# Percent Rural RwD Fatalities

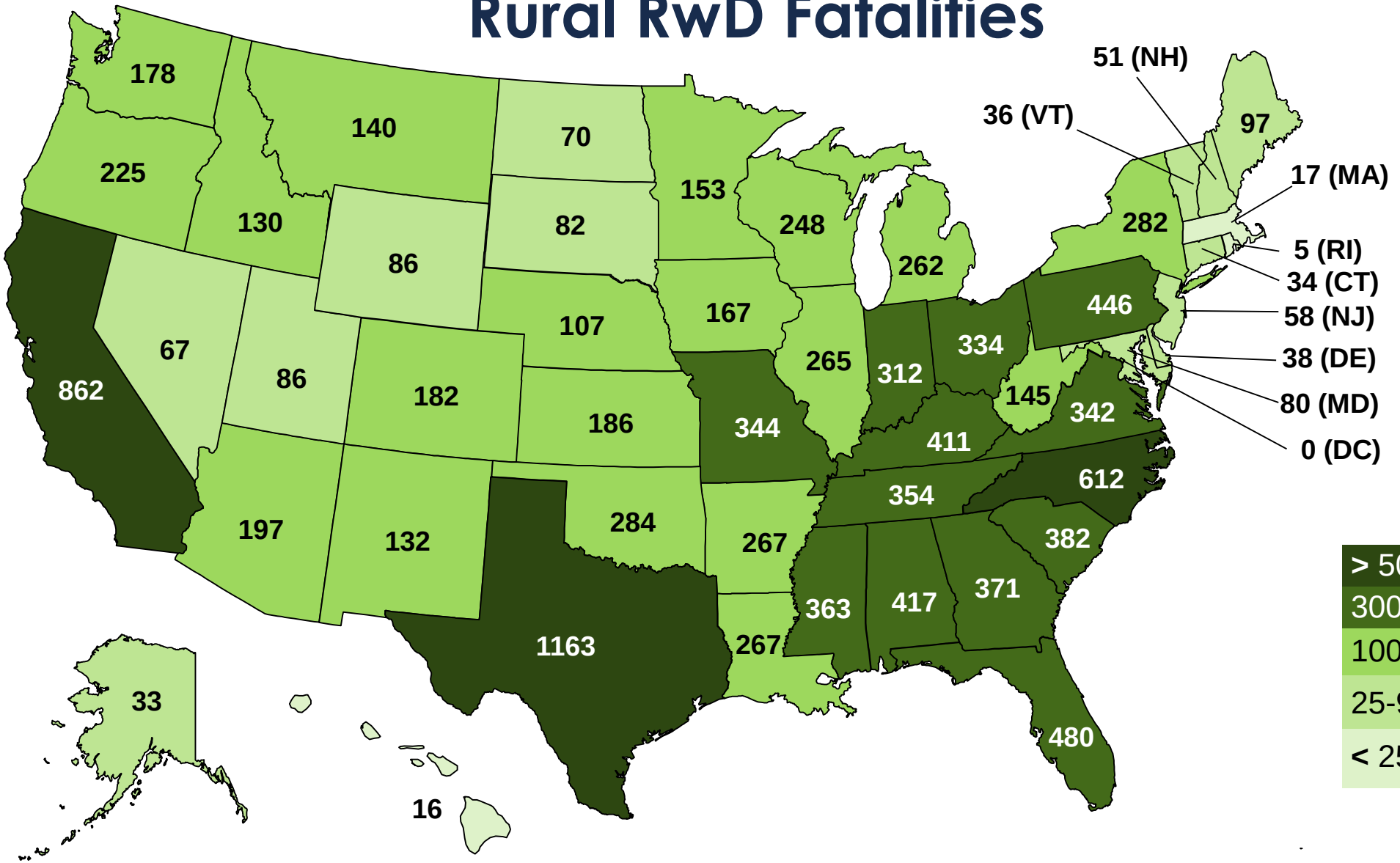



| |
|---|
| > 50% |
| 35% - 50% |
| 20% - 34% |
| < 20% average |

2014-2016 Annual Average of Rural Roadway Departures

Source: FARS

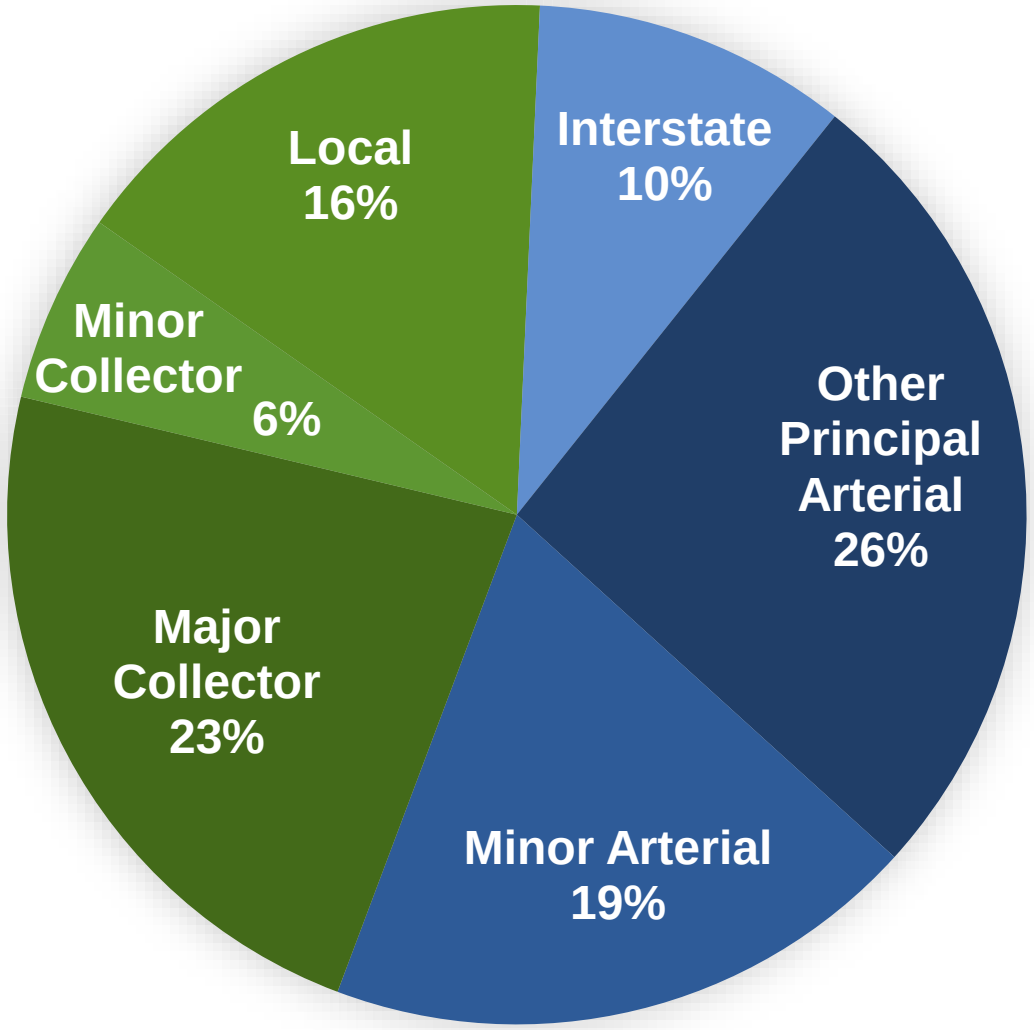
# Rural RwD Fatalities




2014-2016 Annual Average of Rural Roadway Departures

Source: FARS

# Where do rural roadway departures occur?



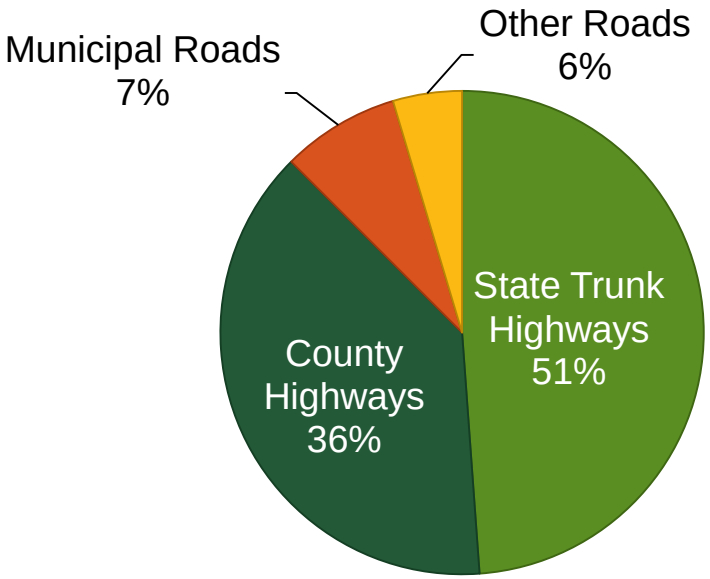

NACE estimates that 40-60% of fatalities occur on roads under local jurisdiction.

2014-2016 Annual Average of Rural Roadway Departures

Source: FARS

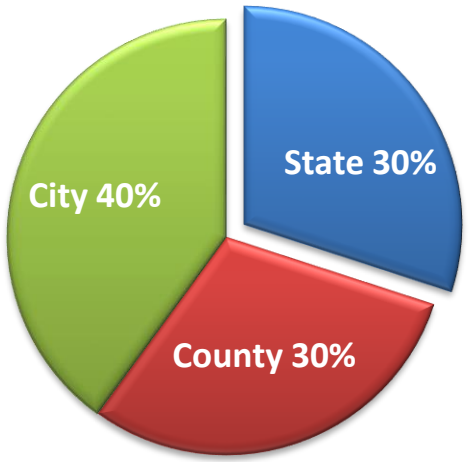
# Funding for Local Agencies

**2015 Fatalities by Roadway in Minnesota**




**50% of HSIP provided to Local Agencies**

**Percent Fatal & Serious Collisions in Washington State**




**70% of HSIP provided to Local Agencies**

- Several states , like Washington and Minnesota, allocate HSIP funding based on crash frequency
- Other fund sources (state, local, tribal) may also be available
- Development of Local Road Safety Plans helps prioritize these investments
- States can also streamline the process for projects that were in the plans
- Counties have found efficiency in bundling projects across county lines

# Focusing on Reducing Rural Roadway Departures (FoRRRwD)

**Mission** - Reduce the potential for serious injury and fatal roadway departure crashes on **all public rural roads** by increasing the systemic deployment of proven countermeasures.

# Priority States based on STIC-Reported Baseline and Goals

| Implementation Stage | Leap (advance 2+ stages) | | | | | Jump (advance 1 stage) | | | Crawl (same stage) |
|---|---|---|---|---|---|---|---|---|---|
| Institutionalized | | TX 1 | | | KY 1 | | | CA, CO, DE, IA, IL, MT, SD, VT, WV 4 | MI, MN, NC, OH, OR, RI, SC, TN, WY 5 |
| Assessment | | | | AK 1 | | | AZ, FL, GA, ID, IN, LA, ME, UT, VA, WA 3 | | KS, PA, PR 5 |
| Demonstration | MA 1 | | FLH 1 | | | AL, CT, MO, MS, NH, NJ, NY, OK 2 | | | ND, AR 5 |
| Development | | | | | | | | | HI 5 |
| Not Implementing | | | | | | | | | DC, MD, NE, NM, NV, WI, VI 5 |

**Priority indicted by numbers shown and based on interest in advancing the initiative**

Stages determined by self-assessment of STICs

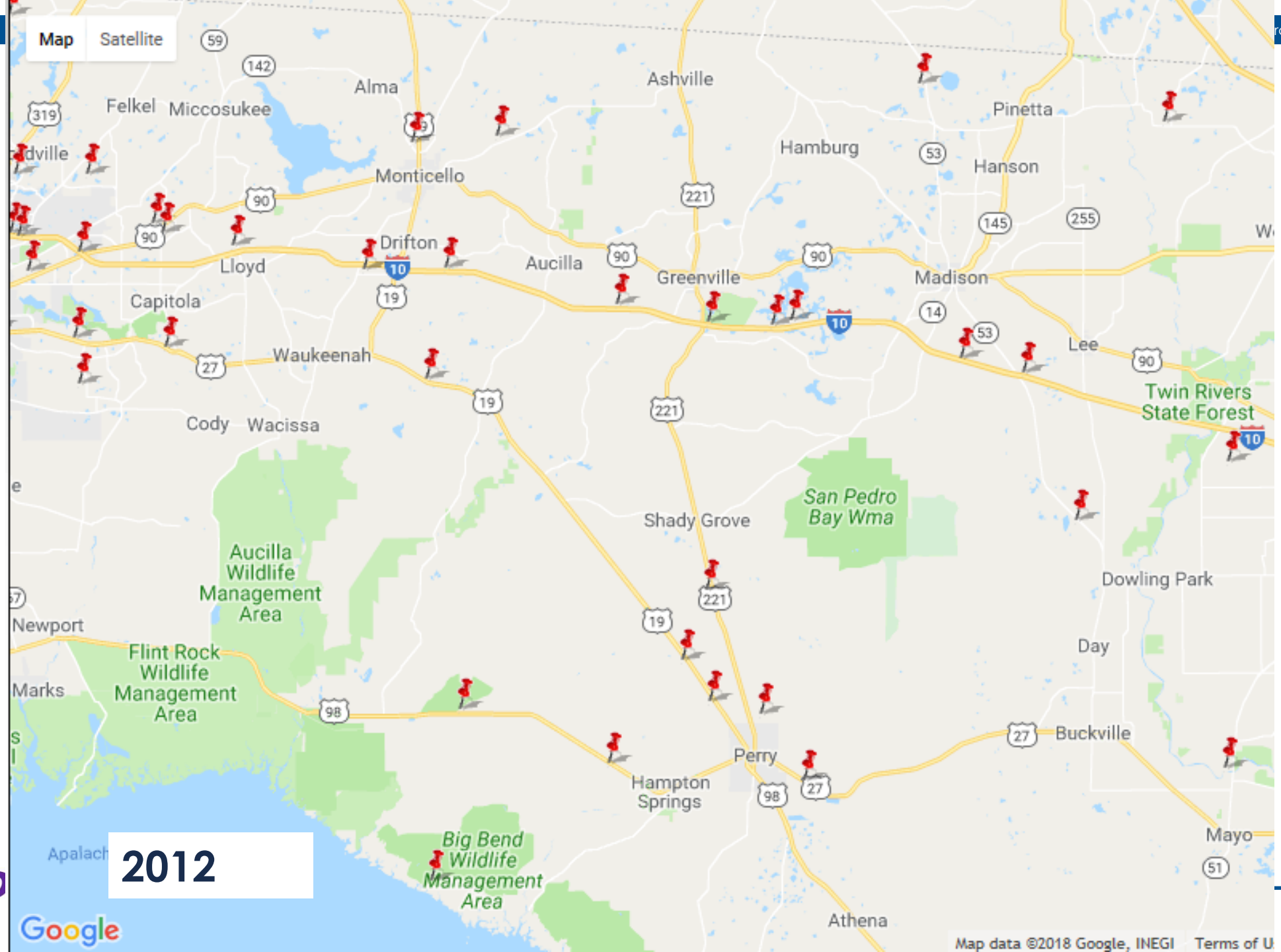
# Why do drivers leave the roadway?

Roadway Condition

Vehicle Component Failure

Collision Avoidance

**Driver Error**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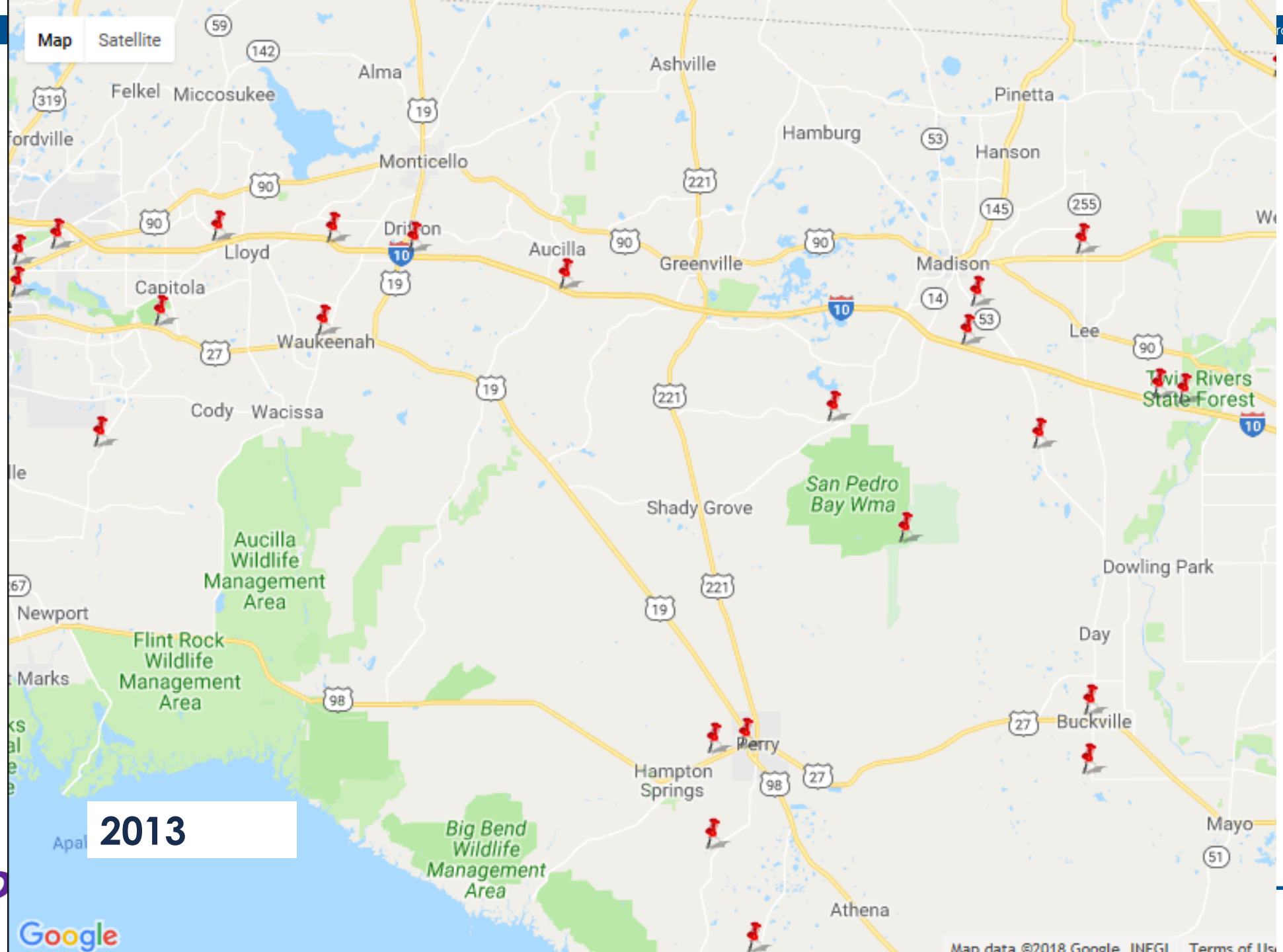
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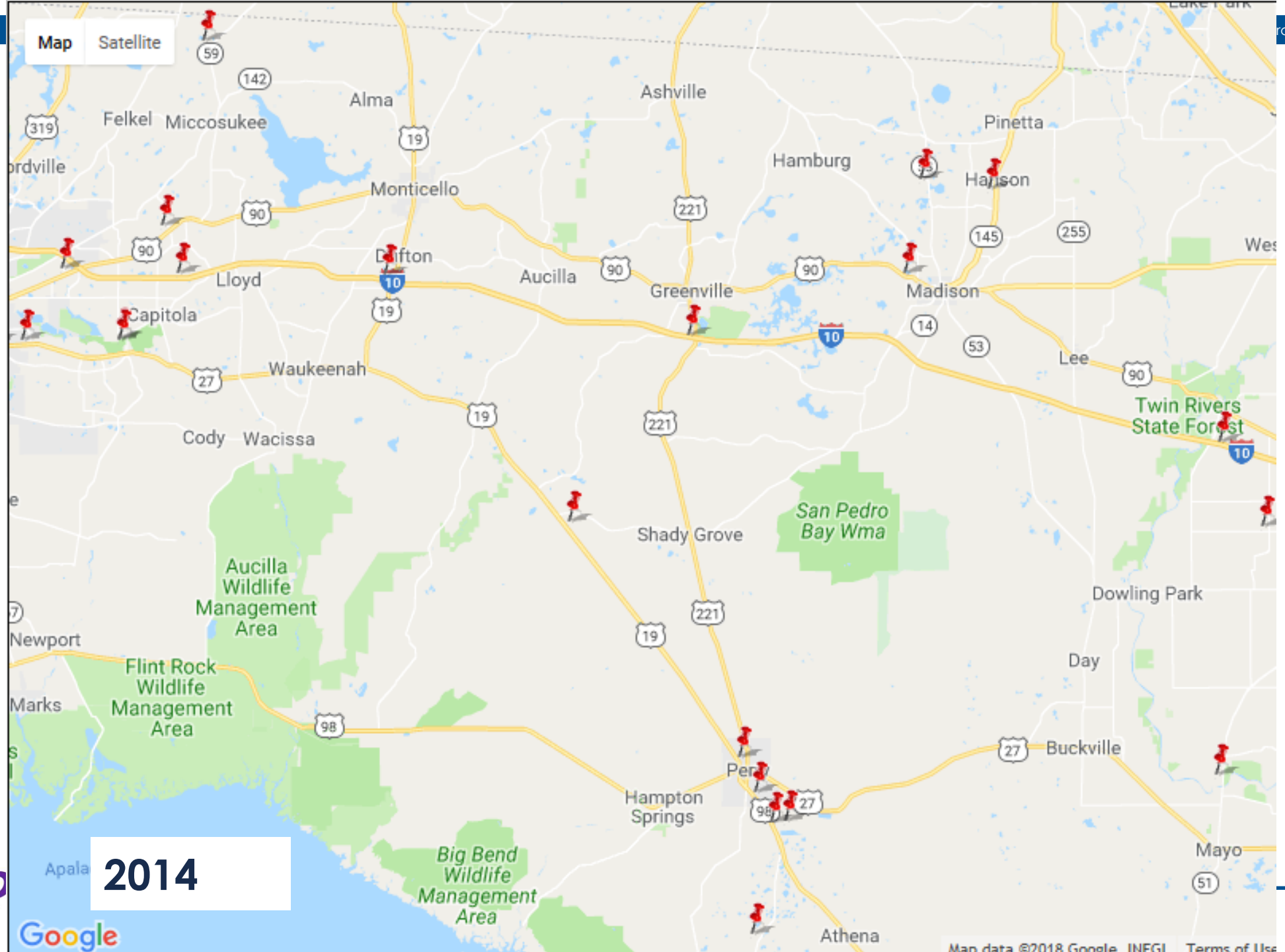
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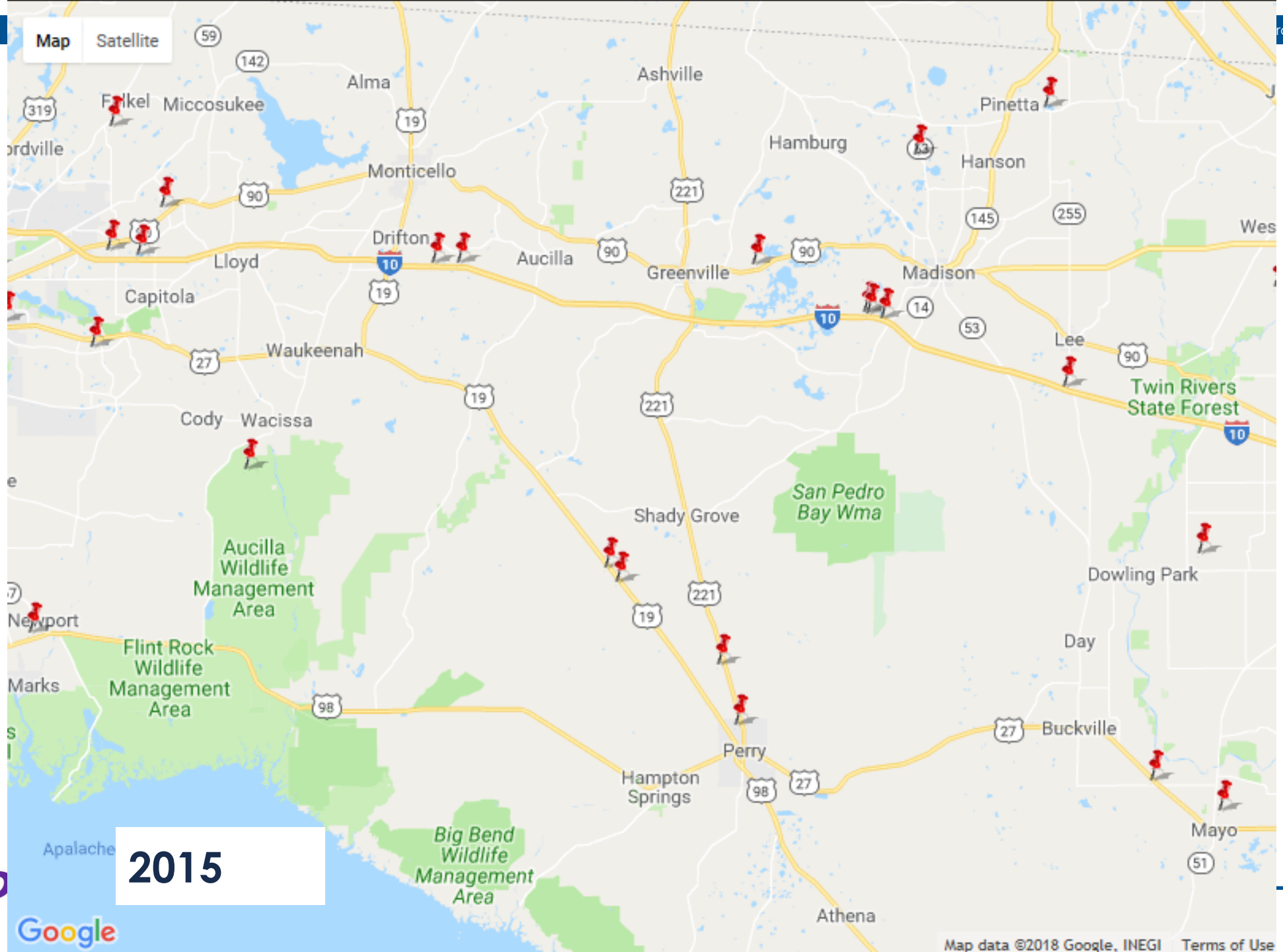
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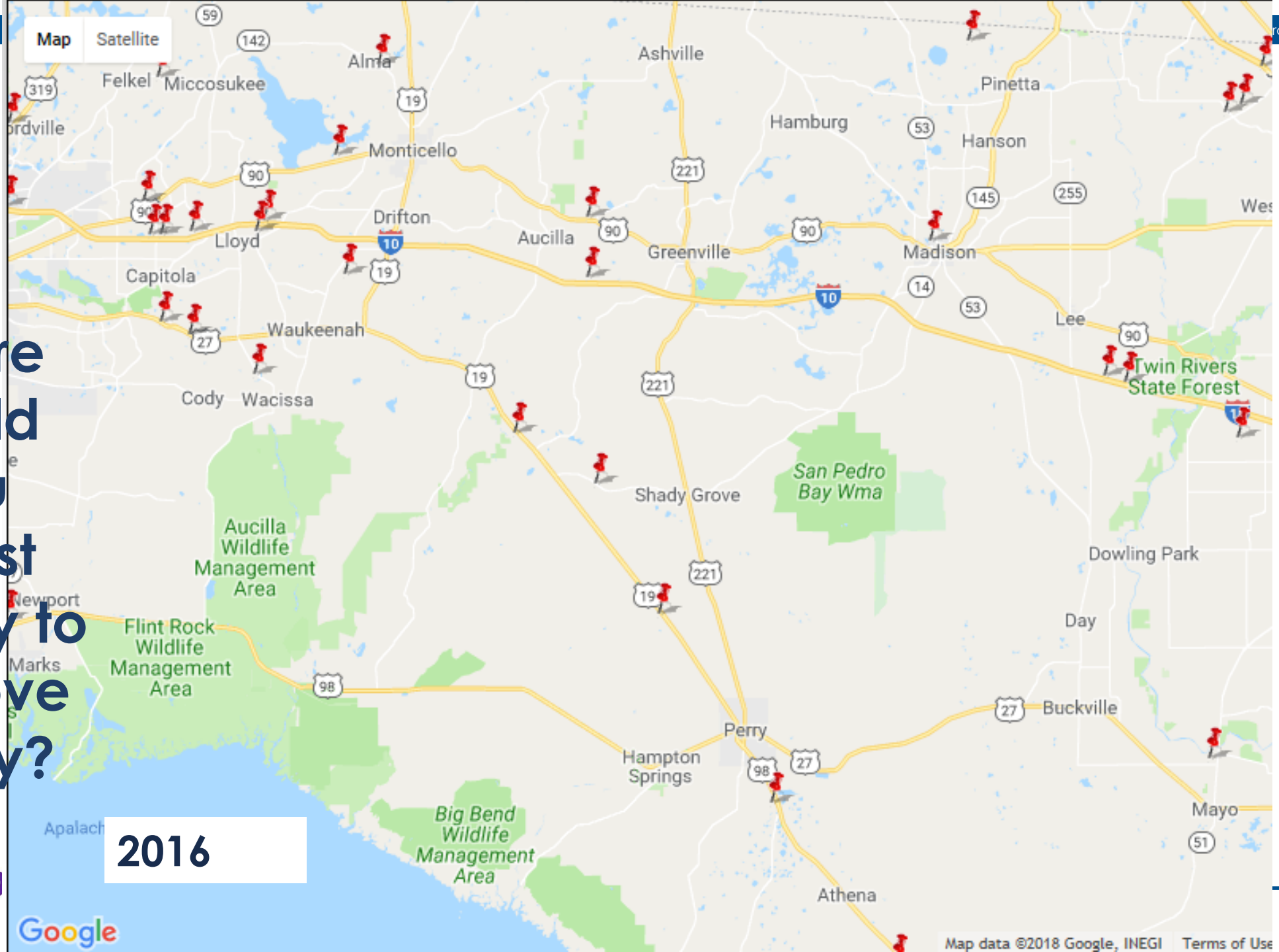
# Where would you invest money to improve safety?



# Fatal Crash Types in Florida

## Most Harmful Event

| | 2012 |
|---|---|
| Motor Vehicle In-Transport | 815 |
| Rollover/Overturn | 379 |
| Tree (Standing Only) | 236 |
| Pole/Sign Support | 96 |
| Traffic Barrier | 60 |
| Fire/Explosion | 47 |
| Fell/Jumped from Vehicle | 34 |
| Immersion or Partial Immersion | 28 |

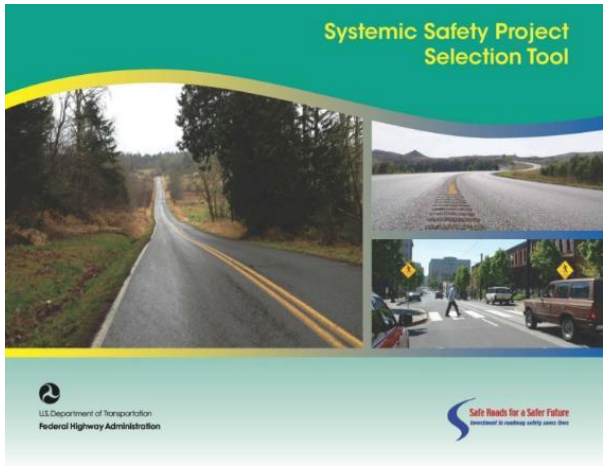

fatal crash locations
are
random


fatal crash
types are
predictable

# Systemic Safety Improvements

**Systemic**

- Based on Risk
- Correlated with particular severe crash types




"Systemic safety improvement" means an improvement that is widely implemented based on **high-risk roadway features** that are correlated with **particular crash types, rather than crash frequency.**
— 23 USC 148 (a)(12) Systemic safety improvement.

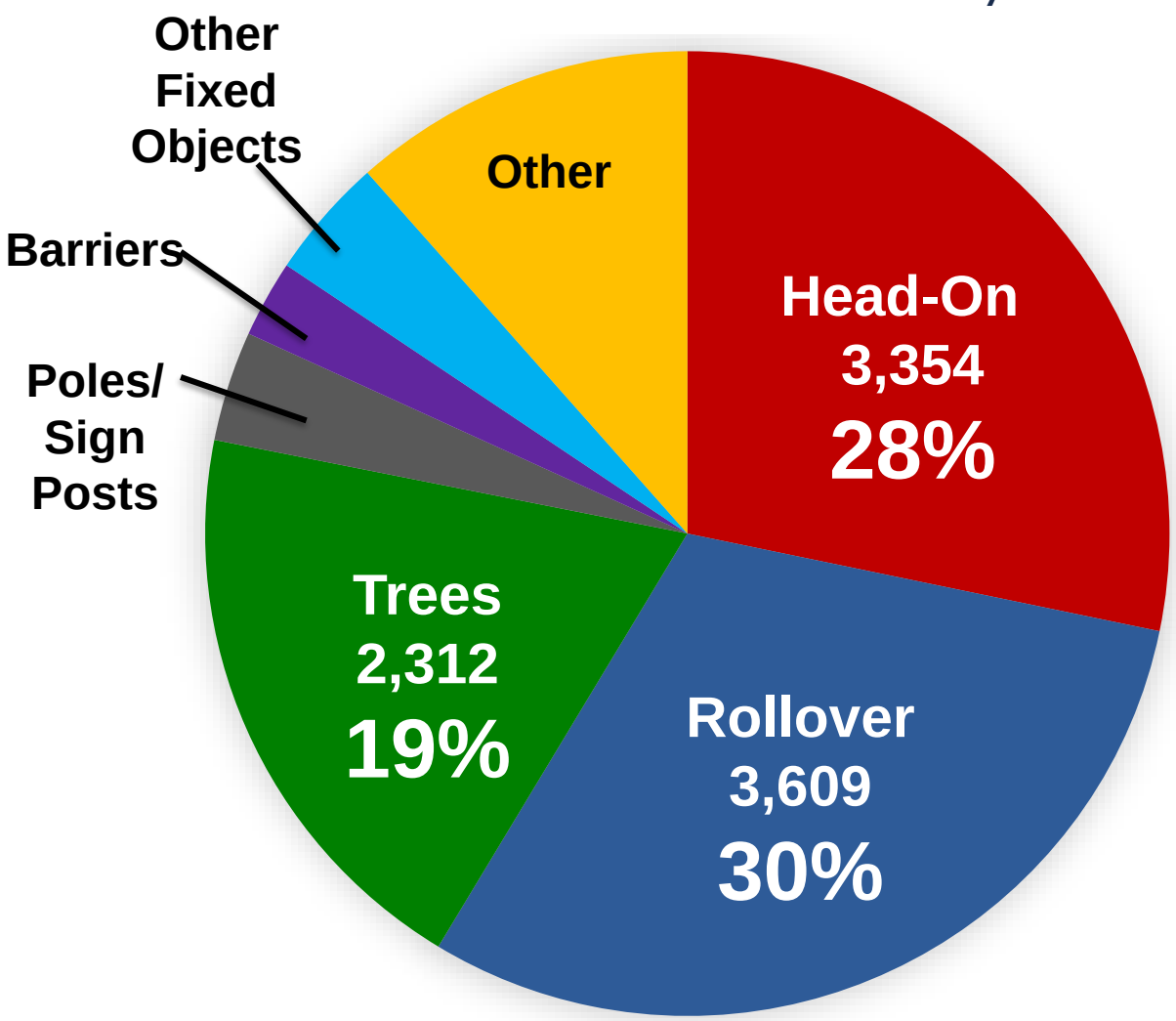
http://safety.fhwa.dot.gov/systemic/index.htm


# You don't have to wait until a crash occurs to make improvements!

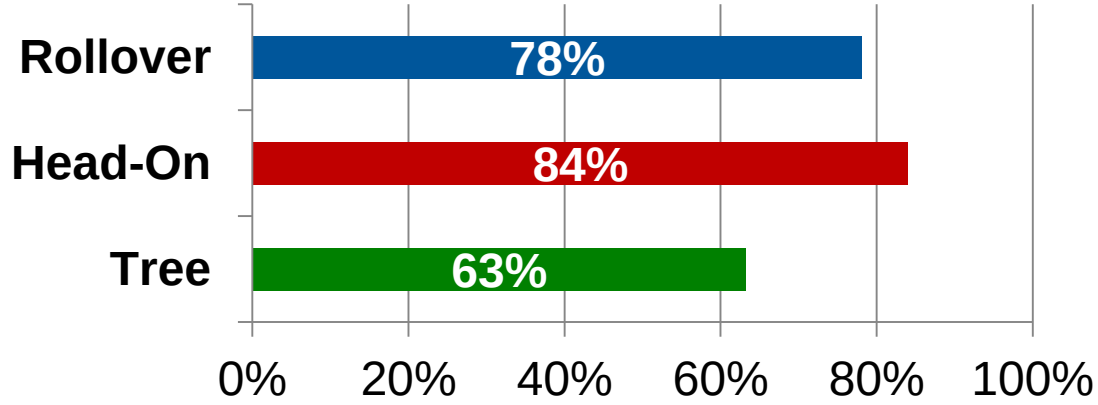
https://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/ddsa_resources/ddsa_systemic_analysis.pdf

# Rural Roadway Departure Fatalities

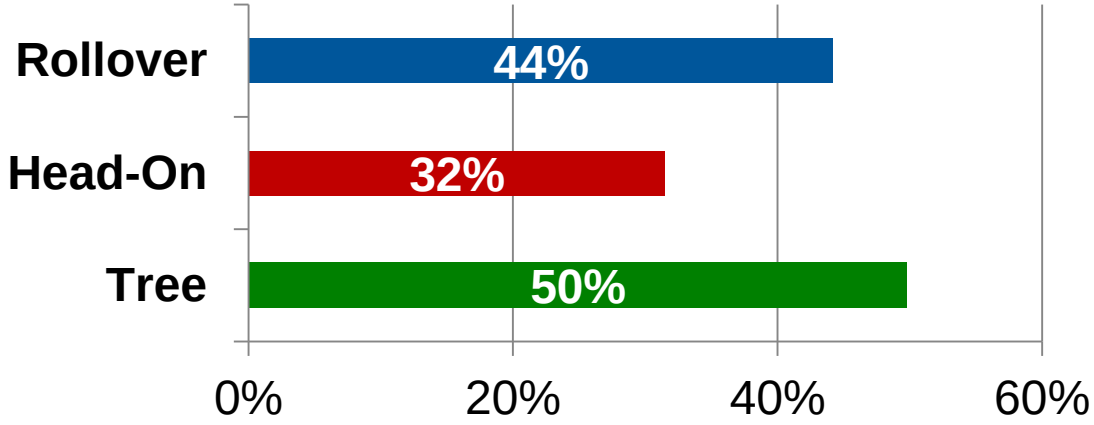
by Most Harmful Event




## Rural RwD fatalities where speed limit is ≥ 50 MPH



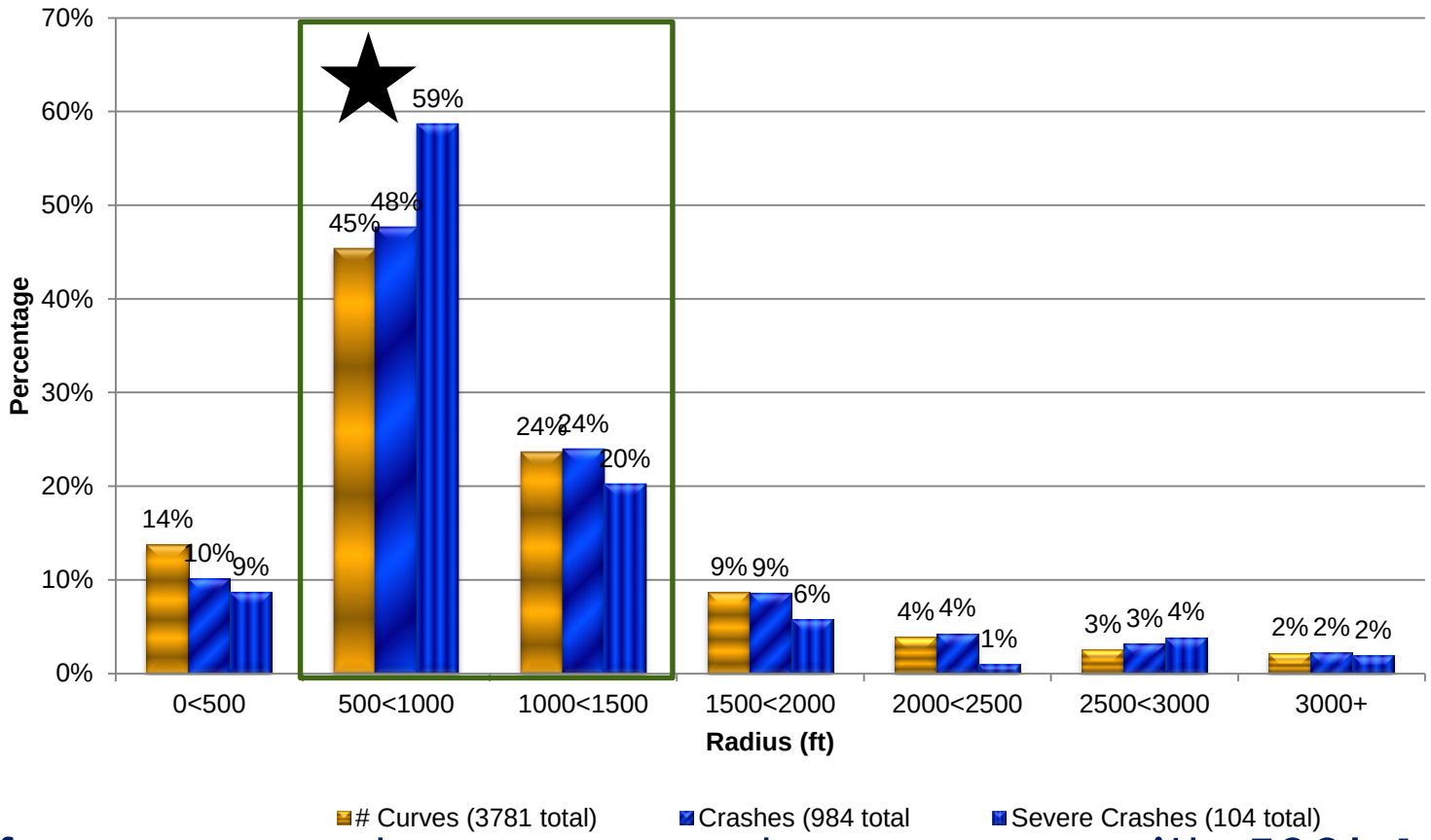

## Curve-related Rural RwD Fatalities




2014-2016 Annual Average of Rural RwDs by MHE

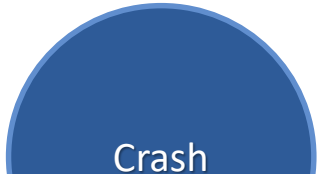
Source: FARS

# Quantitative Crash Analysis Methods Minnesota Example



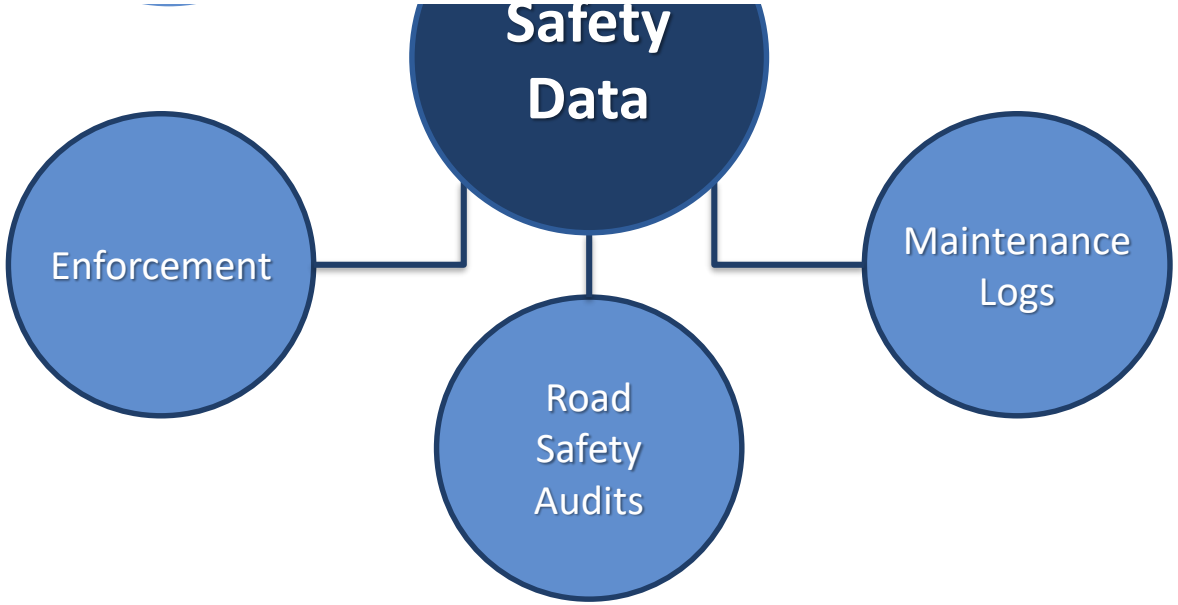

The majority of severe crashes occurred on curves with 500'-1,500' radii.

# Many Data Sources




*"Do what you can, with what you have, where you are."*

*– Theodore Roosevelt*

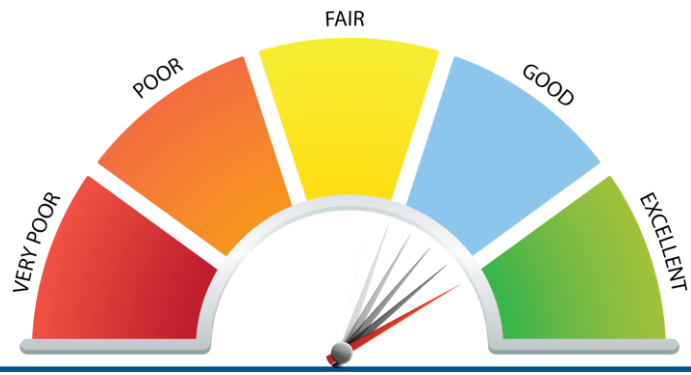


# Qualitative Approach to Risk

Use qualitative ratings when needed:

- *Good, Fair, Not-So-Good (curve radius, roadside, etc.)*
- *High, Medium, Low (traffic volumes, crash frequency, etc.)*

It is important to include the risk factors that are key to your roadway network



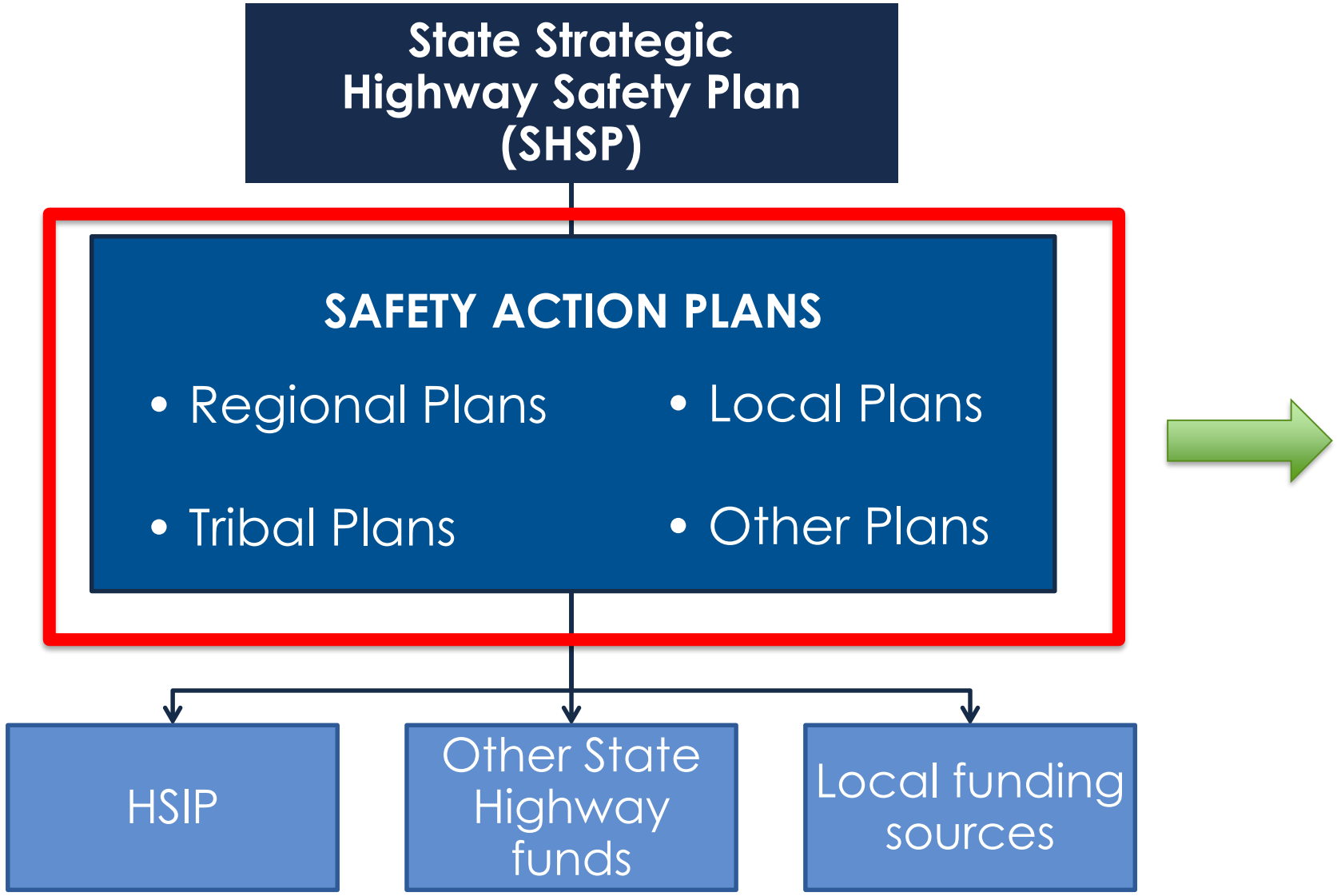
# Qualitative Data – Presence of a Visual Trap

# Prioritization – Example for Minnesota

| Curve Count | ID | Corridor | Segment | Crashes | | | | | | | Severe RoR | | Radius (ft) | Length Curve (ft) | ADT | Intersection on Curve | Chevrons | Visual Trap | Rank | Proximity | Chevron Candidate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Total | Severe | K | A | B | C | PDO | K | A | | | | | | | | | |
| 1 | 001A | 1.01 | CSAH 1 | 1 | - | - | - | - | - | 1 | - | - | 92 | 125 | 50 | - | - | - | | | |
| 2 | 001B | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 557 | 422 | 50 | - | - | - | ★ | | |
| 3 | 001C | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 823 | 493 | 50 | - | - | - | ★ | | |
| 4 | 001D | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 379 | 359 | 50 | - | - | - | | | |
| 5 | 001E | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 669 | 456 | 50 | - | - | - | ★ | | |
| 6 | 001F | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 270 | 431 | 50 | - | - | - | | | |
| 7 | 001G | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 314 | 324 | 50 | - | - | - | | | |
| 8 | 001H | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 545 | 239 | 50 | - | - | - | ★ | | |
| 9 | 001I | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 459 | 225 | 50 | - | - | - | | | |
| 10 | 001J | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 368 | 274 | 50 | - | - | - | | | |
| 11 | 001K | 1.01 | CSAH 1 | 1 | - | - | - | - | - | 1 | - | - | 318 | 390 | 50 | - | - | - | | | |
| 12 | 001L | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 267 | 399 | 50 | - | Yes | - | | | Installed |
| 13 | 001M | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 1,475 | 345 | 50 | - | - | - | ★ | | |
| 14 | 001N | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 763 | 578 | 130 | Yes | - | - | ★★ | | |
| 15 | 001O | 1.01 | CSAH 1 | - | - | - | - | - | - | - | - | - | 859 | 353 | 210 | Yes | - | - | ★★ | | |
| 16 | 002A | 2.02 | CSAH 2 | 1 | - | - | - | 1 | - | - | - | - | 583 | 752 | 930 | - | - | - | ★★ | Yes | Yes |
| 17 | 002B | 2.02 | CSAH 2 | - | - | - | - | - | - | - | - | - | 584 | 635 | 930 | Yes | - | - | ★★★ | - | Yes |
| 18 | 002C | 2.02 | CSAH 2 | - | - | - | - | - | - | - | - | - | 799 | 665 | 930 | Yes | - | - | ★★★ | - | Yes |
| 19 | 002D | 2.02 | CSAH 2 | - | - | - | - | - | - | - | - | - | 963 | 626 | 930 | - | - | - | ★★ | Yes | Yes |
| 20 | 002E | 2.02 | CSAH 2 | - | - | - | - | - | - | - | - | - | 1,234 | 584 | 930 | - | - | - | ★★ | Yes | Yes |
| 21 | 002F | 2.02 | CSAH 2 | - | - | - | - | - | - | - | - | - | 1,188 | 719 | 930 | - | - | - | ★★ | Yes | Yes |
| 22 | 002G | 2.02 | CSAH 2 | 1 | 1 | - | 1 | - | - | - | - | 1 | 938 | 556 | 930 | - | - | - | ★★★ | - | Yes |
| 23 | 002H | 2.02 | CSAH 2 | - | - | - | - | - | - | - | - | - | 1,199 | 402 | 930 | - | - | - | ★★ | Yes | Yes |
| … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … |
| … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … |
| … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … | … |
| 502 | 249ZH | 249.01 | CR 249 | - | - | - | - | - | - | - | - | - | 432 | 301 | 275 | Yes | - | - | | Yes | Yes |
| 503 | 249ZI | 249.01 | CR 249 | - | - | - | - | - | - | - | - | - | 814 | 344 | 275 | - | - | - | | Yes | Yes |
| 504 | 249ZJ | 249.01 | CR 249 | - | - | - | - | - | - | - | - | - | 800 | 685 | 275 | - | - | - | ★ | Yes | Yes |

- Complete census of 504 curves
- 32 High Priority Curves (6%)

| Stars | # | % | Chevrons in Place # | Chevrons in Place % |
|---|---|---|---|---|
| ★★★★★ | 0 | 0% | 0 | 0% |
| ★★★★ | 7 | 1% | 2 | 0% |
| ★★★ | 25 | 5% | 4 | 1% |
| ★★ | 108 | 21% | 1 | 0% |
| ★ | 250 | 50% | 2 | 0% |
| - | 114 | 23% | 5 | 1% |
| | 504 | 100% | 14 | 3% |



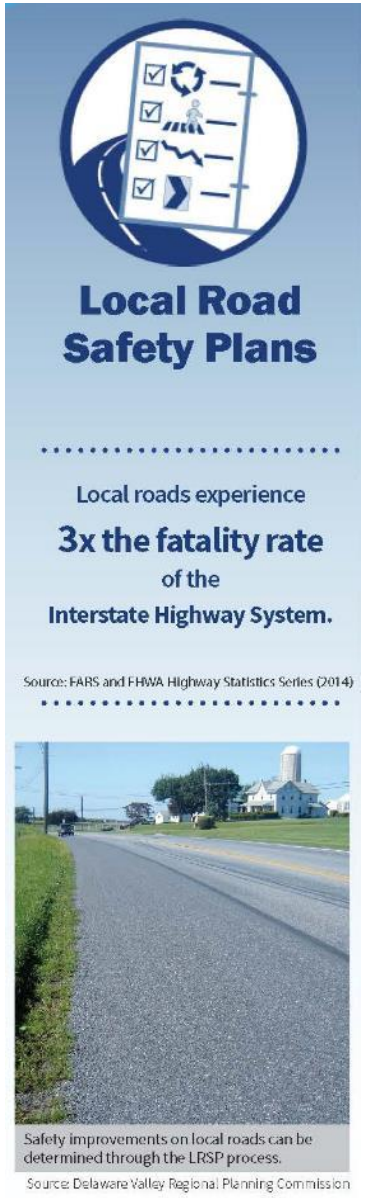


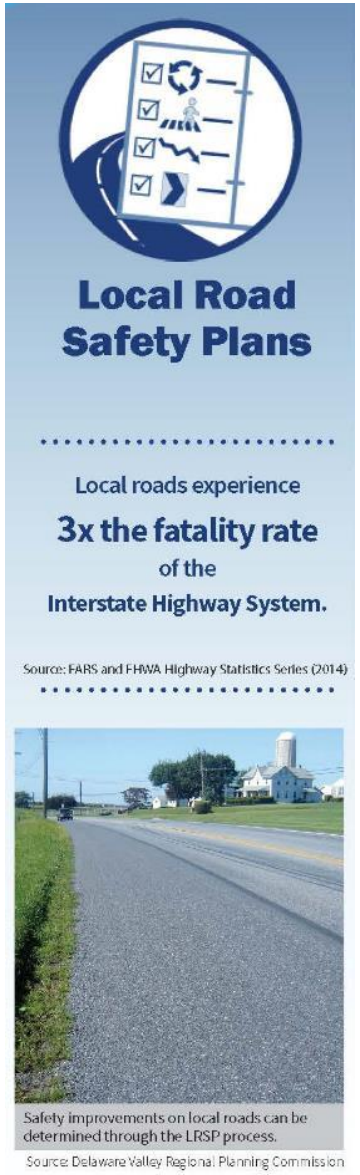

HSIP: 23USC 148(c), 23 CFR 924.7

# Why Local Road Safety Plans?

More than 75% of all roads are maintained by local agencies

Approximately 40-60% of fatalities occur on locally owned roadways

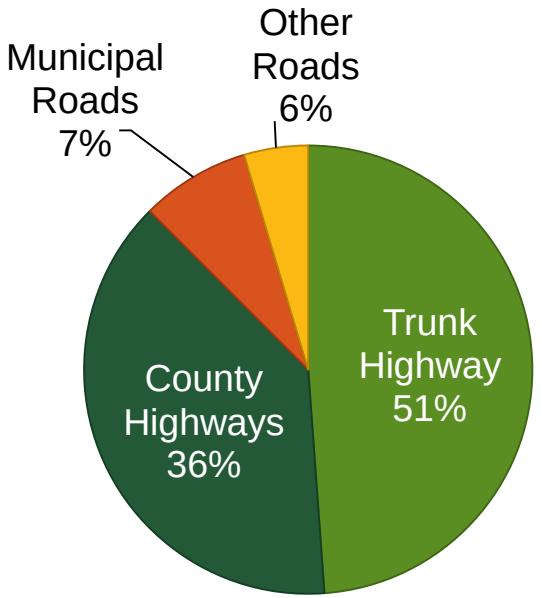





# Why Local Road Safety Plans?

- Greater awareness of road safety as a communication tool
- Development lasting partnerships
- Prioritized investments
- Achievable investments
- Supports grant applications; and
- Reduction in severe crashes

**2015 Fatalities by Roadway in Minnesota**



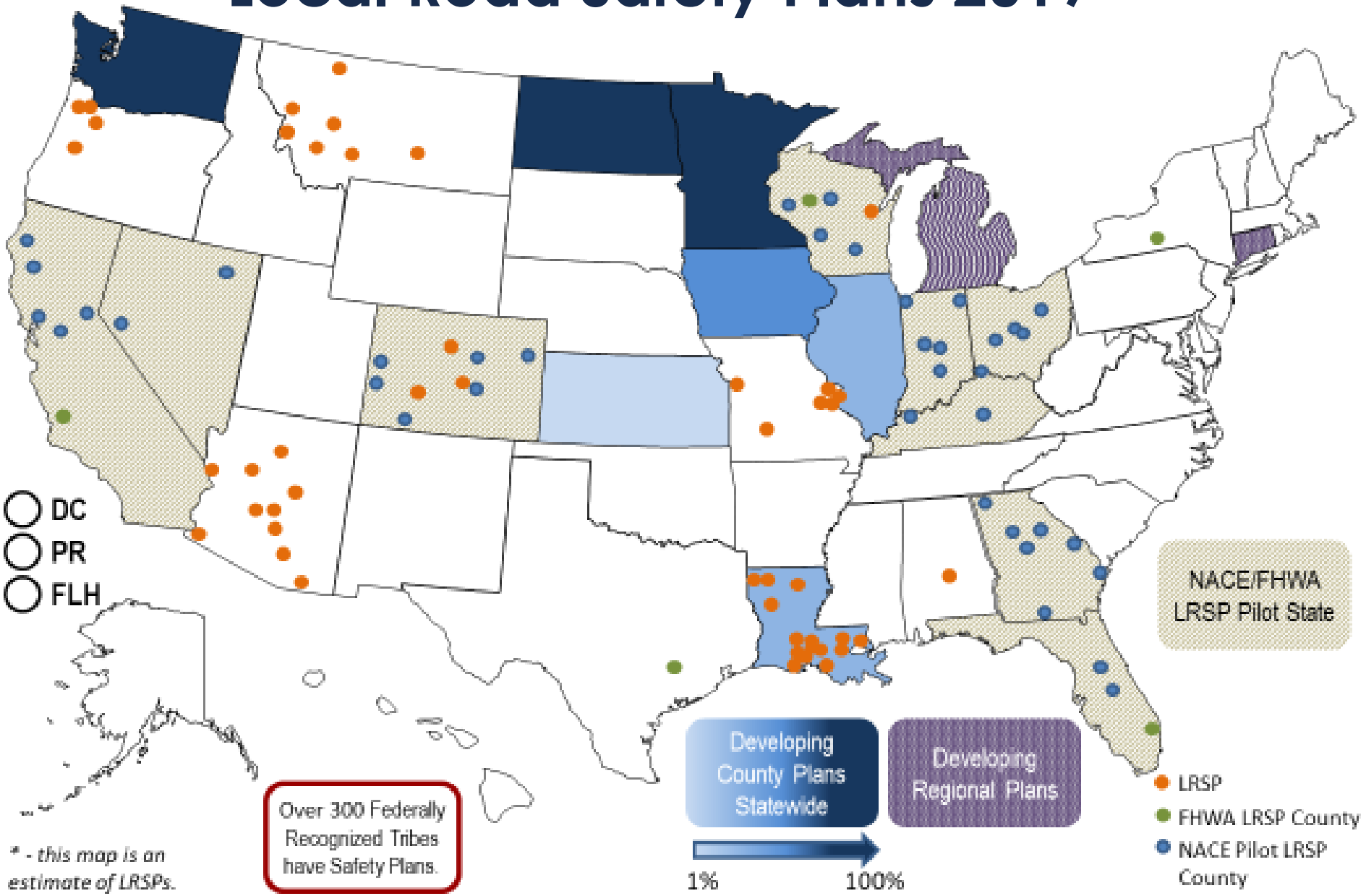
# Local Road Safety Plans:

*Your Map to Safer Roadways*

**No matter what your resources, a Local Road Safety Plan will guide you to data-driven solutions and safer roads.**

https://safety.fhwa.dot.gov/provencountermeasures/local_road/

# Local Road Safety Plans 2019 *

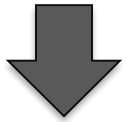



EDC -

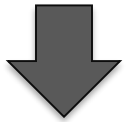
* - this map is an estimate of LRSPs.

# Roadway Departure Objectives

1st - Keep vehicles on the road



2nd - Reduce the potential for crashes



3rd - Minimize the severity

# 1st - Keep vehicles on the road

## Improved curve delineation

- Retroreflective pavement markings and signs
- Lighting

## Friction treatments in curves and other spot locations - HFST

## Edge line, shoulder & center line rumble strips.

# 2nd - Reduce the potential for crashes

Shoulder Widening

SafetyEdge$^{SM}$

Maintained clear zones

Traversable roadside slopes

# 3rd - Minimize the severity

## Breakaway Features

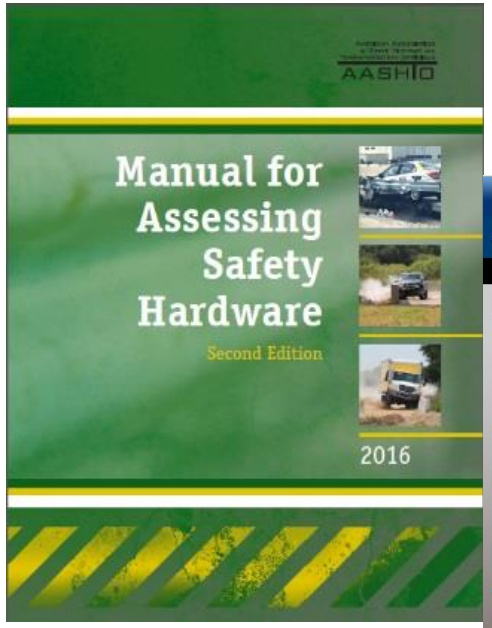
- Signs and luminaire supports
- Utility poles

## Barriers to shield obstacles including:

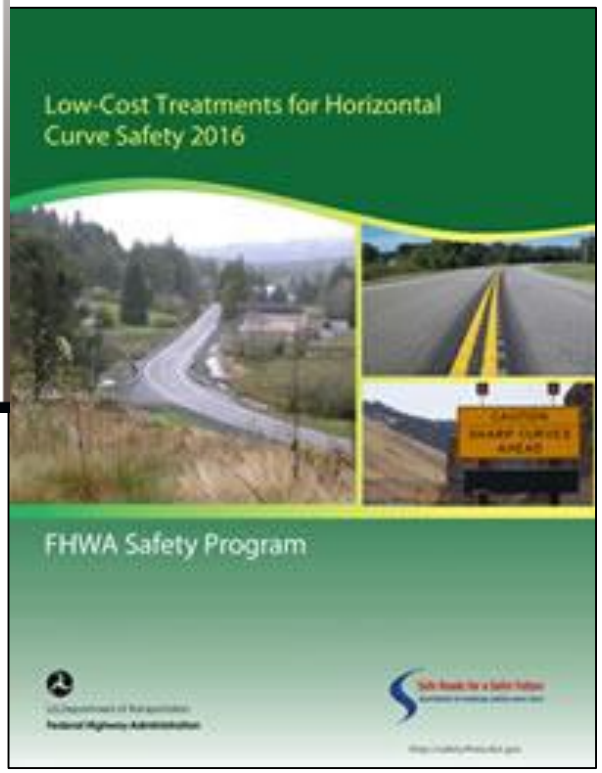
- Trees and shrubbery
- Other fixed objects
- Slopes

# Countermeasures Resources

https://safety.fhwa.dot.gov/roadway_dept/





# EDC-5 Offerings and Products

## Technical Assistance

- Local and Regional Safety Action Plans
- Systemic analysis
- Peer exchanges
- Focus groups on implementation

## Training

- Webinars
- Existing, revised, and new training
- Train-the-trainer
- LTAP resource packet
  - Handout

# Products

## Available Resources

Handout

Trading Cards

Low Cost Safety Improvement Videos (to be completed by May)

- Unpaved roads
- Enhanced Delineation of Horizontal Curves
- Longitudinal Pavement Markings
- Speed Management Techniques

Systemic Safety Analysis Training

NHI Combating Roadway Departures (1 day)

## Planned

Webinar- Taking Action to Reduce Rural RwD Systemically– Spring 2019

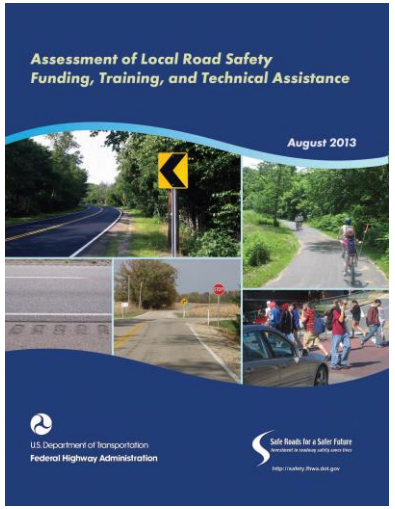
Gap Assessments (in-person and virtual)

Videos

- FoRRRwD overview
- Developing Action Plans Series
- Countermeasures – Rumbles, Signing plus 4 others
- Case Studies

4-hour Combating RwD course

# Local Road Safety Challenges




**Funding Constraints** – challenges in providing upfront money or matching funds or the inability to have staff administering the projects

**Limited State Funds and Resources** – lack of staffing at State Dot

**Competing Interests** – Competing priorities and interests

**Lack of Data/Data Analysis Skills** – lack of technical skills for data analysis

**Low Crash Rates** – vast roadway networks spread out the traffic volume as compare to State route

**Difficulty Securing Local Funding Matches** - difficulties in gaining support from local politicians and reaching consensus among stakeholders

**Lack of staff or expertise** – staffing turnover, application process for Fed-Aid funding

https://safety.fhwa.dot.gov/local_rural/training/fhwasa13029/

# LTAPs assisted with the EDC 5 initiative on Reducing Rural Roadway Departures

- Working with the Rural communities
  - Advocating for Funding
  - Action Plan Development
  - Contracting assistance
- Systemic Deployment of Safety Countermeasures
  - Data Compilation and Organization
  - Data and Risk Factor Analysis
- Mainstreaming Proven Safety Countermeasures


Longitudinal Rumble Strips and Stripes on Two-Lane Roads

Safety Edge$_{SM}$

Enhanced Delineation and Friction for Horizontal Curves

Local Road Safety Plan



Median Barrier

Roadside Design Improvement at Curves

**Systemic**

- Based on Risk
- Correlated with particular severe crash types

# Focusing on Reducing Rural Roadway Departures

**Mission** - Reduce the potential for serious injury and fatal roadway departure crashes on **all public rural roads** by increasing the systemic deployment of proven countermeasures.


How can we help you?

# EDC-5 Funding Opportunities:

- ***State Transportation Innovation Council (STIC) Incentive***
  - ✓ Up to $100,000 per STIC per year to standardize an innovation
  - ✓ https://www.fhwa.dot.gov/innovation/stic/

- ***Accelerated Innovation Deployment (AID) Demonstration***
  - ✓ Up to $1 million available per year to deploy an innovation not routinely used
  - ✓ https://www.fhwa.dot.gov/innovation/grants/

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