

# **Roadway Departure Safety Workshop**

## **Northern Central Valley, California**

**FHWA California Division  
May 24, 2017  
Red Bluff, California**

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Research and Education Center (SafeTREC)**

# Topics

- A. Introduction
- B. Road Departure Injuries
- C. Comparison among Counties
- D. Tehama County (Example)
- E. Potential Countermeasures
- F. Summary
- G. Questions / Contact Information
- H. Appendix (Maps for Individual Counties)



# Northern Central Valley Counties





# Northern Central Valley Counties

County	Population	Road Miles	CHP Division	Caltrans District
Shasta	179,631	2,877	Northern	2
Tehama	63,276	1,682	Northern	2
Glenn	28,085	1,111	Northern	3
Colusa	21,588	905	Northern	3
Butte	226,864	2,061	Northern	3
Total	519,444	23,837		



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# Road Way Departure Definition

## Movement Preceding Crash

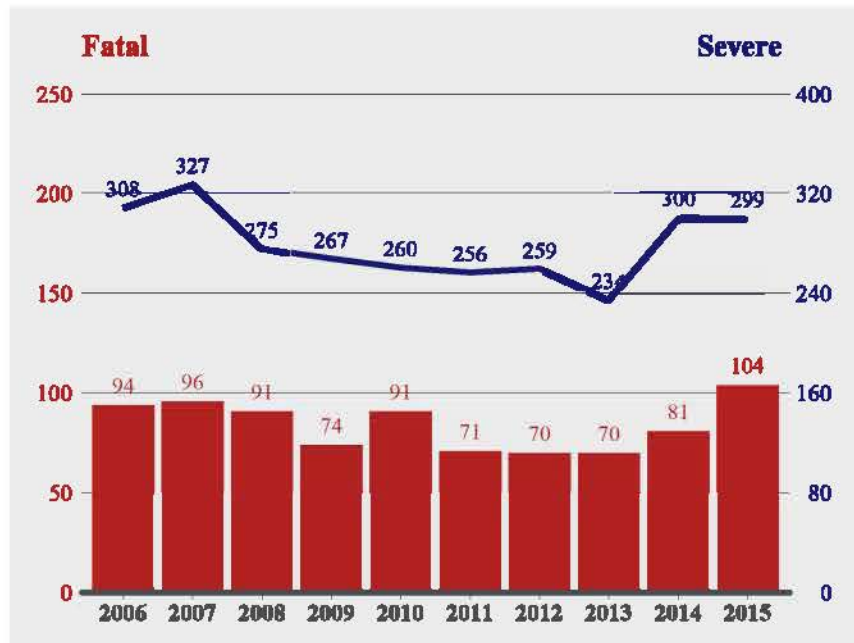
- ☐ Leave roadway left or right
- ☐ Cross over the center line

\*\*\*\*and / or\*\*\*\*

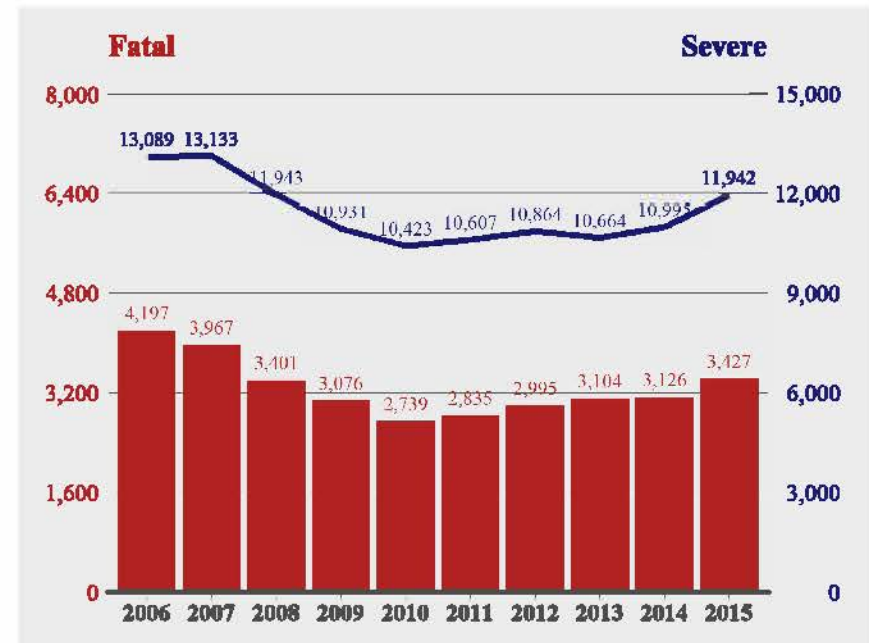
## Outcome (If any of these happen its assumed vehicle left roadway)

- ☐ Hit object
- ☐ Roll over
- ☐ Head on

# Fatal & Severe Injury Trends (Total) Northern Central Valley vs. California



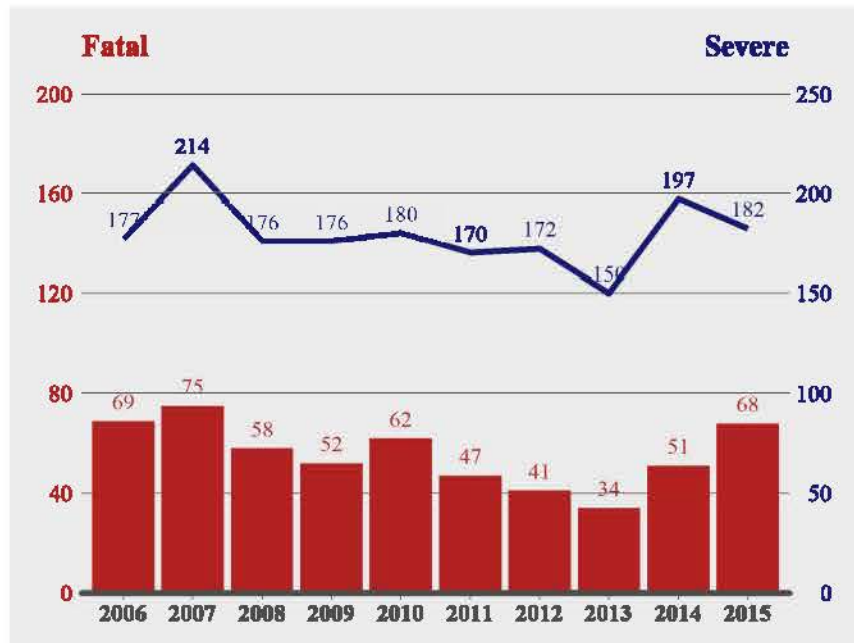
(a) Northern Central Valley



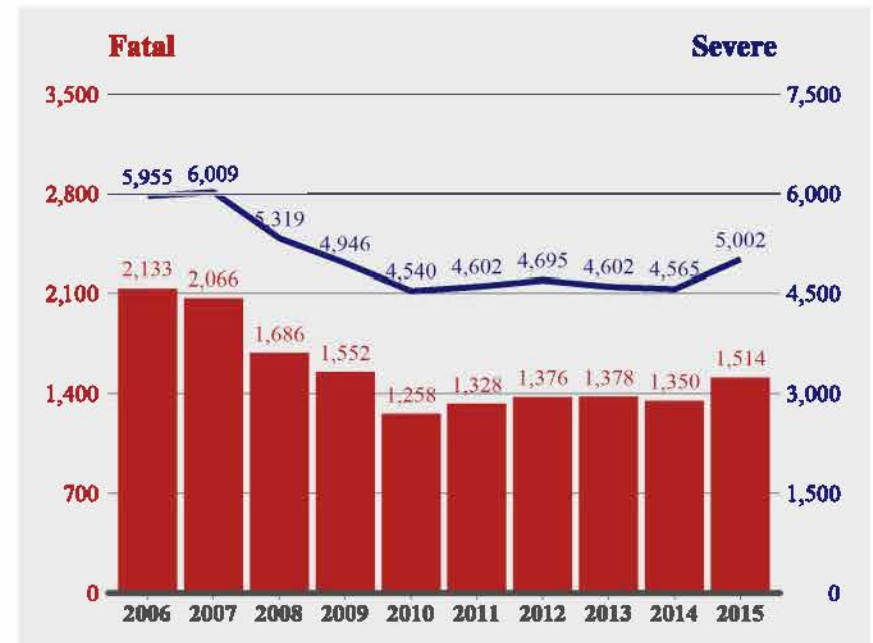
(b) California

Source: SWITRS 2006 – 2015

# Fatal & Severe Injury Trends (Lane Departure) Northern Central Valley vs. California



(a) Northern Central Valley

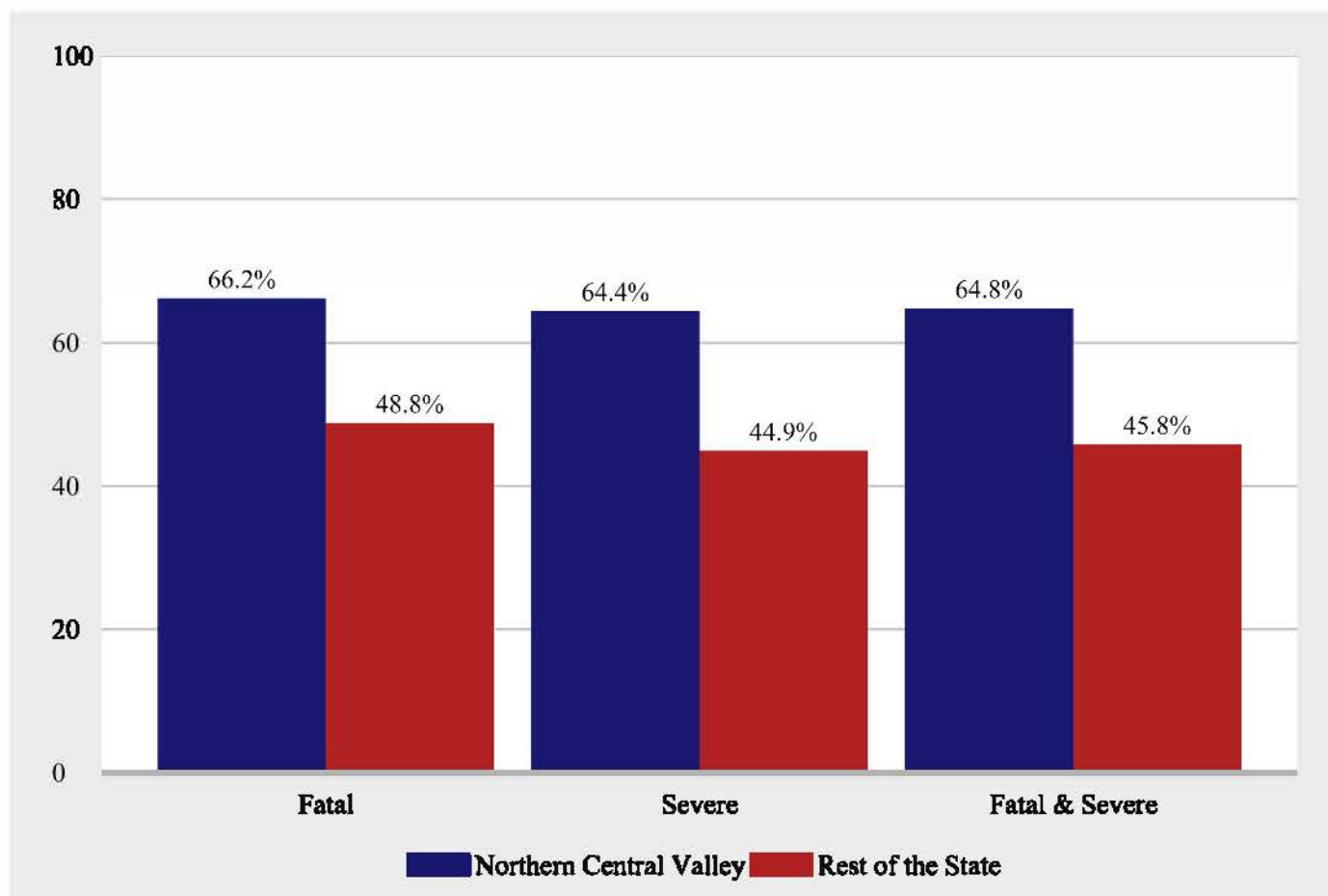


(b) Rest of the State

Source: SWITRS 2006 – 2015



# % Fatal and Severe Injuries (Lane Departure)



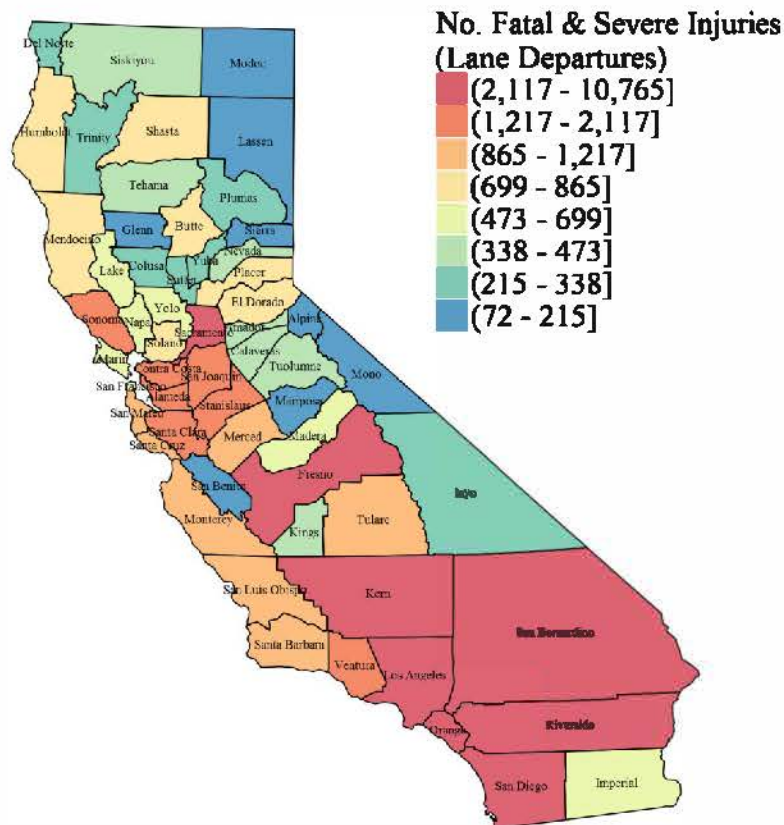
Source: SWITRS 2006 – 2015

5/24/2017

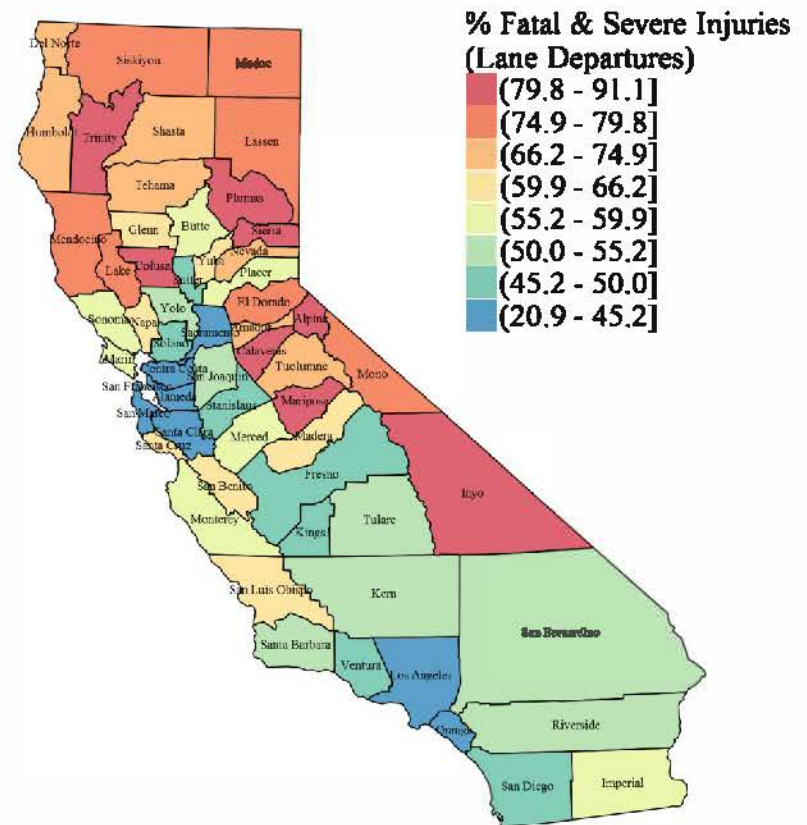
Note: Group injury percentage is defined as group injuries (lane departure) relative to group total injuries.

# Fatal and Severe Land Departure Injuries

## Number (Left) and Percent of Total (Right) by County



(a) Number of Fatal and Severe Injuries

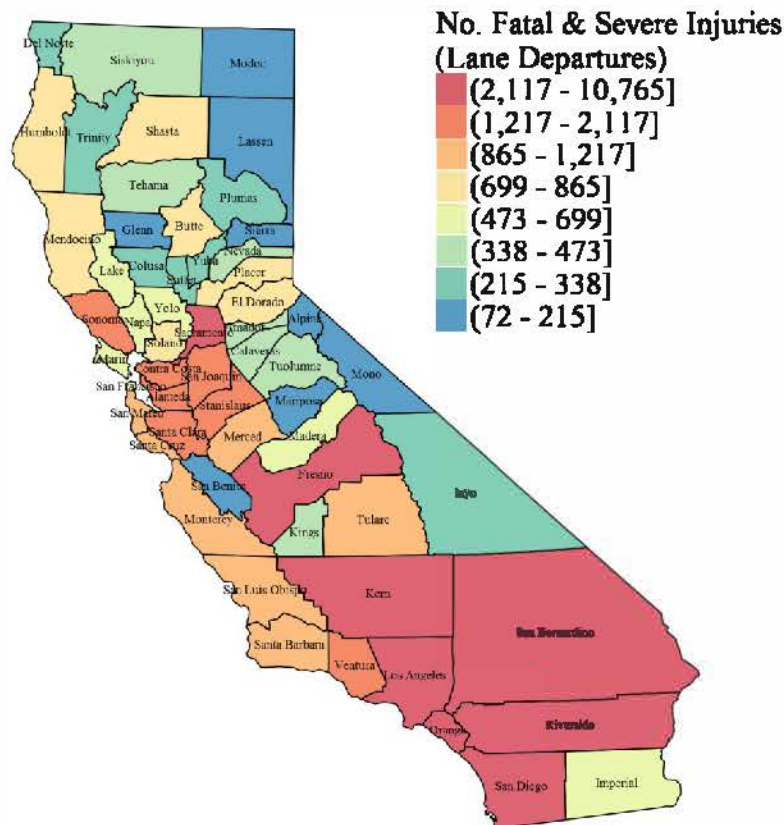


(b) Percent of Fatal and Severe Injuries

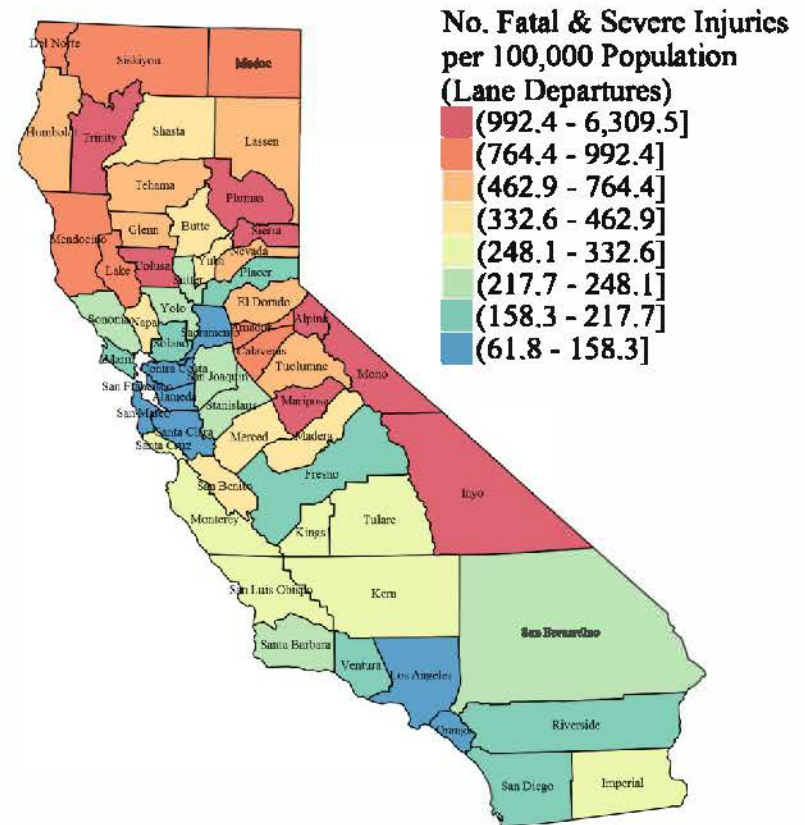


# Fatal and Severe Lane Departure Injuries

## Number (Left) and Population-Based Rate (Right) by County



(a) Number of Fatal and Severe Injuries

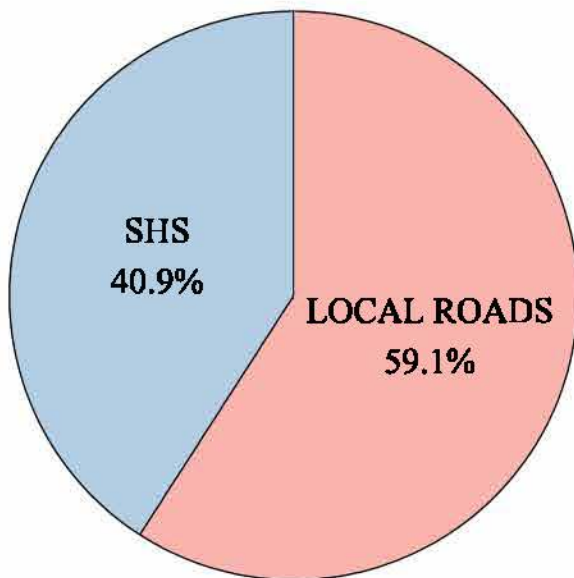


(b) Ratio of Fatal and Severe Injuries per 100,000 Population

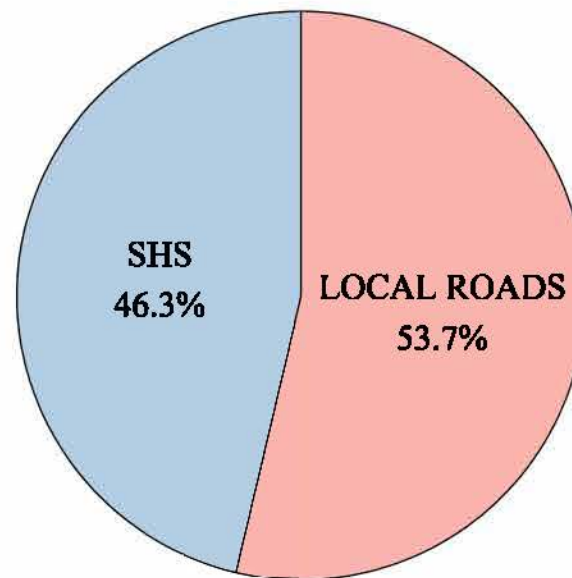


# % Fatal & Severe Injuries (Lane Departures) on State Highway System (SHS) vs. Local Roads

**Northern Central Valley**



**Rest of the State**



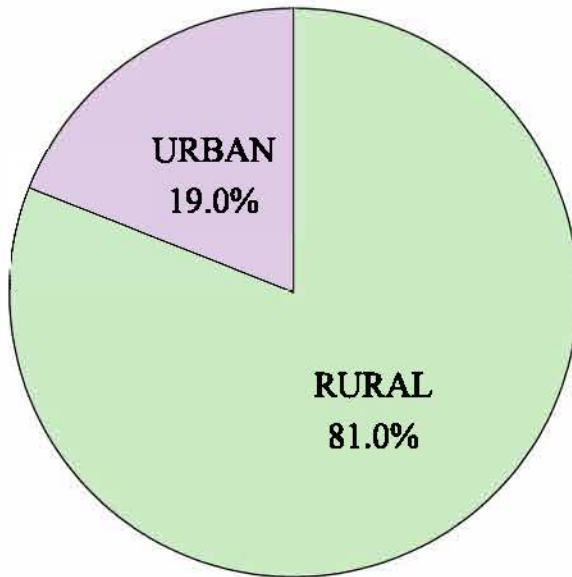
Source: SWITRS 2006 – 2015



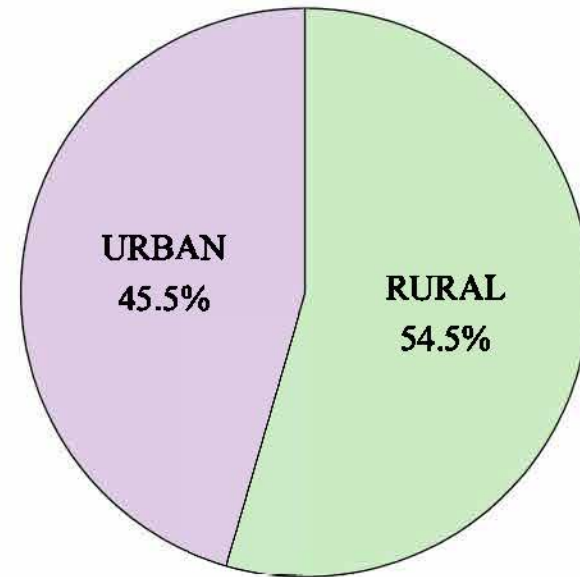


# % Fatal & Severe Injuries (Lane Departures) for urban/rural

**Northern Central Valley**

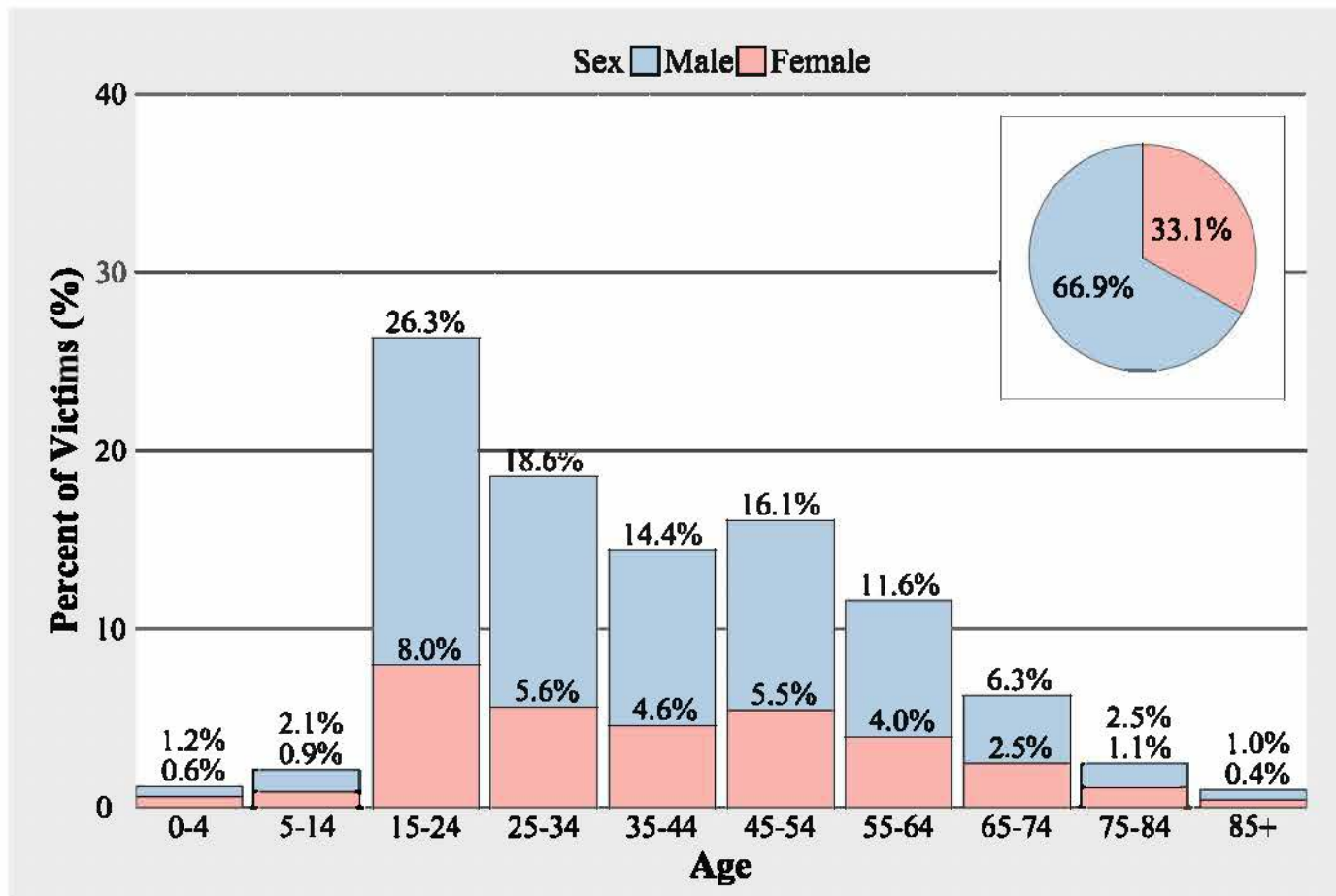


**Rest of the State**



Source: SWITRS 2006 – 2015

# Fatal & Severe Injuries (Lane Departures) by Sex and Age (Northern Central Valley)



Source: SWITRS 2006 – 2015

# Northern Central Valley and Rest of State (Summary)

- From 2006-2015 trends downward to about 2010 and then shift upward, for both total and roadway departure injuries (for Northern Central Valley and for the rest of the state)
- Percent of roadway departure injuries higher in Northern Central Valley compared to rest of the state.
- Population-based roadway departure injuries higher in Northern Central Valley compared to rest of the state.
- Local (non-state highway) and rural involvement for roadway departure injuries higher in Northern Central Valley compared to rest of the state.

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# Roadway Departure Fatal and Severe Injuries Population Based Rates Per Year (2011-2015)

County	RwD Fatal / Severe Injuries	Population	Number / 100,000 Population
Shasta	418	179,631	46.5
Tehama	147	63,276	46.5
Glenn	69	28,085	49.1
Colusa	90	21,588	83.4
Butte	388	226,864	34.2



# Roadway Departure Fatal and Severe Injuries VMT Based Rates Per Year (2011-2015)

County	RwD Fatal / Severe Injuries	VMT	Rate = Number per VMT*
Shasta	418	1,854	4.5
Tehama	147	919	3.2
Glenn	69	487	2.8
Colusa	90	585	3.1
Butte	388	1,703	4.6

\*Rate = number per 100 million miles



# Roadway Departure Fatal and Severe Injuries Road Miles Based Rates Per Year (2011-2015)

County	RwD Fatal / Severe Injuries	Road Miles	Number per 1000 Road Miles
Shasta	418	2,877	29.1
Tehama	147	1,682	17.5
Glenn	69	1,111	12.4
Colusa	90	905	19.9
Butte	388	2,061	37.7

# Comparison Among Counties (Summary)

- Population-based rates vary among Northern Central Valley Counties.
- VMT-based rates vary among counties and are substantially higher in Northern Central Valley
- Road mile-based rates vary among counties and are somewhat lower in Northern Central Valley (implications for systemic approach)



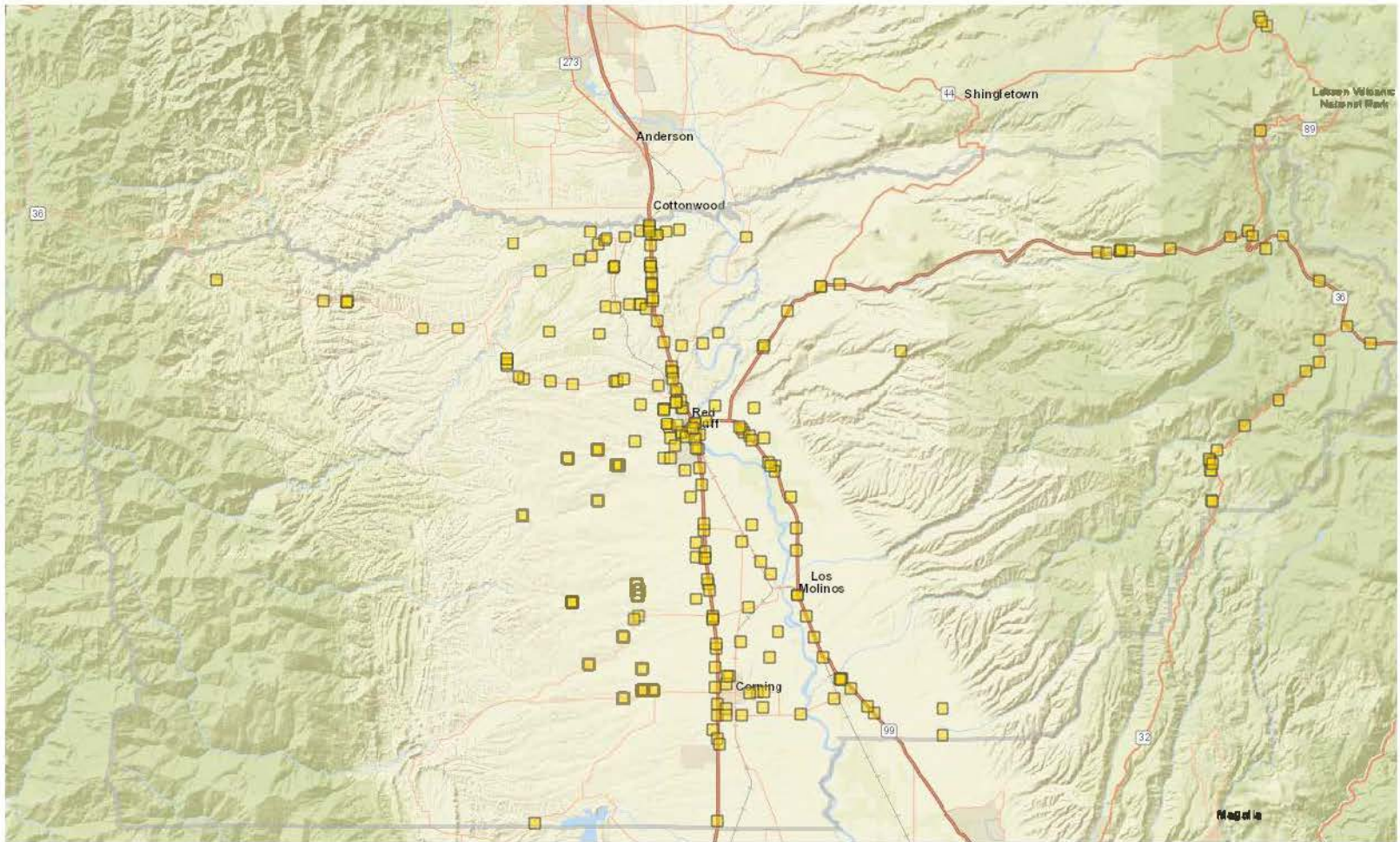
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# Tehama County Road Departure Collisions

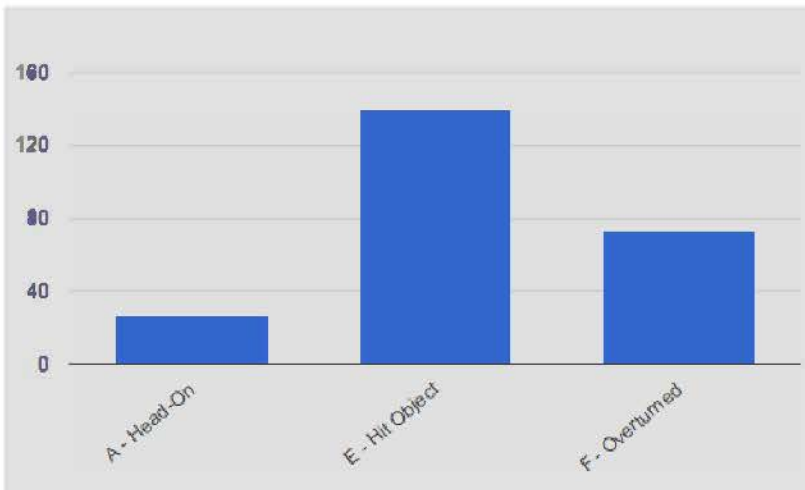
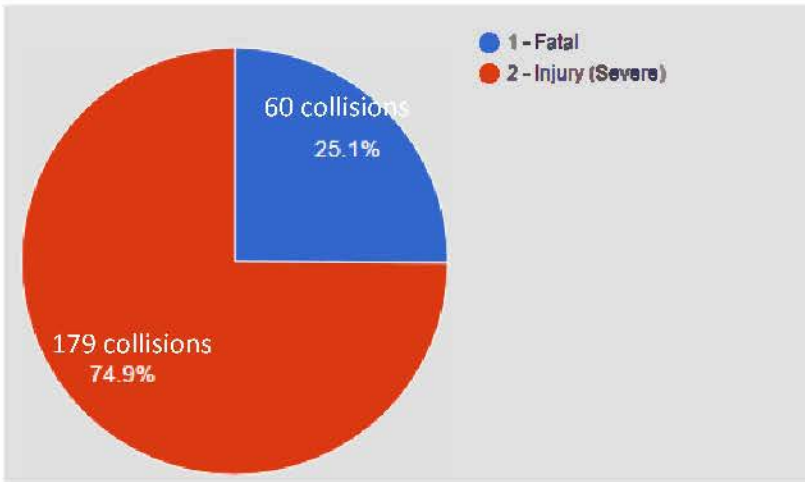
2006-2015

## Tehama County Road Departure collisions from 2006-2015



**239 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2006 to 2015 in all of Tehama County**

## Tehama County Summary Statistics

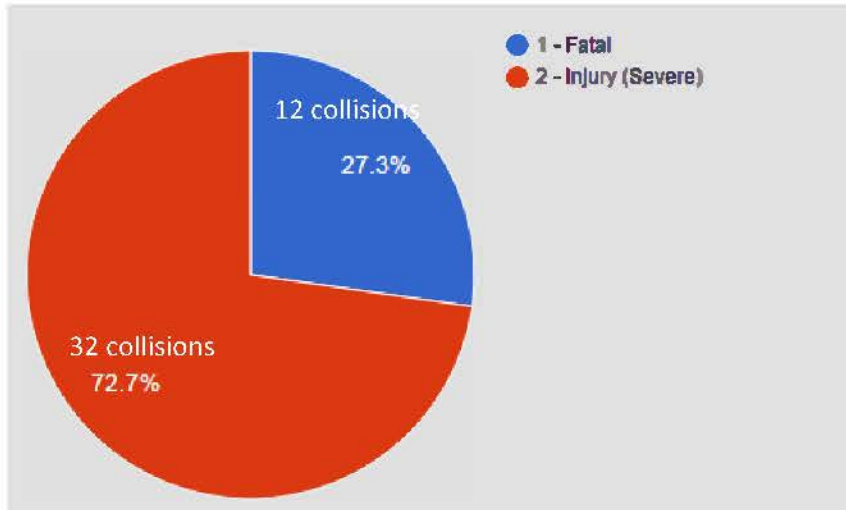


- Summary statistics for 239 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	109	45.6%
Driving or Bicycling Under the Influence of Alcohol or Drug	69	28.9%
Unsafe Speed	24	10%
Wrong Side of Road	20	8.4%
Other Than Driver (or Pedestrian)	5	2.1%
Automobile Right of Way	4	1.7%
Other Hazardous Violation	4	1.7%
Improper Passing	1	0.4%
Unsafe Lane Change	1	0.4%
Pedestrian Violation	1	0.4%
Unsafe Starting or Backing	1	0.4%

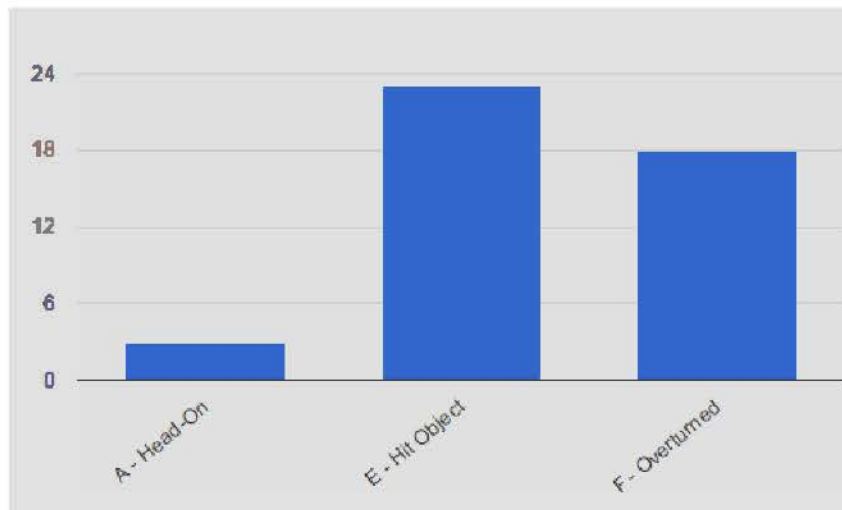
Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	137	57.3%
Non-Collision	65	27.2%
Other Motor Vehicle	23	9.6%
Other Object	8	3.3%
-- Not Stated	2	0.8%
Animal	2	0.8%
Pedestrian	1	0.4%
Motor Vehicle on Other Roadway	1	0.4%

## Tehama County State Highway-5 Summary Statistics



- Summary statistics for 44 collisions.

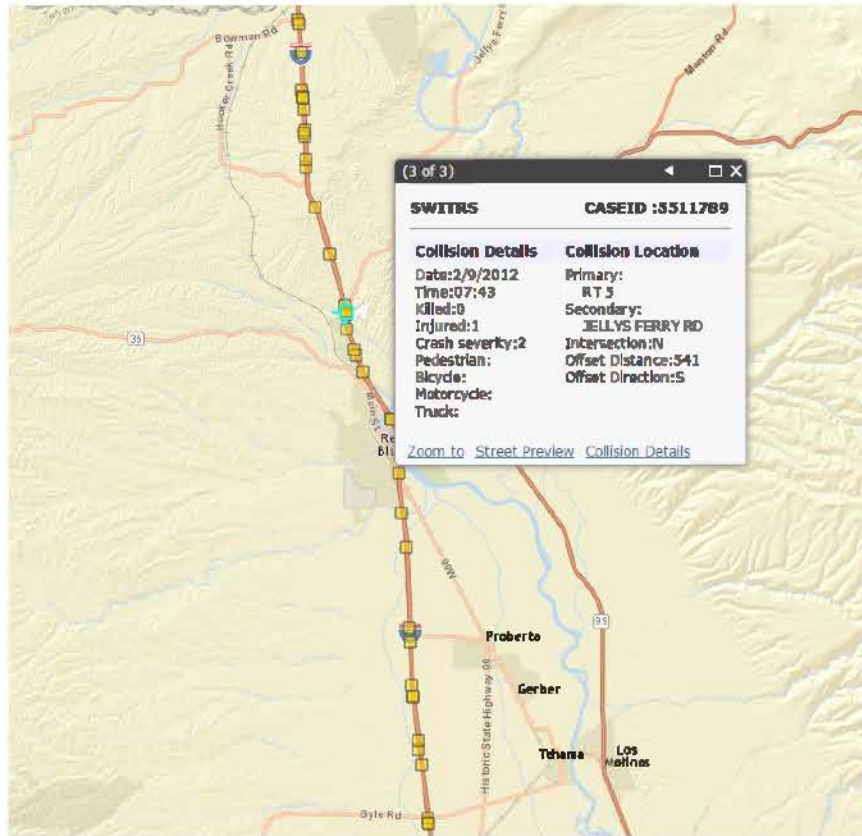
Primary Collision Factor	Collisions	Percentage
Improper Turning	28	63.6%
Driving or Bicycling Under the Influence of Alcohol or Drug	11	25%
Other Than Driver (or Pedestrian)	2	4.5%
Unsafe Speed	1	2.3%
Wrong Side of Road	1	2.3%
Unsafe Lane Change	1	2.3%



Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	23	52.3%
Non-Collision	17	38.6%
Other Motor Vehicle	2	4.5%
Motor Vehicle on Other Roadway	1	2.3%
Other Object	1	2.3%



## Tehama County Collision Example (HW-5)



Collision Details Case ID 5511789

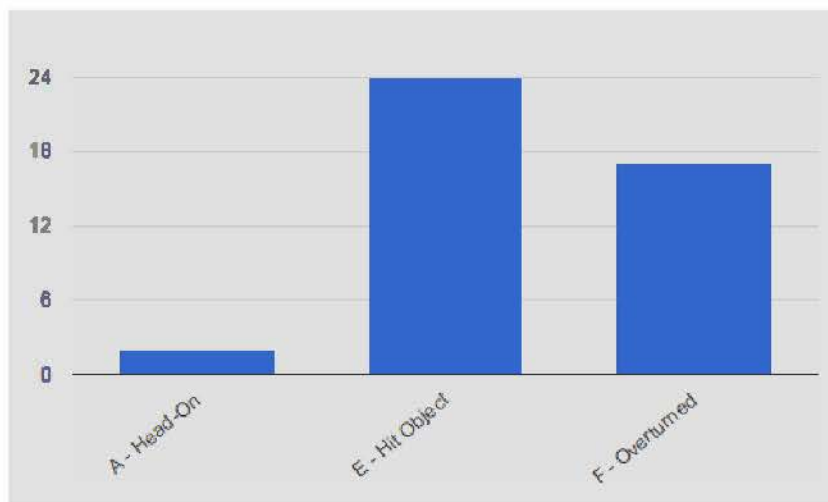
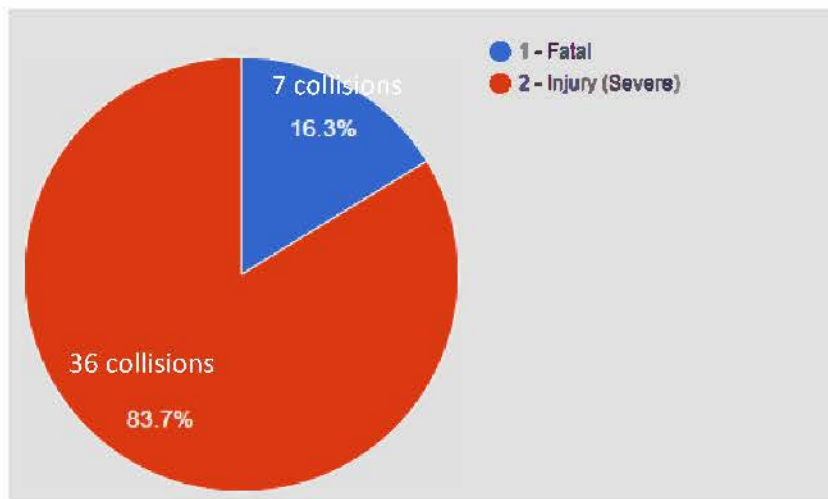


County	TEHAMA	City	UNINCORPORATED
Date (Y-M-D)	2012-02-09	Time	07:43
Nearby Intersection	RT 5 & JELLYS FERRY RD		
Coordinate Location	40.233314919, -122.255699978		
State Highway	Y	Route	SS Postmile 32.14
Injured Victims	1	Fatalities	0
Alcohol	NO	Weather	Clear
Primary Collision Factor	Unsafe Lane Change	Involved with	Non-Collision

Street View



## Tehama County State Highway-36 Summary Statistics

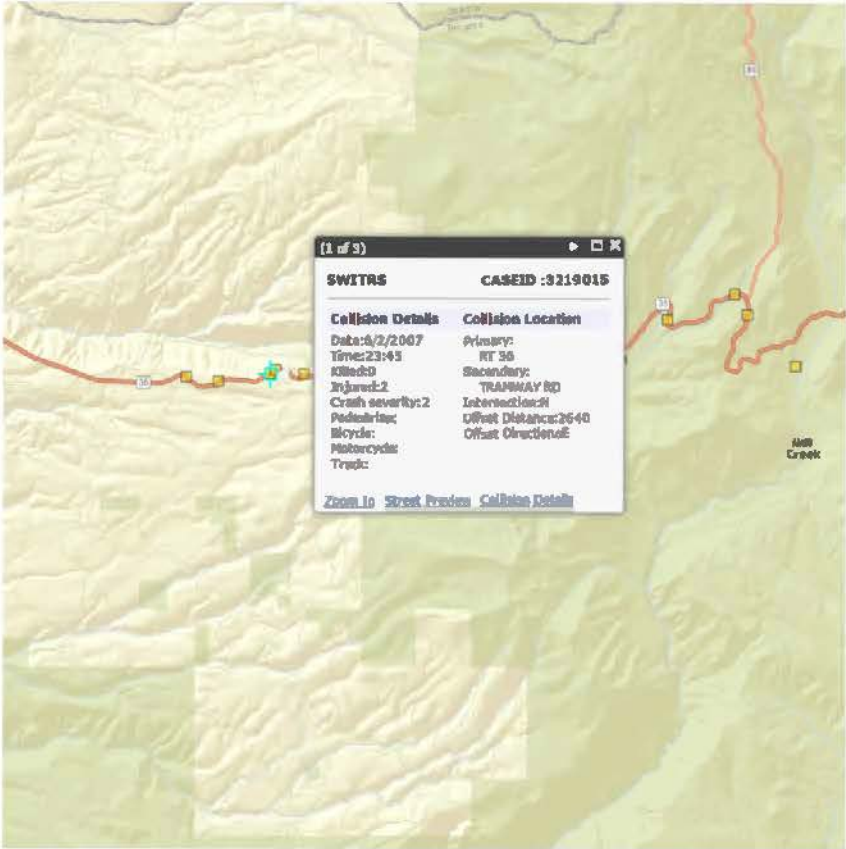


- Summary statistics for 43 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	26	60.5%
Unsafe Speed	11	25.6%
Driving or Bicycling Under the Influence of Alcohol or Drug	3	7%
Wrong Side of Road	1	2.3%
Pedestrian Violation	1	2.3%
Other Than Driver (or Pedestrian)	1	2.3%

Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	21	48.8%
Non-Collision	17	39.5%
Other Object	2	4.7%
Pedestrian	1	2.3%
Other Motor Vehicle	1	2.3%
Animal	1	2.3%

Tehama County Collision Example (RT 36 & Tramway Rd.)





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## Type of countermeasures applied to listed counties

County	CLRS	ELRS	SRS	ADL	HFS	GR	TR	UP	EEA	EES	II	CMB	3E	Total
State Overall	536	2053	3252	1170	179	76	345	21	209	95	120	25	3	8084
Butte	9	21	30	1	2	2	2				1	1		69
Colusa	5	13	30	3										51
Glenn	2	7	26											35
Shasta	10	47	47	1	5		12				1			123
Tehama	1	28	32	2			7							70

## Number of countermeasures implemented by county

County	Urban	Rural	Total Number of Implementation
State Overall	969	6337	7306
Butte	0	61	61
Colusa	0	48	48
Glenn	0	35	35
Shasta	0	114	114
Tehama	0	68	68

### \* Note

Number of Implementation does not match with the sum of number of countermeasure by type because one implementation could have multiple countermeasure type.

Note also the 3 Es

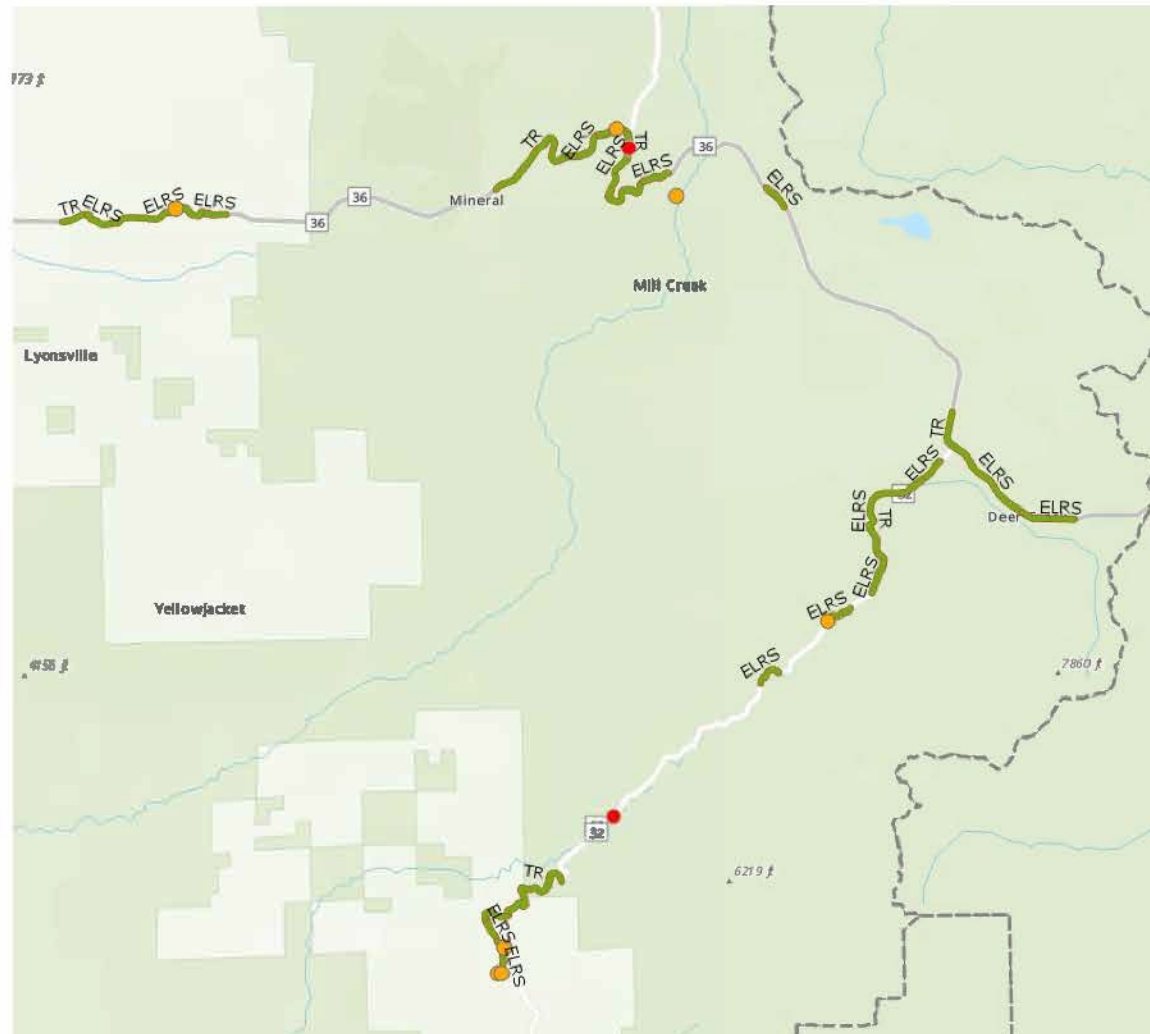
## Countermeasure Name Abbreviation

Countermeasure Name	Abbreviation
Centerline Rumble Strips	CLRS
Edge Line Rumble Stripes	ELRS
Shoulder Rumble Strips	SRS
Alignment Delineation, Lighting	ADL
High Friction Surfaces	HFS
Guardrail Relocation/Safety Enhancements	GR
Tree Removal/Safety Enhancements	TR
Utility Pole Relocation/Safety Enhancements	UP
Enforcement and Education - Alcohol-related	EEA
Enforcement and Education - Speeding-related	EES
Infrastructure Improvements - Speeding-related	II
Install Cable Median Barrier	CMB
3-E Corridor Improvements	3E

## Tehama County Road Departure Collisions from 2011 – 2015

-

## Roadway Departure Crashes and Recommended Countermeasures Eastern Tehama County



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# Main Points

- From 2006-2015 trends downward to about 2010 and then shift upward, for both total and roadway departure injuries (for Northern Central Valley and for the rest of the state)
- Percent of roadway departure injuries differ among counties and are higher in Northern Central Valley compared to rest of the state.
- Population-based roadway departure injuries higher in Northern Central Valley compared to rest of the state.
- Local (non-state highway) and rural involvement for roadway departure injuries higher in Northern Central Valley compared to rest of the state.
- VMT-based rates vary among counties and are substantially higher in Northern Central Valley
- Road mile-based rates vary among counties and are somewhat lower in Northern Central Valley (implications for systemic approach)
- Roadway Departure countermeasures have been recommended for the State Highway System.

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# Contact Information

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( <http://safetrec.berkeley.edu/> )

University of California, Berkeley

[925-457-3682](tel:925-457-3682)

[davidr@berkeley.edu](mailto:davidr@berkeley.edu)

Transportation Injury Mapping System (TIMS:

<http://tims.berkeley.edu/>



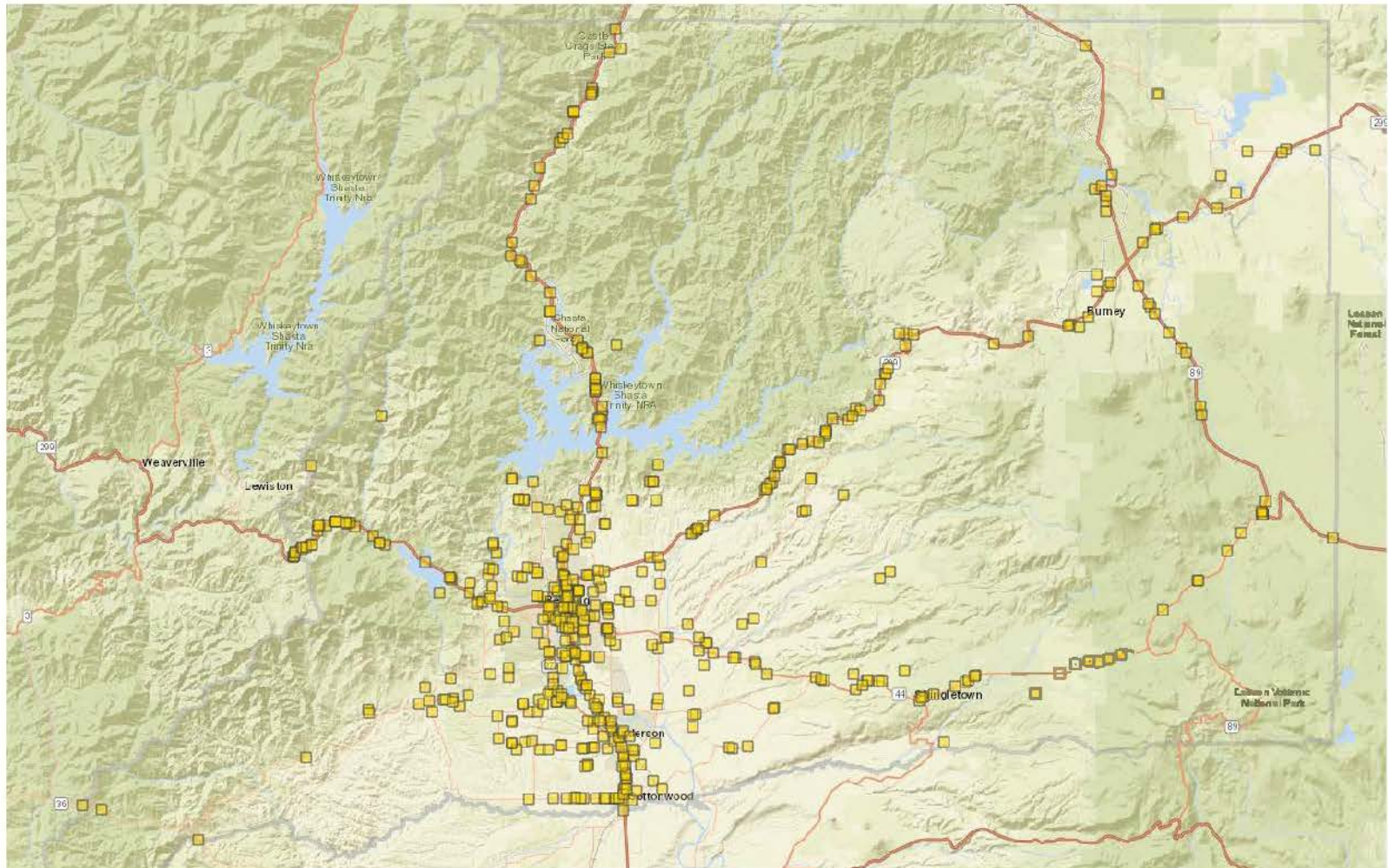
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# Shasta County Road Departure Collisions

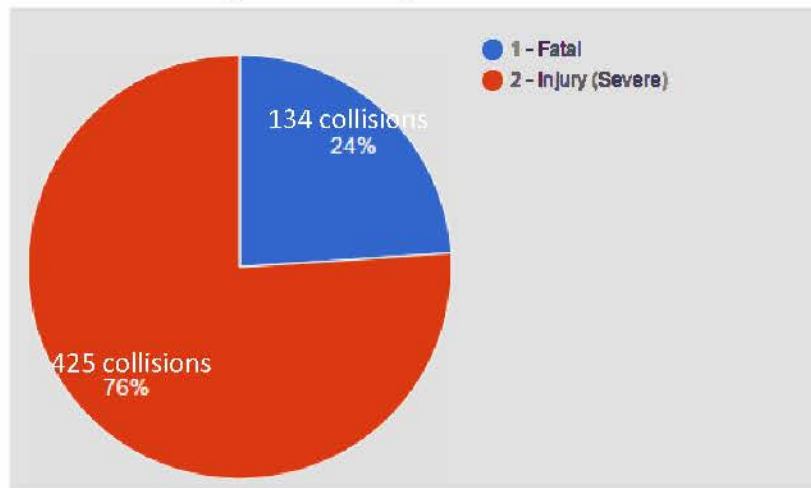
2006-2015

### Shasta County Road Departure collisions from 2006-2015



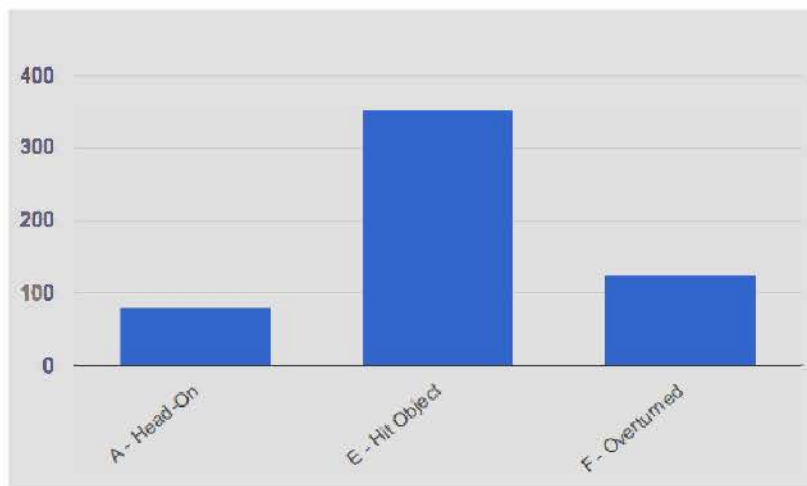
**559 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2006 to 2015 in all of Shasta County**

## Shasta County Summary Statistics



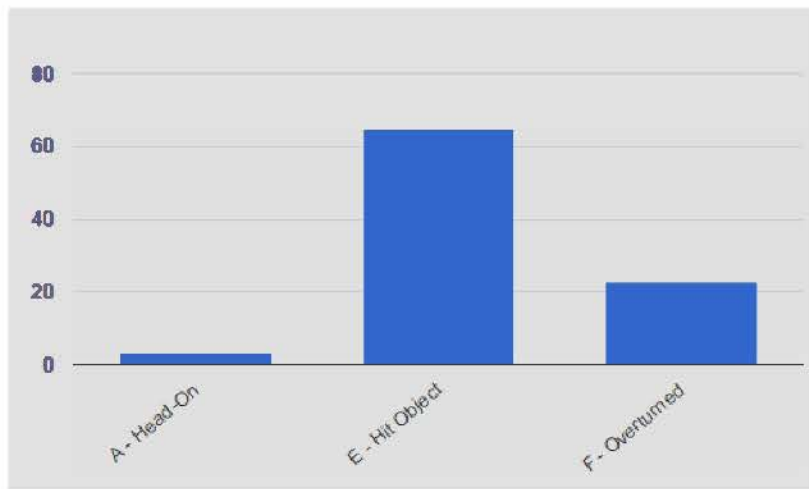
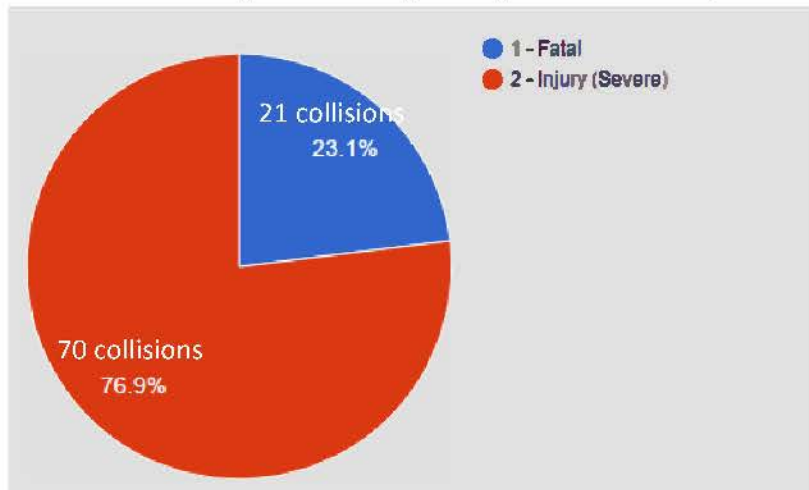
- Summary statistics for 559 collisions.

Primary Collision Factor	Collisions	Percentage
Driving or Bicycling Under the Influence of Alcohol or Drug	218	39%
Improper Turning	169	30.2%
Unsafe Speed	78	14%
Wrong Side of Road	52	9.3%
Other Than Driver (or Pedestrian)	14	2.5%
Unsafe Lane Change	5	0.9%
Automobile Right of Way	5	0.9%
Unknown	3	0.5%
Other Hazardous Violation	3	0.5%
-- Not Stated or other	12	2.1%



Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	347	62.1%
Non-Collision	106	19%
Other Motor Vehicle	71	12.7%
Other Object	23	4.1%
Bicycle	3	0.5%
-- Not Stated or other	9	1.6%

## Shasta County State Highway-5 Summary Statistics



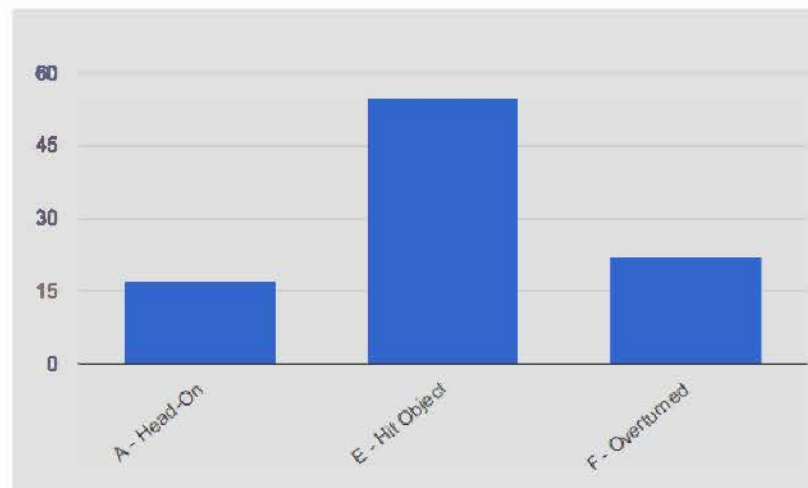
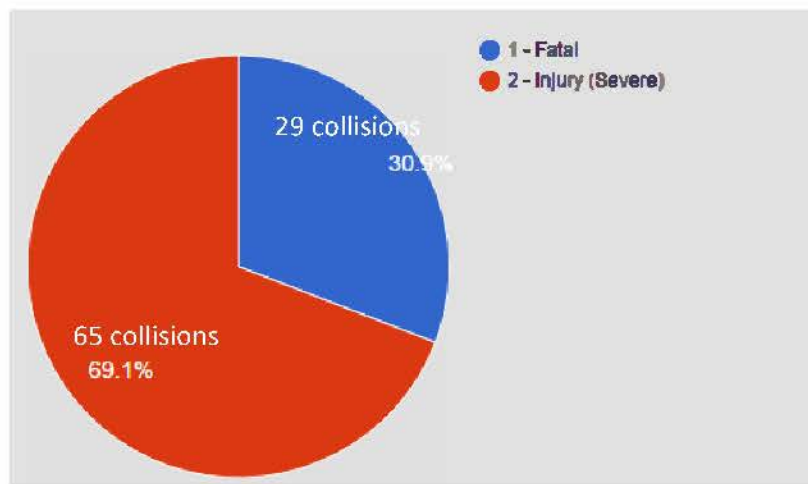
- Summary statistics for 91 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	40	44%
Driving or Bicycling Under the Influence of Alcohol or Drug	26	28.6%
Unsafe Speed	12	13.2%
Other Than Driver (or Pedestrian)	7	7.7%
Unsafe Lane Change	4	4.4%
- - Not Stated	1	1.1%
Other Equipment	1	1.1%

Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	66	72.5%
Non-Collision	20	22%
Other Motor Vehicle	3	3.3%
Other Object	2	2.2%



## Shasta County State Highway-299 Summary Statistics



- Summary statistics for 94 collisions.

Primary Collision Factor	Collisions	Percentage
01 - Driving or Bicycling Under the Influence of Alcohol or Drug	30	31.9%
08 - Improper Turning	29	30.9%
03 - Unsafe Speed	18	19.1%
05 - Wrong Side of Road	15	16%
09 - Automobile Right of Way	1	1.1%
18 - Other Than Driver (or Pedestrian)	1	1.1%

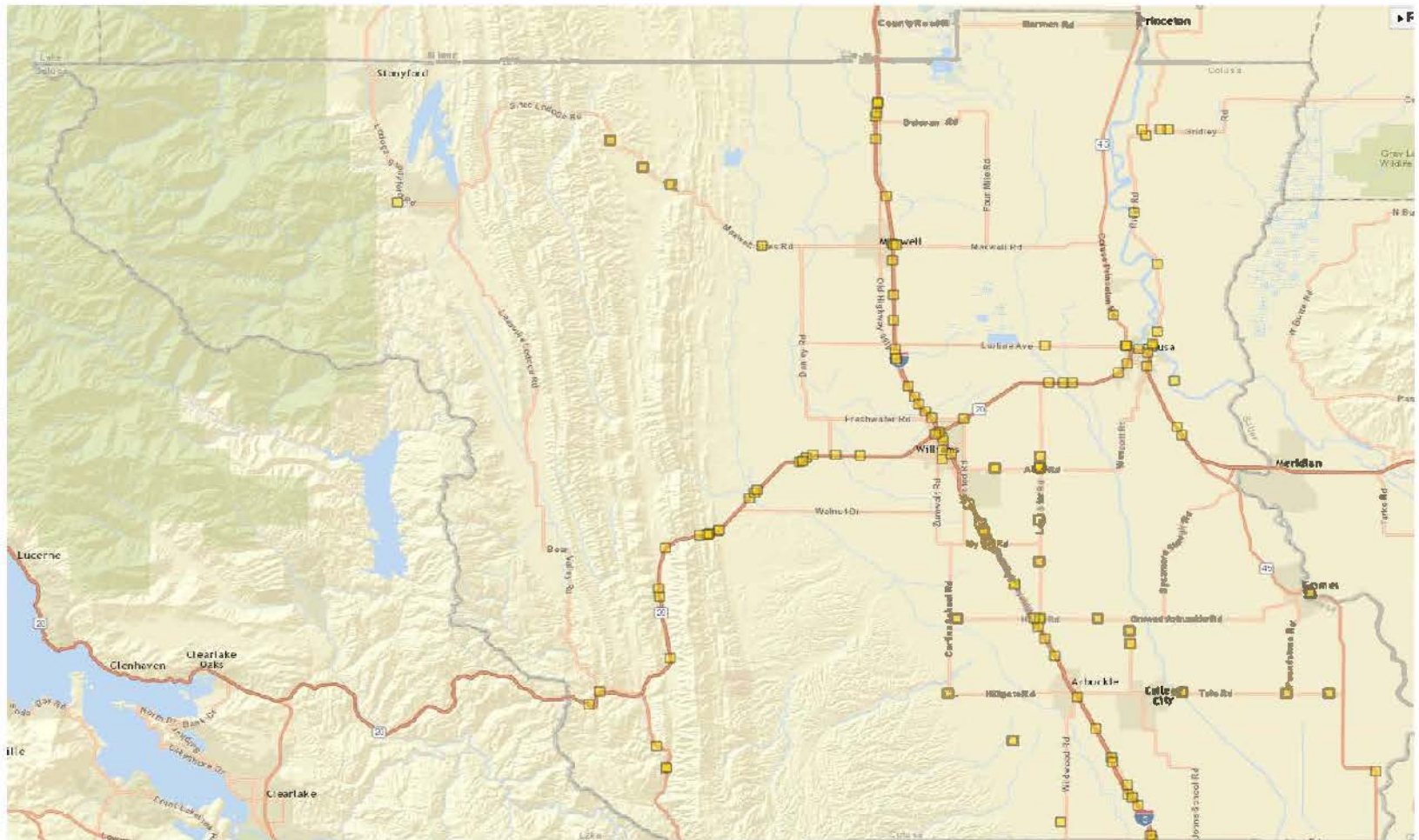
Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	57	60.6%
Other Motor Vehicle	17	18.1%
Non-Collision	15	16%
Other Object	4	4.3%
-- Not Stated	1	1.1%



# Colusa County Road Departure Collisions

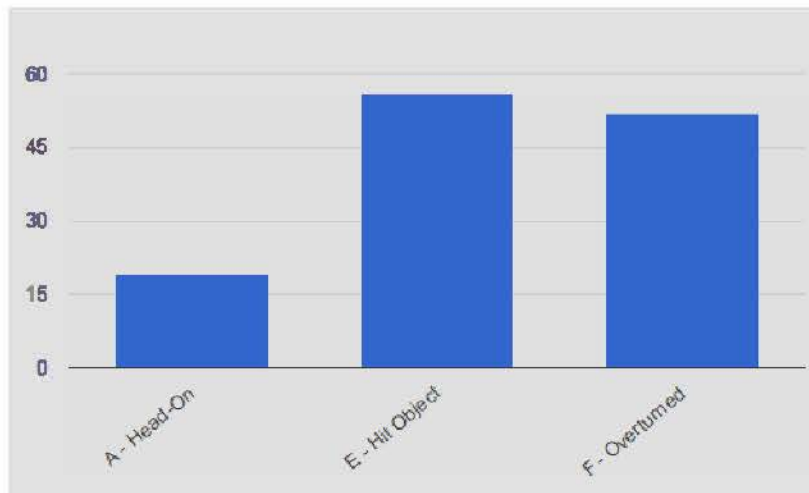
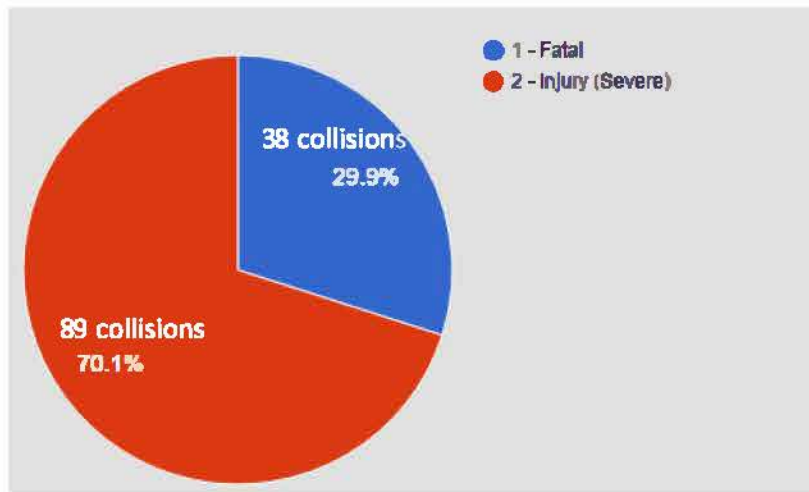
2006-2015

## Colusa County Road Departure collisions from 2006-2015



127 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2006 to 2015 in all of Colusa County

## Colusa County Summary Statistics

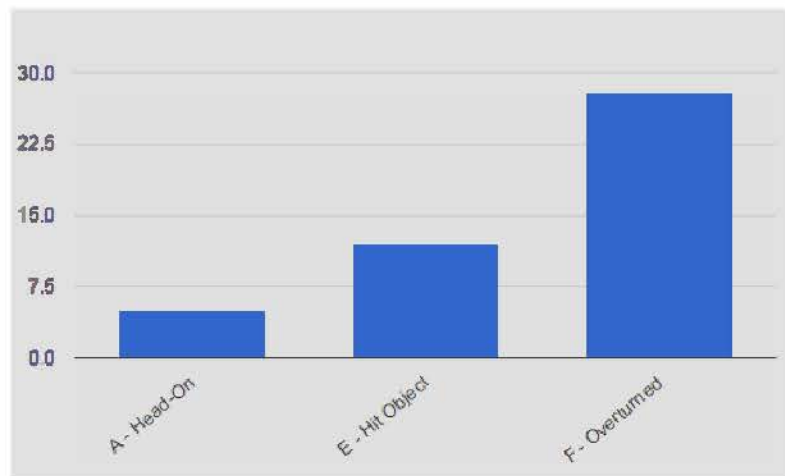
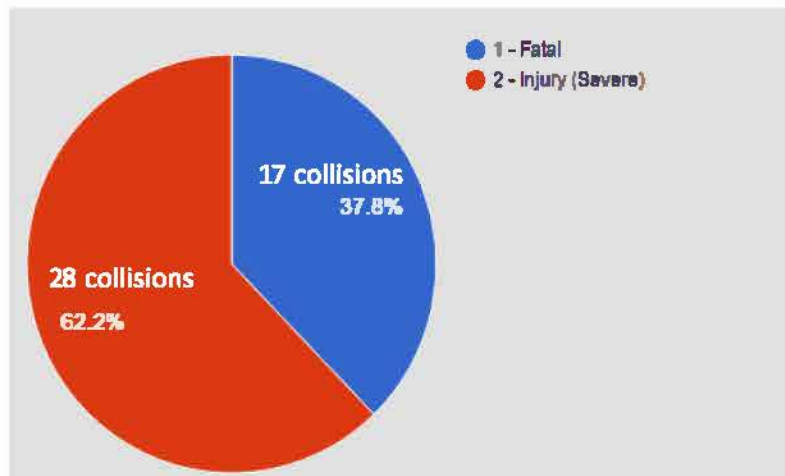


- Summary statistics for 127 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	68	53.5%
Driving or Bicycling Under the Influence of Alcohol or Drug	33	26%
Wrong Side of Road	7	5.5%
Unsafe Speed	5	3.9%
Automobile Right of Way	4	3.1%
Improper Passing	3	2.4%
Unsafe Lane Change	2	1.6%
Other Than Driver (or Pedestrian)	2	1.6%
Not Stated	1	0.8%
Pedestrian Violation	1	0.8%
Traffic Signals and Signs	1	0.8%

Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	58	45.7%
Non-Collision	51	40.2%
Other Motor Vehicle	15	11.8%
Pedestrian	1	0.8%
Motor Vehicle on Other Roadway	1	0.8%
Other Object	1	0.8%

## Colusa County State Highway-5 Summary Statistics

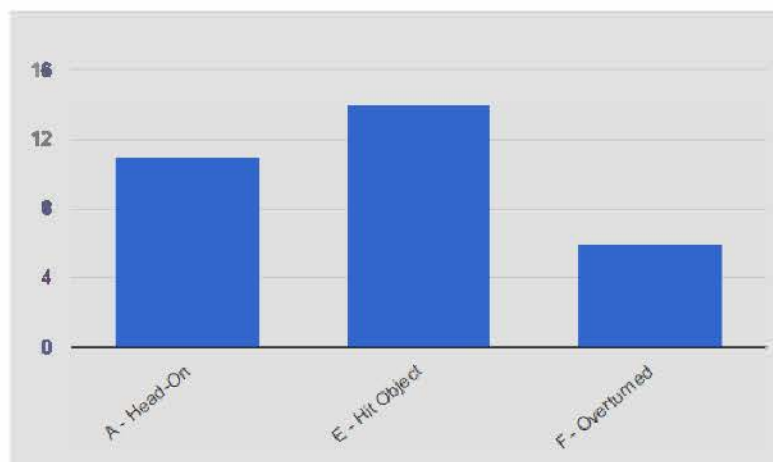
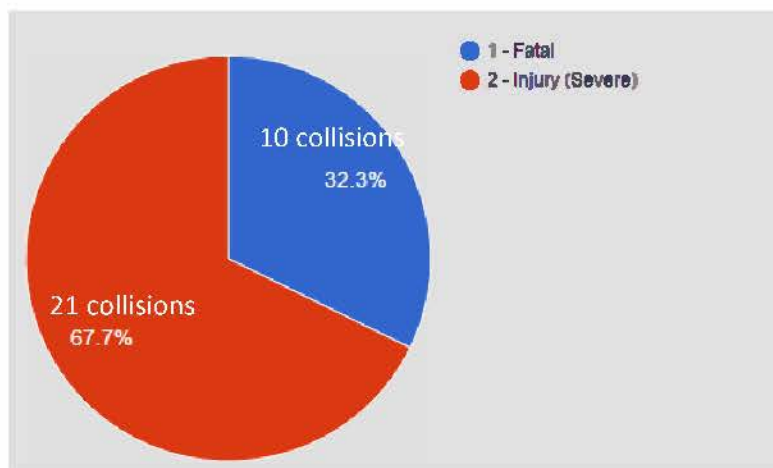


- Summary statistics for 45 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	31	68.9%
Driving or Bicycling Under the Influence of Alcohol or Drug	9	20%
Unsafe Lane Change	2	4.4%
Other Than Driver (or Pedestrian)	2	4.4%
Wrong Side of Road	1	2.2%

Motor Vehicle Involved With	Collisions	Percentage
Non-Collision	28	62.2%
Fixed Object	13	28.9%
Other Motor Vehicle	3	6.7%
Motor Vehicle on Other Roadway	1	2.2%

## Colusa County State Highway-20 Summary Statistics



- Summary statistics for 31 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	13	41.9%
Driving or Bicycling Under the Influence of Alcohol or Drug	7	22.6%
Wrong Side of Road	4	12.9%
Improper Passing	3	9.7%
Automobile Right of Way	3	9.7%
Pedestrian Violation	1	3.2%

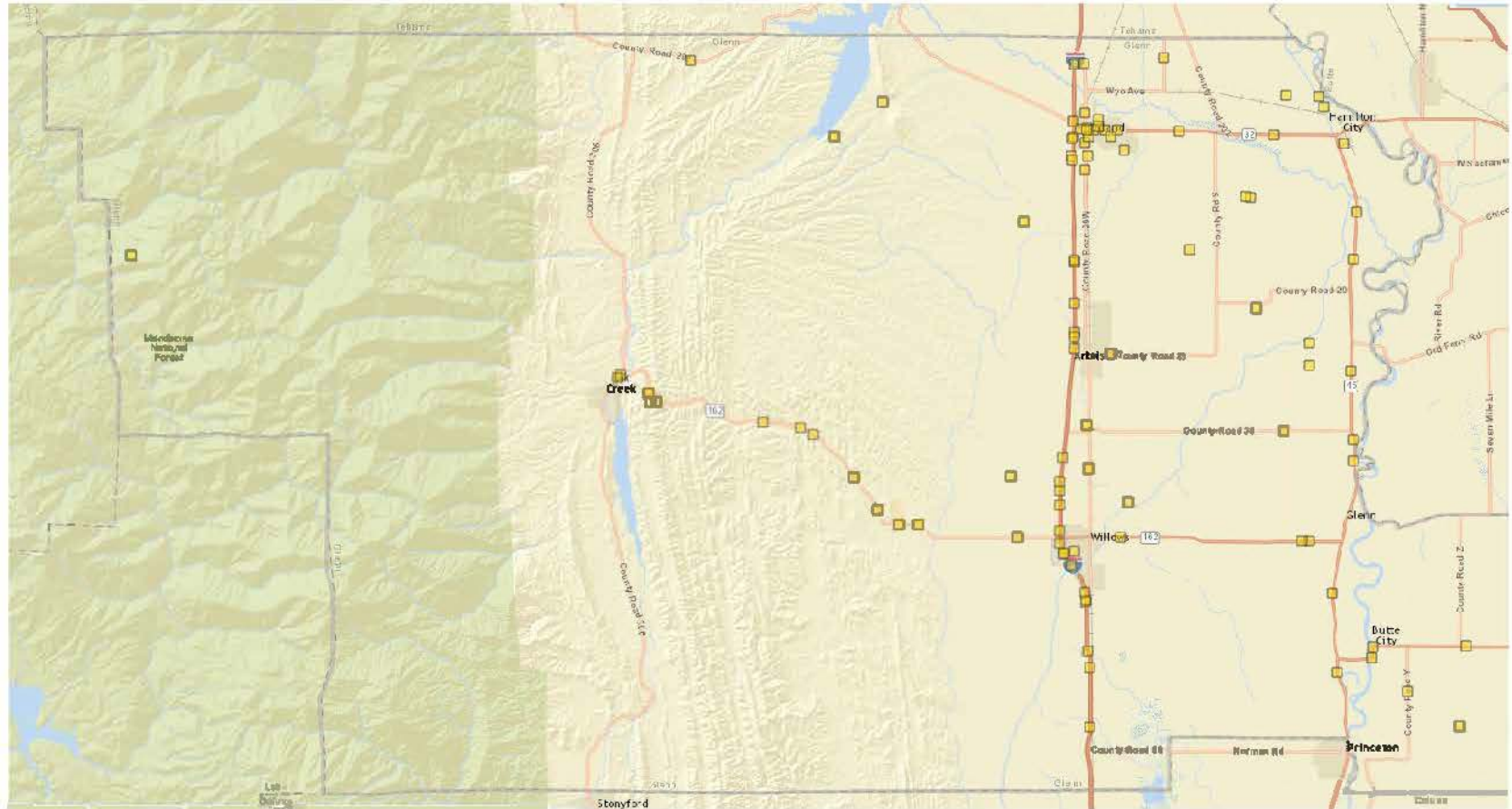
Motor Vehicle Involved With	Collisions	Percentage
I - Fixed Object	13	41.9%
C - Other Motor Vehicle	10	32.3%
A - Non-Collision	7	22.6%
B - Pedestrian	1	3.2%

# Glenn County Road Departure Collisions

SWITRS Data 2006-2015

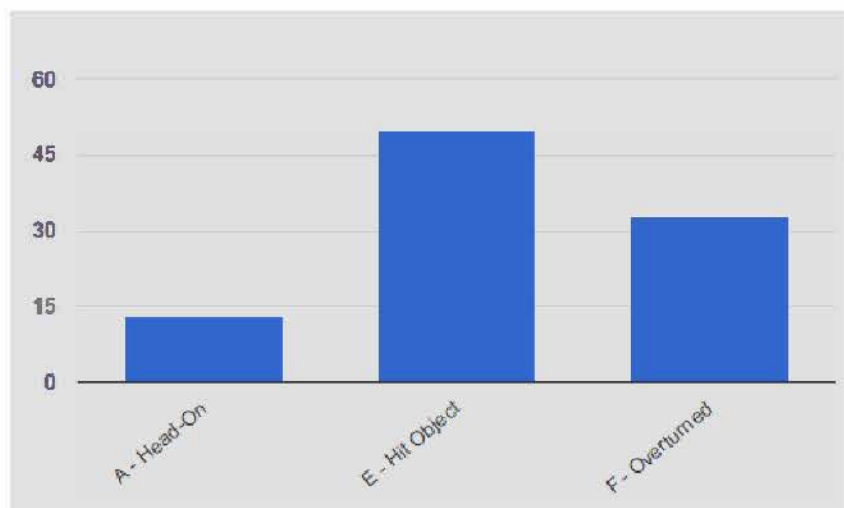
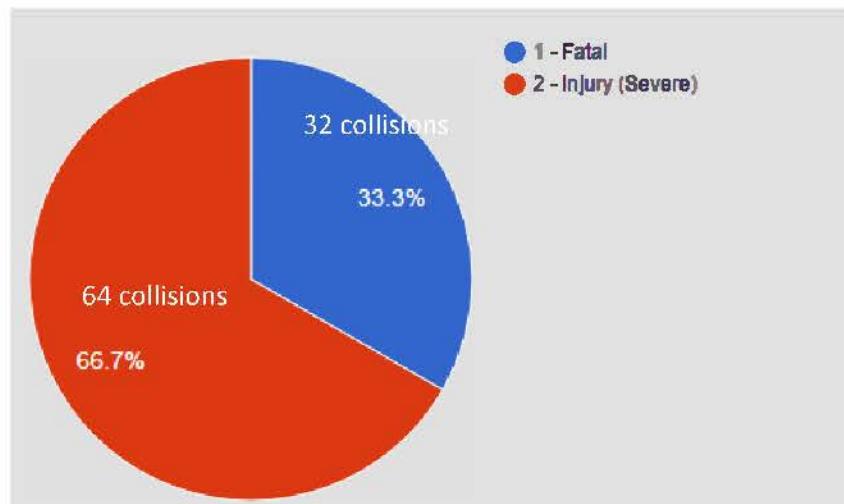


## Glenn County Road Departure collisions from 2006-2015



**96 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2006 to 2015 in all of Glenn County**

## Glenn County Summary Statistics



- Summary statistics for 96 collisions.

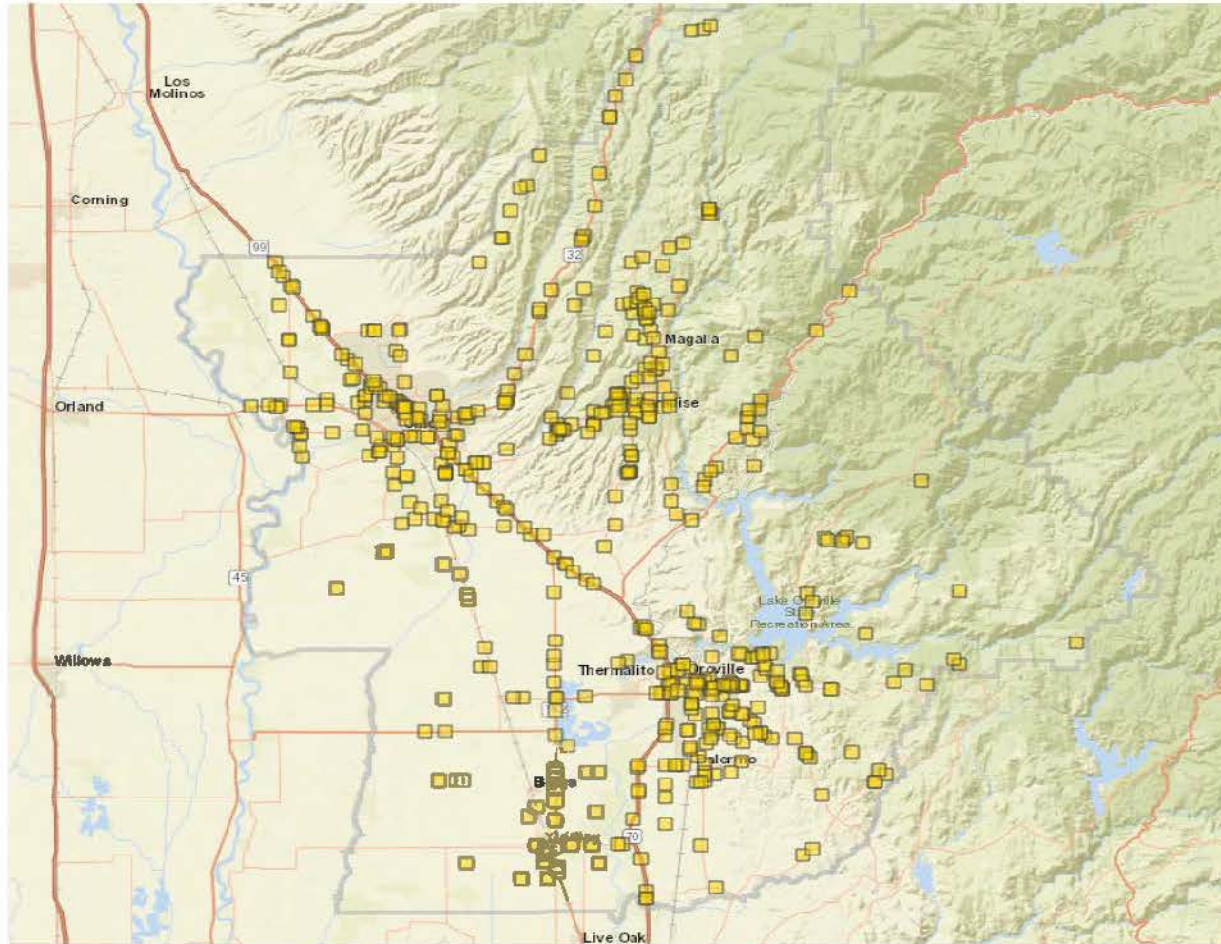
Primary Collision Factor	Collisions	Percentage
Improper Turning	41	42.7%
Driving or Bicycling Under the Influence of Alcohol or Drug	36	37.5%
Unsafe Speed	8	8.3%
Automobile Right of Way	6	6.3%
Wrong Side of Road	3	3.1%
-- Not Stated	1	1%
Other Than Driver (or Pedestrian)	1	1%

Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	50	52.1%
Non-Collision	33	34.4%
Other Motor Vehicle	12	12.5%
Other Object	1	1%

# Butte County Road Departure Collisions

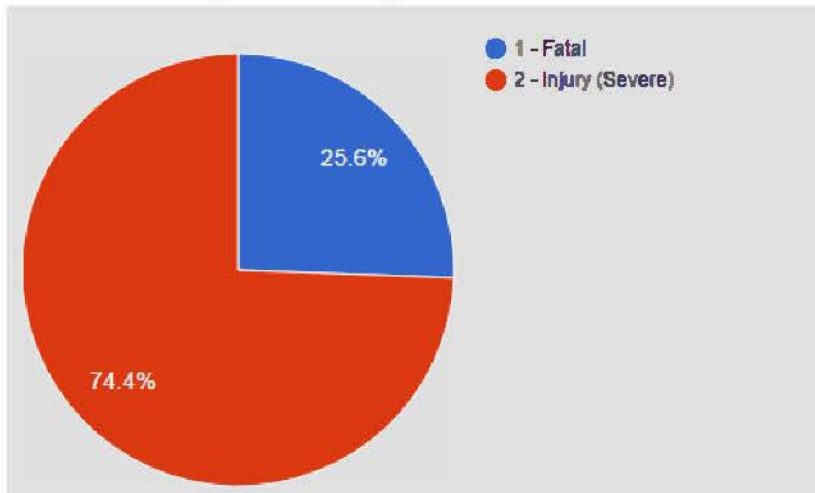
SWITRS Data 2006-2015

## Butte County Road Departure collisions from 2006-2015



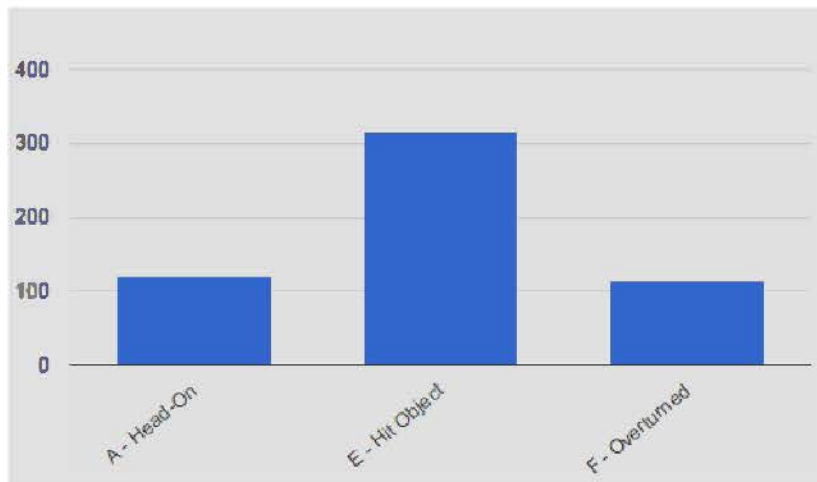
551 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2006 to 2015 in all of Butte County

## Butte County Summary Statistics



- Summary statistics for 551 collisions.

Primary Collision Factor	Collisions	Percentage
Driving or Bicycling Under the Influence of Alcohol or Drug	201	36.5%
Improper Turning	114	20.7%
Unsafe Speed	88	16%
Wrong Side of Road	67	12.2%
Automobile Right of Way	19	3.4%
Other Than Driver (or Pedestrian)	15	2.7%
Other Hazardous Violation	12	2.2%
-- Not Stated	10	1.8%
Other	25	4.5%



Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	310	56.3%
Other Motor Vehicle	106	19.2%
Non-Collision	92	16.7%
Other Object	22	4%
-- Not Stated	5	0.9%
Animal	5	0.9%
Pedestrian	4	0.7%
Parked Motor Vehicle	4	0.7%
Motor Vehicle on Other Roadway	2	0.4%
Bicycle	1	0.2%

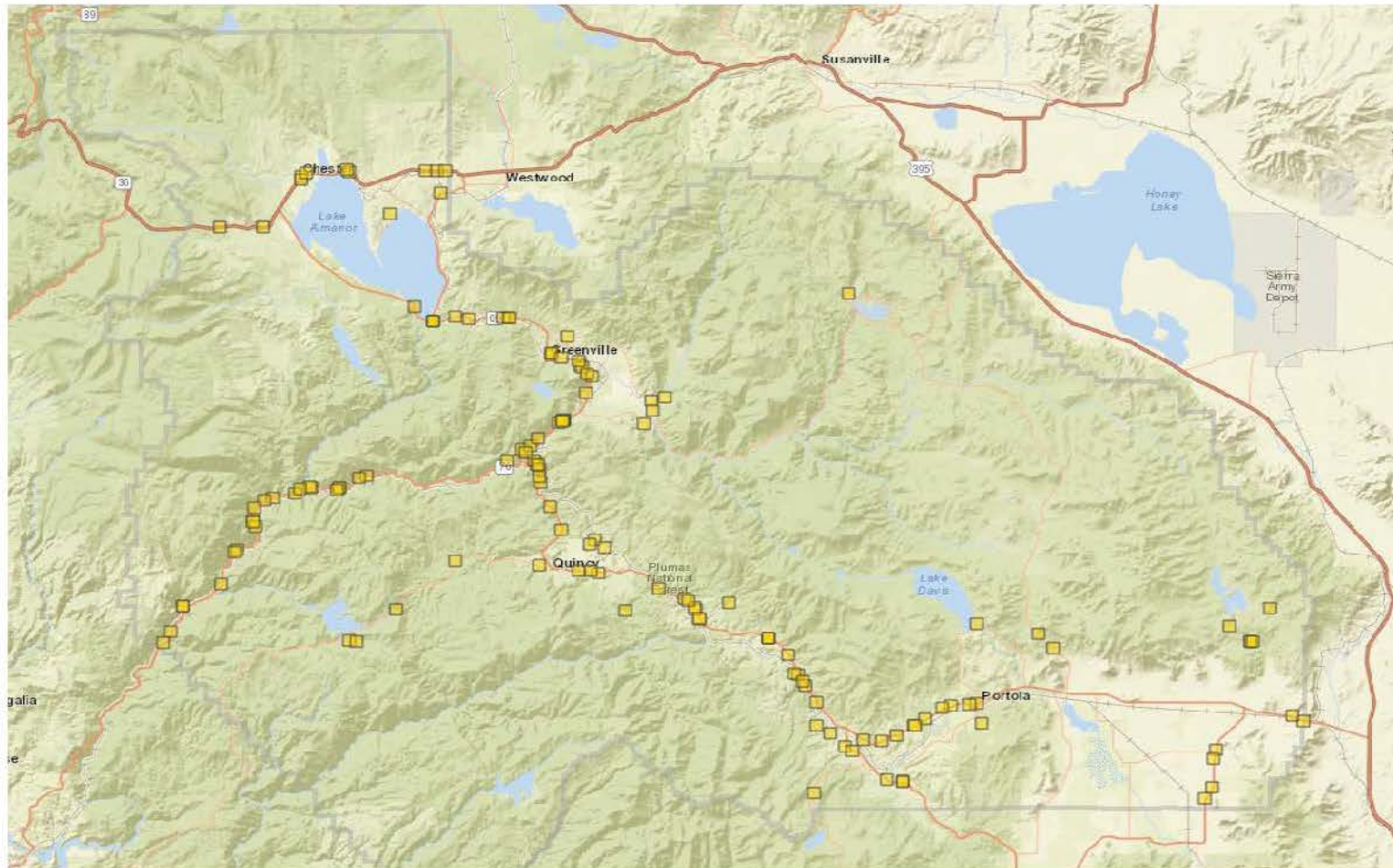


# Plumas and Trinity County Road Departure Collisions

SWITRS Data 2006-2015



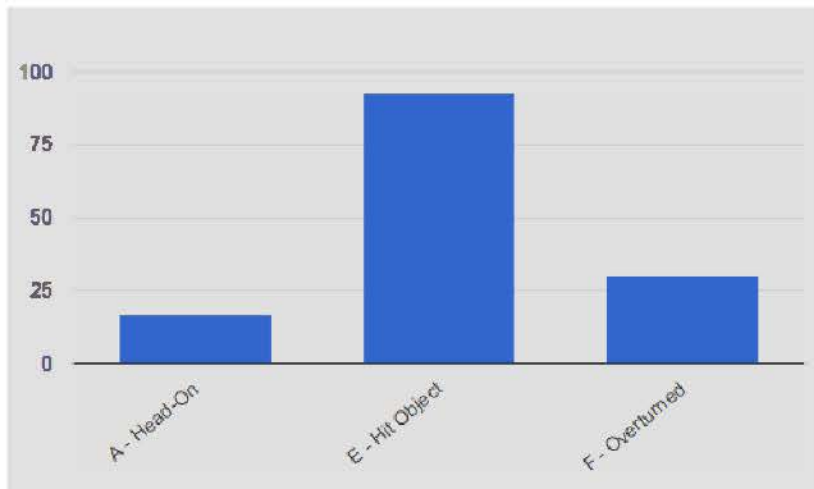
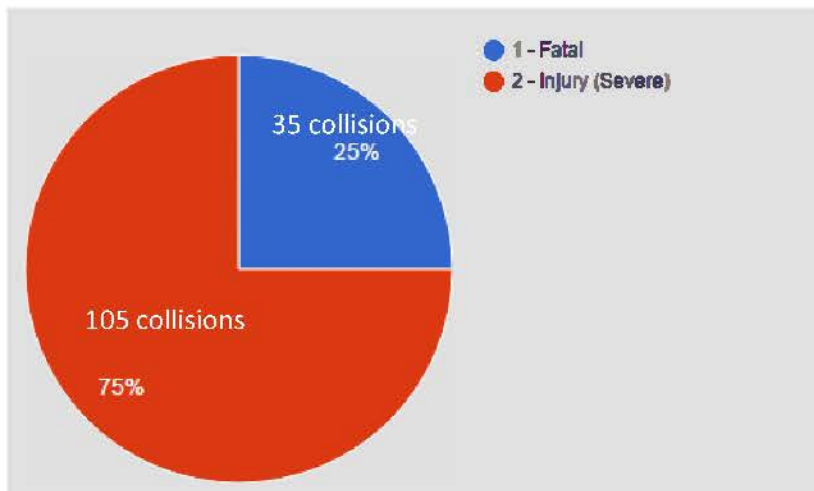
## Plumas County Road Departure collisions from 2006-2015



Note: Only 140 of 207 Collisions are geo-coded.

**140 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2006 to 2015 in all of Plumas County**

## Plumas County Summary Statistics



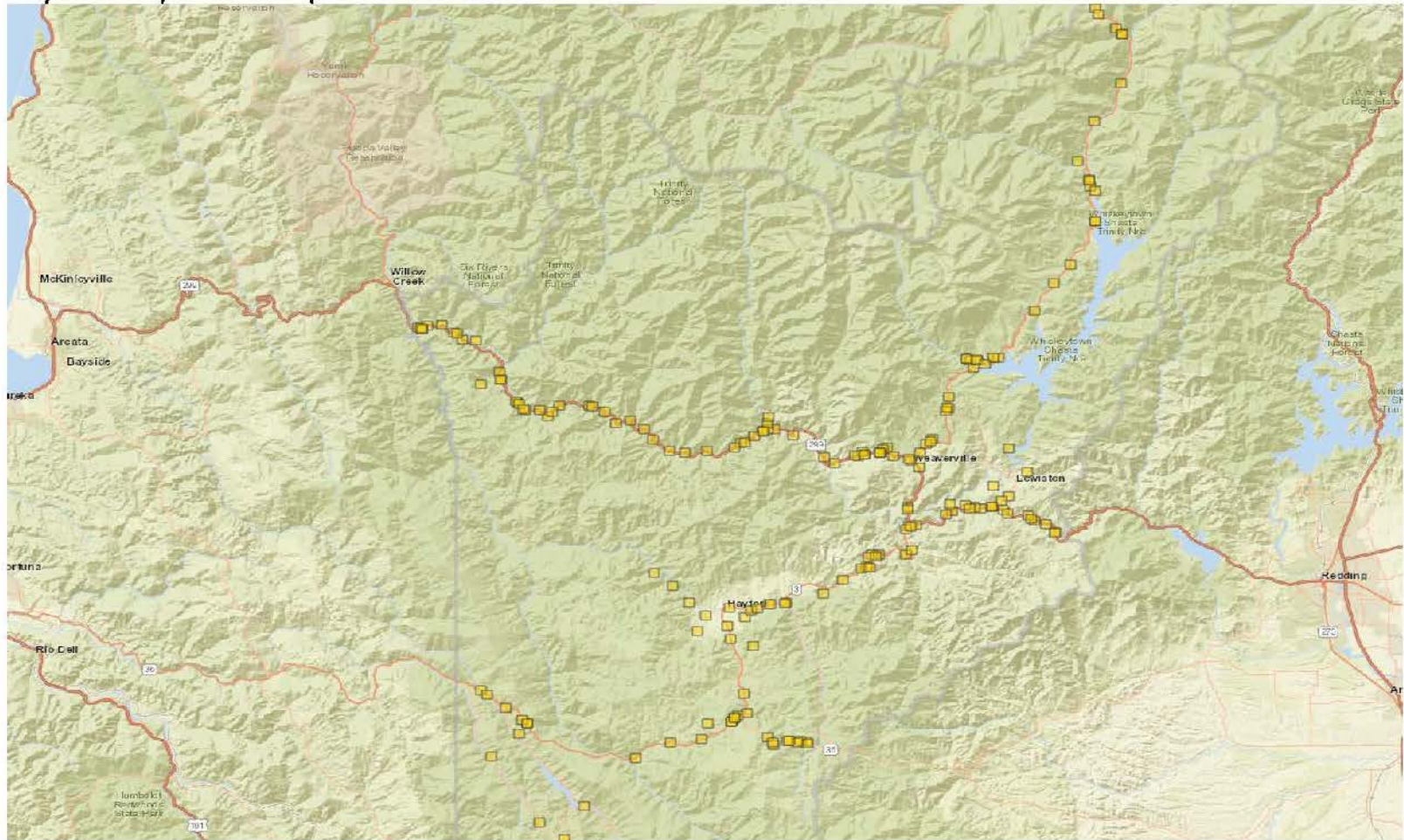
- Summary statistics for 140 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	49	35%
Driving or Bicycling Under the Influence of Alcohol or Drug	38	27.1%
Unsafe Speed	33	23.6%
Wrong Side of Road	12	8.6%
Other Than Driver (or Pedestrian)	4	2.9%
Other Hazardous Violation	2	1.4%
Not Stated	1	0.7%
Automobile Right of Way	1	0.7%

Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	88	62.9%
Non-Collision	30	21.4%
Other Motor Vehicle	16	11.4%
Other Object	5	3.6%
Parked Motor Vehicle	1	0.7%



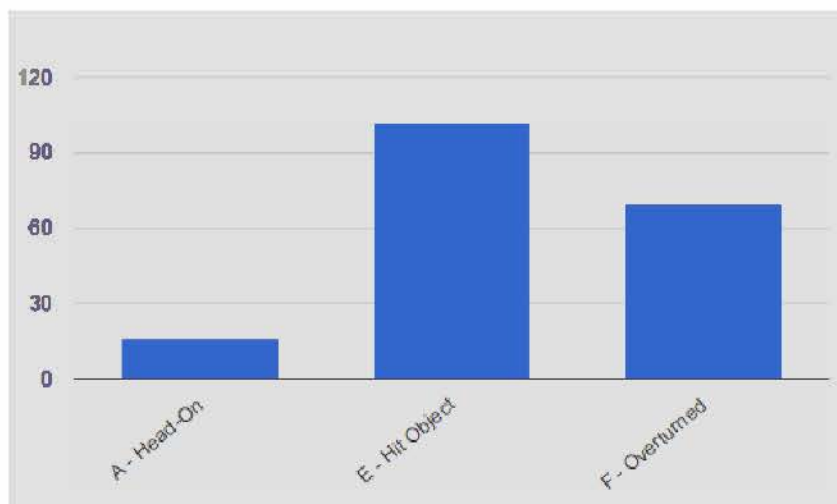
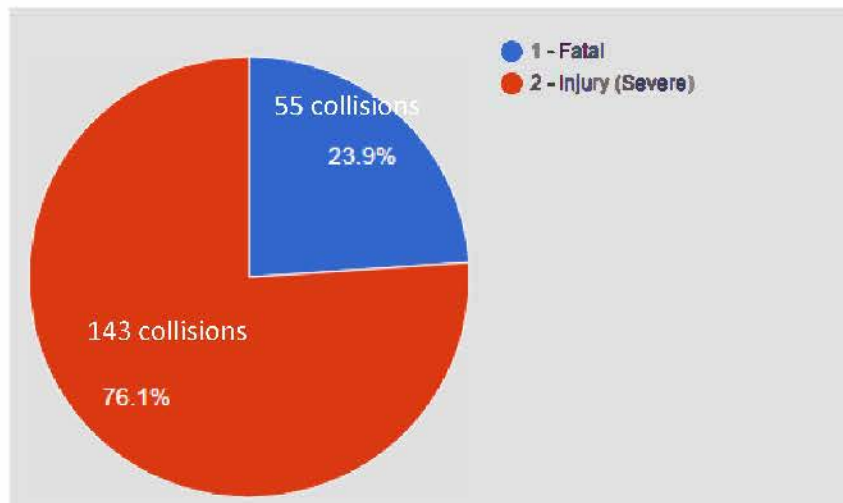
## Trinity County Road Departure collisions from 2006-2015



**Note: Only 188 of 232 collisions are geo-coded.**

**188 fatal or severe road departure collisions (head on, hit object and overturned collision factors) from 2011 to 2015 in all of Trinity County**

## Trinity County Summary Statistics



- Summary statistics for 188 collisions.

Primary Collision Factor	Collisions	Percentage
Improper Turning	72	38.3%
Driving or Bicycling Under the Influence of Alcohol or Drug	47	25%
Unsafe Speed	37	19.7%
Wrong Side of Road	10	5.3%
Other Hazardous Violation	9	4.8%
Other Than Driver (or Pedestrian)	7	3.7%
Not Stated	2	1.1%
Automobile Right of Way	2	1.1%
Unknown	1	0.5%
Traffic Signals and Signs	1	0.5%

Motor Vehicle Involved With	Collisions	Percentage
Fixed Object	102	54.3%
Non-Collision	65	34.6%
Other Motor Vehicle	15	8%
Other Object	4	2.1%
Animal	2	1.1%