Appendix A

Critical Facilities List

Zone	Catagory	Facility Name	Address	Community
A	Fairground	Frog Town Fairground	101 Frogtown Road	Angels Camp
A	City/Town/Community Hall	Mokelumne Hill Town Hall	8283 Main Street, Mokelumne Hill, CA, 95245	Mokelumne Hill
A	City/Town/Community Hall	San Andreas Town Hall	24 Church Hill Rd	San Andreas
A	Fire Protection District	Mokelumne Hill Fire Protection District Station #1	8160 Church St, Mokelumne Hill, CA 95245	Mokelumne Hill
A	Fire Station	CalFire Station - Altaville	125 N Main St	Angels Camp
A	Fire Protection District	San Andreas Fire Protection District Station #1	37 Church Hill Rd	San Andreas
A	Fire Protection District	Altaville Melones Fire Station	143 Monte Verda St	Angels Camp
A	Fire Station	City of Angels Camp Fire Station #1	1404 Vallecito Rd	Angels Camp
A	Medical/Health Care	Mark Twain Medical Center	768 Mountain Ranch Rd	San Andreas
A	Medical/Health Care	Allergy Immunology and Asthma	700 Mountain Ranch Rd	San Andreas
A	Medical/Health Care	Angels Camp Medical Facility	445 S Main St	Angels Camp
A	Medical/Health Care	Silver Oak Medical	702 Mountain Ranch Rd	San Andreas
A	Medical/Health Care	MACT Medical	265 W St Charles St	San Andreas
A	Medical/Health Care	Angels Camp Family Medical Office	222 S Main St	Angels Camp
A	Senior Living/Center	Calaveras Senior Center	956 Mountain Ranch Rd	San Andreas
A	Veterans	VFW Post 2600	156 W St Charles St	San Andreas
A	Medical/Health Care	Golden San Andreas Care Center	900 Mountain Ranch Rd	San Andreas
A	Senior Living/Center	Country Haven Senior Living Center	556 Toyon Dr	San Andreas
A	Crisis Center	Calaveras Crisis Center	1404 Gold Hunter Rd	San Andreas
A	Medical/Health Care	Angels Camp Medical Facility (Adventist Health)	445 S Main St	Angels Camp
A	Medical/Health Care	James B. Dalton Medical Center (Mark Twain Family Medical Center)	590 Stanislaus Ave	Angels Camp
A	Senior Living/Center	Sonora Prompt Care (Adventist Health)	23 N Main St	Angels Camp
A	Senior Living/Center	Foothill Village Senior Living Facility	1400 Foothill Village Dr	Angels Camp
A	Police Station	Angels Camp Police Department	200 Monte Verda St	Angels Camp
A	Utility Infrastructure	Angels Camp Water Treatment Plant	1954 Centennial Ln	Angels Camp
A	City/Town/Community Hall	Angels Camp City Hall	200 Monte Verda St	Angels Camp
A	Utility Infrastructure	Utica Water and Power Authority - Hydroelectric	1168 Booster Way	Angels Camp
A	Jail	Calaveras County Jail	1045 Jeff Tuttle Dr	San Andreas
A	Highway Maintenance Station	Caltrans Altaville Maintenance Station	173 Monte Verda St	Angels Camp
A	Helicopter Port	Mokelumne Hill Fire Protection District Station #1	768 Mountain Ranch Rd	San Andreas
A	Helicopter Port	Angels Camp City Hall	200 Monte Verda St	Angels Camp
A	Foodbank	Sierra Hope / Sierra Hope Food Bank	1168 Booster Way	Angels Camp
A	Foodbank	HRC Food Bank/Emergency Services	1113 CA-49	San Andreas
A	Foodbank	The Resource Connection	206 George Reed Dr	San Andreas
A	Helicopter Port	Frog Town	2465 Gunclub Rd	Angels Camp
A	Helicopter Port	Mokelumne Hill Ball field	8572 Lafayette St, Mokelumne Hill, CA 95245	Mokelumne Hill
B	City/Town/Community Hall	American Legion Post 376	2769 Upper Dorray Rd	Glencoe
B	Veterans	VFW Post 3322	202 Spink Rd	West Point
B	City/Town/Community Hall	Blue Mountain Coalition for Youth and Families	364 Main St	West Point
B	City/Town/Community Hall	West Point Community Hall	22283 State Rte 26	West Point
B	Veterans	West Point Veterans Memorial Hall	22273 State Rte 26	West Point
B	Fire Protection District	Copperopolis Fire Protection District Station #3	9164 Pool Station Rd	Angels Camp
B	Fire Protection District	West Point Fire Protection District Station #1	195 Spink Rd	West Point
B	Fire Station	CalFire Station - West Point	22670 State Rte 26	West Point
B	Veterans	VFW Post 3322	202 Spink Rd	West Point
B	Highway Maintenance Station	Caltrans West Point Maintenance Station	22412 State Rte 26	West Point
C	Highway Maintenance Station	Caltrans Cabbage Patch Maintenance Station (Winter Only)	HWY 4, Cabbage Patch	Cabbage Patch
D	City/Town/Community Hall	Jenny Lind Memorial Hall	189 Pine St	Valley Springs
D	Fire Protection District	Calaveras Consolidated Fire Protection District Station #2	129 CA-12	Valley Springs
D	Fire Protection District	Calaveras Consolidated Fire Protection District Station #3	6501 Jenny Lind Rd	Valley Springs
D	Fire Station	CalFire Station – Valley Springs	1855 New Hogan Pkwy	Valley Springs
D	Fire Protection District	Calaveras Consolidated Fire Protection District Station #1	3255 Helisma Rd	Valley Springs
D	Sheriff	Calaveras County Sherriff's Substation - Camanche Southshore	11700 Wade Ln	Valley Springs
D	Sheriff	Calaveras County Sheriff's Substation – Valley Springs	200 CA-12	Valley Springs
E	City/Town/Community Hall	Masonic Hall	384 Church St	Murphys
E	City/Town/Community Hall	Ebbetts Pass Moose Lodge #1123	1965 Blagen Rd	Arnold
E	City/Town/Community Hall	Native Sons of the Golden West	389 Main St	Murphys
E	Fire Protection District	Murphys Fire Protection District Station #1	37 Jones St	Murphys
E	Fire Protection District	Murphys Fire Protection District Station #2	3424 Main St	Vallecito
E	Fire Station	CalFire Station - Arnold	2517 CA-4	Arnold
E	Fire Protection District	Ebbetts Pass Fire Protection District Station #1	1037 Blagen Rd	Arnold
E	Fire Protection District	Ebbetts Pass Fire Protection District Station #2	5510 Meko Dr	Camp Connell
E	Fire Protection District	Ebbetts Pass Fire Protection District Station #3	40 Canyon View Dr	Hathaway Pines
E	Fire Protection District	Ebbetts Pass Fire Protection District Station #4	2038 Moran Rd	Arnold
E	Fire Station	CalFire Station - Murphys	33 Apple Blossom Dr	Murphys
E	Fire Station	USFS Dorrington Fire Station	5050 Smokey Ct, Camp Connell, CA 95223	Camp Connell
E	Fire Station	Dorrington Fire Station 2	5510 Meko Dr, Camp Connell, CA 95223	Camp Connell
E	Sheriff	Calaveras County Sheriff's Substation - Arnold	2182 CA-4	Arnold
E	Medical/Health Care	Arnold Family Medical Center	2037 CA-4	Arnold
E	City/Town/Community Hall	Faith Lutheran Church	65 Mitchler St	Murphys
E	Utility Infrastructure	Angels Camp Sewer Treatment Plant	1131 Murphys Grade Rd	Angels Camp
E	Utility Infrastructure	Union Public Utility District	339 Main St	Murphys
E	Highway Maintenance Station	Caltrans Camp Connell Maintenance Station	5507 Meko Dr	Arnold
E	Helicopter Port	Crescent Cove	Crescent Cove, Hathaway Pines, CA 95233	Hathaway Pines
E	Helicopter Port	Chalcedon Foundation	Chalcedon	Vallecito
F	City/Town/Community Hall	Mountain Ranch Youth Center	7869 Whiskey Slide Road	Mountain Ranch
F	City/Town/Community Hall	Mountain Ranch Community Hall	8049 Washington St	Mountain Ranch
F	City/Town/Community Hall	Rail Road Flat Community Hall	250 Railroad Flat St	Rail Rd Flat
F	Fire Station	CalFire Station - Esperanza	9740 Mountain Ranch Rd	Mountain Ranch
F	Fire Protection District	Central Calaveras Fire Protection District Station #1	19927 Jesus Maria Rd	Mokelumne Hill
F	Fire Protection District	Central Calaveras Fire Protection District Station #2	6338 Swiss Ranch Rd	Mountain Ranch
F	Fire Protection District	Central Calaveras Fire Protection District Station #3	8041 Washington St	Mountain Ranch
F	Fire Protection District	Central Calaveras Fire Protection District Station #4	15815 State Rte 26	Glencoe
F	Fire Protection District	Central Calaveras Fire Protection District Station #5	11309 Sheep Ranch Rd	Sheep Ranch
G	Fire Protection District	Copperopolis Fire Protection District Station #2	1927 Quiver St	Copperopolis
G	Fire Station	CalFire Station - Copperopolis	433 Main St	Copperopolis

G	Fire Protection District	Copperopolis Fire Protection District Station #1	370 Main St	Copperopolis
G	Sheriff	Calaveras County Sheriff's Substation - Copperopolis	3505 Spangler Ln	Copperopolis
G	Helicopter Port	Copperopolis Fire Station #1	370 Main St	Copperopolis

Category	Name	Address	Community
Animal Services	Calaveras Animal Services	t 901 Jeff Tuttle Drive	San Andreas
Firgrounds	Firgrounds	2465 Gun Club Road	Angels Camp
School	Albert Michelson Elementary School Grade K-5	196 Pennsylvania Gulch Rd	Murphys
School	Angels Creek Community Day School	1219 Rasberry Ln	Angels Camp
School	Arnold High School	874 Henry Rd #4	Arnold
School	Avery Middle School Grade 6-8	4545 Moran Rd	Avery
School	Bret Harte Union High School District	323 South Main St	Angels Camp
School	Bret Harte Union High School Grade 9-12	364 Murphys Grade Road	Angels Camp
School	Calaveras County Office of Education	185 S. Main St	Angels Camp
School	Calaveras High School Grade 9-12	350 High School Street	San Andreas
School	Calaveras Unified School District	3304 Hwy 12 Bldg.B	San Andreas
School	Community Day School	1605 Blagen Rd	Arnold
School	Copper Cove High School	19 Copper Dr.	Copperopolis
School	Copperopolis Elementary School Grade K-6	217 School Street	Copperopolis
School	Gold Strike High School Grade 10-12	501 Gold Strike Rd	San Andreas
School	Hazel Fisher Elementary School Grade K-5	1605 Blagen Rd	Arnold
School	Home School Academy	196 Pennsylvania Gulch Rd	Murphys
School	Jenny Lind Alternative High School Grade 9-12	11618 School Street	Jenny Lind
School	Jenny Lind Elementary School Grade K-6	5100 Driver Rd	Valley Springs
School	Mark Twain Union Elementary School District	981 Tuolumne Av	Angels Camp
School	Mark Twain Union Elementary School Grade K-8	646 Stanislaus Ave	Angels Camp
School	Mokelume Hill Elementary School Grade K-6	8350 Highway 26	Mokelumne Hill
School	Mountain Oaks School	924 Church Hill Rd Unit B1&B2	San Andreas
School	Mountain Ranch Community School	3667 Whiskey Slide Rd	Mountain Ranch
School	Oakendell Court School	3585 Hawver Road	San Andreas
School	Rail Road Flat Elementary School Grade K-6	298 Rail Road Flat Rd	Rail Road Flat
School	Rite of Passage -ATCS	10400 Fricot City Rd	San Andreas
School	San Andreas Elementary School Grade K-6	255 Lewis Av	San Andreas
School	Sierra Hills Education Center	501 Gold Strike Rd	San Andreas
School	Special Education Administration Unit	185 S. Main St	Angels Camp
School	Toyon Middle School Grade 7 & 8	3412 Double Springs Rd	Valley Springs
School	Transition Program	255 Lewis Av	San Andreas
School	Vallecito High School	3670 Church St	Vallecito
School	Vallecito Union School District	4545 Moran Rd	Avery
School	Valley Springs Elementary School Grade K-6	240 Pine St	Valley Springs
School	West Point Alternative High School Grade 9-12	54 Bald Mountain Rd	West Point
School	West Point Elementary School Grade K-6	54 Bald Mountain Rd	West Point
City/Town/Community Hall	Mokelumne Hill Town Hall	8283 Main Street, Mokelumne Hill, CA, 95245	Mokelumne Hill
City/Town/Community Hall	San Andreas Town Hall	24 Church Hill Rd	San Andreas
City/Town/Community Hall	Angels Camp City Hall	200 Monte Verda St	Angels Camp
City/Town/Community Hall	American Legion Post 376	2769 Upper Dorray Rd	Glencoe
City/Town/Community Hall	Blue Mountain Coalition for Youth and Families	364 Main St	West Point
City/Town/Community Hall	West Point Community Hall	22283 State Rte 26	West Point
City/Town/Community Hall	Jenny Lind Memorial Hall	189 Pine St	Valley Springs
City/Town/Community Hall	Masonic Hall	384 Church St	Murphys
City/Town/Community Hall	Ebbetts Pass Moose Lodge #1123	1965 Blagen Rd	Arnold
City/Town/Community Hall	Native Sons of the Golden West	389 Main St	Murphys
City/Town/Community Hall	Faith Lutheran Church	65 Mitchler St	Murphys
City/Town/Community Hall	Mountain Ranch Youth Center	7869 Whiskey Slide Road	Mountain Ranch
City/Town/Community Hall	Mountain Ranch Community Hall	8049 Washington St	Mountain Ranch
City/Town/Community Hall	Rail Road Flat Community Hall	250 Railroad Flat St	Rail Rd Flat

Appendix B

Potential Resiliency Projects Exhibits

Legend

- Highway Defensible Space Clearing Areas
- County Road Defensible Space Clearing Areas
- Calaveras County Boundary
- Calaveras County Main Roads
- Highways

HAZARD TREE REMOVAL:
Removing structurally deficient or compromised trees and limbs that are likely to fall on the roadway.

DEFENSIBLE SPACE CLEARING:
Trimming vegetation to keep flames smaller and closer to the ground, and to interrupt a fire ladder and path.

Esri, NASA, NGA, USGS, California State Parks, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Defensible Space Clearing and Hazard Tree Removal Projects

Potential Clearing Projects on County Roads

Project Number	Road Name	Project Number	Road Name
1	RIDGE RD	39	SHEEP RANCH RD
2	MORAN RD	40	SHEEP RANCH RD
3	PARROTS FERRY ROAD	41	MOUNTAIN RANCH RD
4	MURPHYS GRADE RD	42	MOUNTAIN RANCH RD
5	JESUS MARIA RD	43	MOUNTAIN RANCH RD
6	JESUS MARIA RD	44	MOUNTAIN RANCH RD
7	RAILROAD FLAT RD	45	SHEEP RANCH RD
8	RAILROAD FLAT RD	46	SHEEP RANCH RD
9	RAILROAD FLAT RD	47	SHEEP RANCH RD
10	RAILROAD FLAT RD	48	SHEEP RANCH RD
11	RAILROAD FLAT RD	49	MORAN RD
12	RAILROAD FLAT RD	50	MORAN RD
13	RAILROAD FLAT RD	51	SHEEP RANCH RD
14	RAILROAD FLAT RD	52	SHEEP RANCH RD
15	RAILROAD FLAT RD	53	SHEEP RANCH RD
16	RAILROAD FLAT RD	54	SHEEP RANCH RD
17	RIDGE RD	55	SHEEP RANCH RD
18	RIDGE RD	56	SHEEP RANCH RD
19	RAILROAD FLAT RD	57	SUMMIT LEVEL RD
20	RAILROAD FLAT RD	58	SUMMIT LEVEL RD
21	MOUNTAIN RANCH RD	59	SUMMIT LEVEL RD
22	MOUNTAIN RANCH RD	60	SUMMIT LEVEL RD
23	SHEEP RANCH RD	61	SUMMIT LEVEL RD
24	SHEEP RANCH RD	62	SUMMIT LEVEL RD
25	JESUS MARIA RD	63	SUMMIT LEVEL RD
26	JESUS MARIA RD	64	SUMMIT LEVEL RD
27	RAILROAD FLAT RD	65	SUMMIT LEVEL RD
28	RAILROAD FLAT RD	66	SUMMIT LEVEL RD
29	RIDGE RD	67	SUMMIT LEVEL RD
30	RIDGE RD	68	SUMMIT LEVEL RD
31	JESUS MARIA RD	69	SUMMIT LEVEL RD
32	JESUS MARIA RD	70	SUMMIT LEVEL RD
33	JESUS MARIA RD	71	RAILROAD FLAT RD
34	JESUS MARIA RD	72	RAILROAD FLAT RD
35	RAILROAD FLAT RD	73	RAILROAD FLAT RD
36	RAILROAD FLAT RD	74	JESUS MARIA RD
37	JESUS MARIA RD	75	JESUS MARIA RD
38	JESUS MARIA RD	76	JESUS MARIA RD

Potential Clearing Projects on State Routes

Project Number	Road Name	Project Number	Road Name	Project Number	Road Name
1	HWY4	39	HWY4	77	HWY26
2	HWY4	40	HWY4	78	HWY26
3	HWY4	41	HWY4	79	HWY26
4	HWY4	42	HWY4	80	HWY26
5	HWY4	43	HWY4	81	HWY26
6	HWY4	44	HWY4	82	HWY26
7	HWY4	45	HWY4	83	HWY26
8	HWY4	46	HWY4	84	HWY26
9	HWY4	47	HWY4	85	HWY26
10	HWY4	48	HWY4	86	HWY26
11	HWY4	49	HWY4	87	HWY26
12	HWY4	50	HWY4	88	HWY26
13	HWY4	51	HWY4	89	HWY26
14	HWY4	52	HWY4	90	HWY26
15	HWY4	53	HWY4	91	HWY26
16	HWY4	54	HWY4	92	HWY26
17	HWY4	55	HWY4	93	HWY26
18	HWY4	56	HWY4	94	HWY26
19	HWY4	57	HWY4	95	HWY26
20	HWY4	58	HWY4	96	HWY26
21	HWY4	59	HWY26	97	HWY49
22	HWY4	60	HWY26	98	HWY49
23	HWY4	61	HWY26	99	HWY49
24	HWY4	62	HWY26	100	HWY49
25	HWY4	63	HWY26	101	HWY49
26	HWY4	64	HWY26	102	HWY49
27	HWY4	65	HWY26	103	HWY49
28	HWY4	66	HWY26	104	HWY49
29	HWY4	67	HWY26	105	HWY49
30	HWY4	68	HWY26	106	HWY49
31	HWY4	69	HWY26	107	HWY49
32	HWY49	70	HWY26	108	HWY49
33	HWY26	71	HWY26	109	HWY49
34	HWY49	72	HWY26	110	HWY49
35	HWY4	73	HWY26	111	HWY49
36	HWY4	74	HWY26		
37	HWY4	75	HWY26		
38	HWY4	76	HWY26		

Projects Located where 100-year FEMA Flood Plain Crosses a Road

Legend

Calaveras County Boundary

Potential Future Repair Projects To Prevent Flooding

FEMA 100 Year Flood Zone

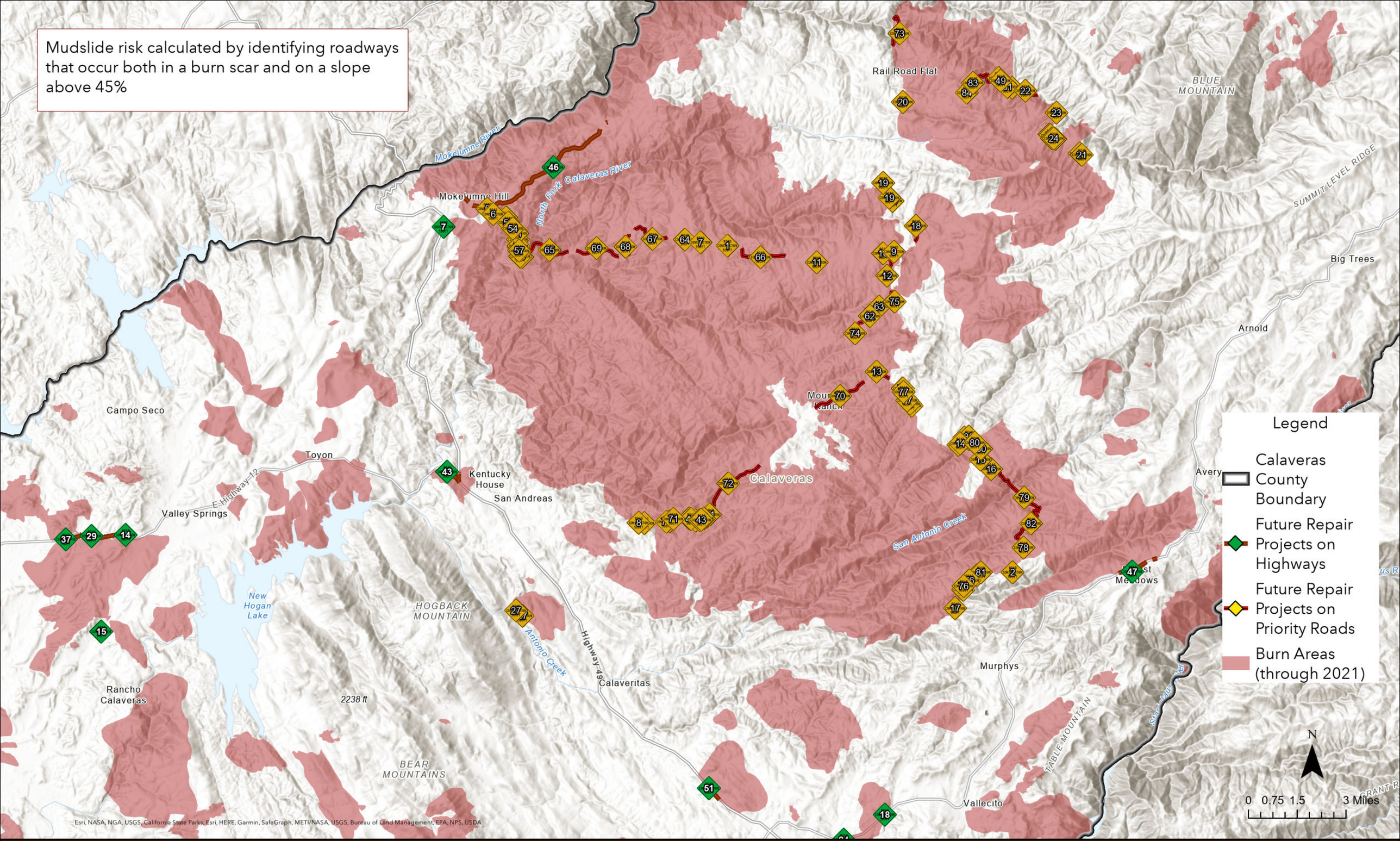
Esri, NASA, NGA, USGS, California State Parks, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA

Future Repair Projects to Prevent Flooding

Potential Flooding Projects on County Roads					
Project Number	Road Name	Project Number	Road Name	Project Number	Road Name
1	O'BYRNES FERRY RD	11	RAILROAD FLAT RD	21	JESUS MARIA RD
2	O'BYRNES FERRY RD	12	SUMMIT LEVEL RD	22	SHEEP RANCH RD
3	MORAN RD	13	SUMMIT LEVEL RD	23	SHEEP RANCH RD
4	MORAN RD	14	MILTON RD	24	SHEEP RANCH RD
5	MILTON RD	15	MILTON RD	25	SHEEP RANCH RD
6	MILTON RD	16	MILTON RD	26	SHEEP RANCH RD
7	SUMMIT LEVEL RD	17	MILTON RD	27	RAILROAD FLAT RD
8	MAIN ST	18	HUNT RD	28	POOL STATION RD
9	MAIN ST	19	JESUS MARIA RD	29	PARROTS FERRY ROAD
10	RAILROAD FLAT RD	20	JESUS MARIA RD		

Potential Flooding Projects on State Routes					
Project Number	Road Name	Project Number	Road Name	Project Number	Road Name
30	SR 4 PM 5.9	40	SR 49 PM 14.1	50	SR 49 PM 21.5
32	SR 49 PM 0.1	42	SR 26 PM 9	52	SR 4 PM 40.700001
34	SR 4 PM 16.9	44	SR 26 PM 9.1	54	SR 49 PM 30.865
36	SR 4 PM 17.700001	46	SR 12 PM 17.299999	56	SR 26 PM 30
38	SR 26 PM 1.3	48	SR 49 PM 20.700001	58	SR 26 PM 38.325001

Mudslide risk calculated by identifying roadways that occur both in a burn scar and on a slope above 45%



Future Repair Projects Due to Mudslides

Future State Route Projects Due to Mudslides					
Project Number	Road Name	Project Number	Road Name	Project Number	Road Name
1	SR-4	21	SR-12	41	SR-4
2	SR-4	22	SR-4	42	SR-26
3	SR-4	23	SR-26	43	SR-12
4	SR-12	24	SR- 4	44	SR-12
5	SR-26	25	SR-4	45	SR-26
6	SR-26	26	SR-4	46	SR-26
7	SR-49	27	SR-26	47	SR-4
8	SR-49	28	SR-26	48	SR-4
9	SR-49	29	SR-12	49	SR-49
10	SR-49	30	SR-12	50	SR-49
11	SR-49	31	SR-12	51	SR-49
12	SR-49	32	SR-12	52	SR-49
13	SR-12	33	SR-12		
14	SR-12	34	SR-12		
15	SR-26	35	SR-12		
16	SR-4	36	SR-12		
17	SR-49	37	SR-12		
18	SR-4	38	SR-12		
19	SR-4	39	SR-4		
20	SR-4	40	SR-4		

Future County Road Projects Due to Mudslides					
Project Number	Road Name	Project Number	Road Name	Project Number	Road Name
1	JESUS MARIA RD	31	JESUS MARIA RD	61	O'BYRNES FERRY RD
2	SHEEP RANCH RD	32	JESUS MARIA RD	62	RAILROAD FLAT RD
3	O'BYRNES FERRY RD	33	JESUS MARIA RD	63	RAILROAD FLAT RD
4	SHEEP RANCH RD	34	JESUS MARIA RD	64	JESUS MARIA RD
5	JESUS MARIA RD	35	JESUS MARIA RD	65	JESUS MARIA RD
6	JESUS MARIA RD	36	SHEEP RANCH RD	66	JESUS MARIA RD
7	JESUS MARIA RD	37	SHEEP RANCH RD	67	JESUS MARIA RD
8	MOUNTAIN RANCH RD	38	MOUNTAIN RANCH RD	68	JESUS MARIA RD
9	RAILROAD FLAT RD	39	MOUNTAIN RANCH RD	69	JESUS MARIA RD
10	JESUS MARIA RD	40	MOUNTAIN RANCH RD	70	MOUNTAIN RANCH RD
11	JESUS MARIA RD	41	MOUNTAIN RANCH RD	71	MOUNTAIN RANCH RD
12	RAILROAD FLAT RD	42	MOUNTAIN RANCH RD	72	MOUNTAIN RANCH RD
13	SHEEP RANCH RD	43	MOUNTAIN RANCH RD	73	RAILROAD FLAT RD
14	SHEEP RANCH RD	44	MOUNTAIN RANCH RD	74	RAILROAD FLAT RD
15	SHEEP RANCH RD	45	MOUNTAIN RANCH RD	75	RAILROAD FLAT RD
16	SHEEP RANCH RD	46	SHEEP RANCH RD	76	SHEEP RANCH RD
17	SHEEP RANCH RD	47	SHEEP RANCH RD	77	SHEEP RANCH RD
18	RAILROAD FLAT RD	48	SUMMIT LEVEL RD	78	SHEEP RANCH RD
19	RAILROAD FLAT RD	49	SUMMIT LEVEL RD	79	SHEEP RANCH RD
20	SUMMIT LEVEL RD	50	SUMMIT LEVEL RD	80	SHEEP RANCH RD
21	SUMMIT LEVEL RD	51	SUMMIT LEVEL RD	81	SHEEP RANCH RD
22	SUMMIT LEVEL RD	52	JESUS MARIA RD	82	SHEEP RANCH RD
23	SUMMIT LEVEL RD	53	JESUS MARIA RD	83	SUMMIT LEVEL RD
24	SUMMIT LEVEL RD	54	JESUS MARIA RD	84	SUMMIT LEVEL RD
25	PARROTS FERRY ROAD	55	JESUS MARIA RD		
26	PARROTS FERRY ROAD	56	JESUS MARIA RD		
27	POOL STATION RD	57	JESUS MARIA RD		
28	JESUS MARIA RD	58	JESUS MARIA RD		
29	JESUS MARIA RD	59	JESUS MARIA RD		
30	JESUS MARIA RD	60	JESUS MARIA RD		

Potential Projects Identified by Community Members through MetroQuest Survey One	
Zone A	
One Way In/ One Way Out	Mayo Road
One Way In/ One Way Out	Hwy 4/49 Intersection
One Way In/ One Way Out	Angel Oaks Drive
One Way In/ One Way Out	Tapadero Street (off Riata Way and Pool Station Road)
One Way In/ One Way Out	Behind Spence Ranch and Feed Supply off of North Main Street (SR-49)
One Way In/ One Way Out	Gelding Road
One Way In/ One Way Out	Pony Way
One Way In/ One Way Out	Appaloosa Road
One Way In/ One Way Out	Roan Road
One Way In/ One Way Out	Stallion Way
Traffic Bottleneck	Dogtown Road
Narrow Roadway	Stallion Way
Narrow Roadway	Buckskin Road
Narrow Roadway	Hogan Dam Road
One Way In/One Way Out	Gunclub Road
One Way In/One Way Out	Kurt Road
One Way In/One Way Out	Sam's Way
One Way In/One Way Out	Bush st
One Way In/One Way Out	Highway 49 in Jamestown
Traffic Bottleneck	Finnegan Ct
Traffic Bottleneck	McCauley Ranch Road
Traffic Bottleneck	San Joaquin Ave
Traffic Bottleneck	Demarest St
Traffic Bottleneck	Main St
Traffic Bottleneck	Hwy 4 and Hwy 49 intersection
Traffic Bottleneck	Hwy 4
Traffic Bottleneck	Hwy 49/S Main St between crossroads Gunclub Road and Whittle Road
Flooding	Hwy 4 and Hwy 49 intersection
Flooding	Gold Cliff Road and Finnegan Lane
Narrow Roadway	Finnegan Ln
Narrow Roadway	Tyron Road
Narrow Roadway	Greenhorn Creek Road and Tuolumne
Narrow Roadway	McCauley Ranch Road
Narrow Roadway	Finnigan Lane
Narrow Roadway	Riata Way
Narrow Roadway	Tapadero Street

Narrow Roadway	Jaquima Drive
Traffic Bottleneck	Highway 49
Narrow Roadway	Mountain Ranch Road
Other	San Andreas
Zone B	
Traffic Bottlenecks	Tiger Creek
Narrow Roadway	Jesus Maria Road
One Way In/One Way Out	Hwy 4
Traffic Bottleneck	Hwy 26
Traffic Bottleneck	Hwy 49
Narrow Roadway	Ponderosa Way
Narrow Roadway	Jesus Maria Road
One Way In/One Way Out	Doe Road
Zone C	
Zone D	
Traffic Bottlenecks	W Hwy 12
Traffic Bottleneck	Burson Road/Hwy 12
Traffic Bottleneck	Hwy 26
Traffic Bottleneck	Jenny Lind Road
Traffic Bottleneck	Olive Orchard Road intersection
Flooding	Josephine Lane and Hwy 26
Flooding	Hwy 26
Flooding	Buson Road
Flooding	Hogan Dam Road
Narrow Roadway	Hogan Dam Road
Narrow Roadway	Hwy 26
Narrow Roadway	Olive Orchard Road
Narrow Roadway	S Burson Road
Narrow Roadway	Arapaho Way
Roadside Grass Mowing	Zone D (general)
Zone E	
One Way In/ One Way Out	Hwy 4
Traffic Bottleneck	Hwy 4
Narrow Roadway	Hwy 4
One Way In/One Way Out	Hwy 4
One Way In/One Way Out	Thompson Road
One Way In/One Way Out	Ansil Davis Road, Bridge on Monge Ranch Road
One Way In/One Way Out	Pennsylvania Gulch Road
One Way In/One Way Out	Skunk Ranch Road
One Way In/One Way Out	Ponderosa way
One Way In/One Way Out	Butte Mountain Road
One Way In/One Way Out	Buckhorn Drive
One Way In/One Way Out	Camp Nine Road
One Way In/One Way Out	Ponderosa way
One Way In/One Way Out	Candy Rock Road
Traffic Bottleneck	6-mile Road
Traffic Bottleneck	Hwy 4 and Allen Lane intersection
Traffic Bottleneck	Hwy 4 and Pennsylvania Gulch Road

Traffic Bottleneck	Murphy's and Big Tree Road intersection
Traffic Bottleneck	Forest Meadows
Flooding	Big Valley
Narrow Roadways	Hwy 4 through Murphy's
Narrow Roadways	Nob Hill Road
Narrow Roadways	Sheep Ranch Road outside of Murphys
Narrow Roadways	Sheep Ranch Road outside of Murphy's
Narrow Roadways	San Domingo Road
Narrow Roadways	Monge Ranch Road
Narrow Roadways	Ponderosa Way
Narrow Roadways	Ponderosa Way
Narrow Roadways	Butte Mountain Road
Narrow Roadways	Butte Mountain Road
Narrow Roadways	Skunk Ranch Road
Narrow Roadways	Sandy Wash Road
Narrow Roadways	Skunk Ranch Road
Narrow Roadways	Vineya Road Terrace Ct
Other	Red Hill Road
Other	Parrotts Ferry Road
Other	Douglas Flat
Other	La Honda Park
Other	Tom Bell Road
Other	Pennsylvania Gulch Road
Other	Skunk Ranch Road
Other	Ponderosa Way
Other	Butte Mountain Road
Other	Skunk Ranch Road
Other	Peppermint Lane
Other	Skunk Ranch Road
One Way In/One Way Out	Big Trees State Park Fire Road
One Way In/One Way Out	Ponderosa way
One Way In/One Way Out	Highway 4
One Way In/One Way Out	Hwy 4
One Way In/One Way Out	Hwy 4
One Way In/One Way Out	Highway 4
One Way In/One Way Out	Camp Nine Road
One Way In/One Way Out	Lightning Lane
One Way In/One Way Out	Silver Dr
One Way In/One Way Out	Lilac Dr
Traffic Bottleneck	Hwy 4
Traffic Bottleneck	Country Club Drive and Linnet Lane
Traffic Bottleneck	Hwy 4 through Dorrington
Narrow Roadway	Avery Sheep Ranch Road
Narrow Roadway	Moran Road
Narrow Roadway	Moran Road
Narrow Roadway	Hwy 4 through Dorrington
Narrow Roadway	Hwy 4 through Dorrington
Other	Harmony Lane
Other	Mokelumne Dr E

Other	Sierra Pkwy
Zone F	
One Way In/One Way Out	Doe Road
One Way in/One Way Out	Armstrong Road
Narrow Roadway	Manzanita Ridge Road
One Way In/One Way Out	Swiss Ranch Road
Traffic Bottlenecks	Hwy 4 and Sheep Ranch Road
Flooding	Mountain Ranch and Sheep Ranch
Narrow Roadway	Sheep Ranch Road
Zone G	
Road Not Accessible to Us	Pinto Drive
One Way In/ One Way Out	Dunn Road
One Way In/ One Way Out	Chestnut Way
One Way In/ One Way Out	Morgan Road
One Way In/ One Way Out	Filly Lane at Shetland Court
One Way In/ One Way Out	Poker Flat Road
One Way In/ One Way Out	Kiva Drive
One Way In/ One Way Out	Saddle Creek Lane
One Way In/ One Way Out	Horseshoe Lane
Traffic Bottleneck	Hwy 4 in Copperopolis
Narrow Roadway	Buckboard Drive
Narrow Roadway	Hodson Road
Narrow Roadway	Horseshoe Drive north of Hwy 4
Narrow Roadway	Tug Way
Narrow Roadway	Pommel Way
Narrow Roadway	Council Trail
Narrow Roadway	Thomson Lane
Narrow Roadway	Hunt Road at the Lanford Pacheco Road Intersection
Narrow Roadway	Hogan Dam Road
Narrow Roadway	Salt Spring Valley Road
One Way In/One Way Out	Cheyenne
One Way In/One Way Out	Pheasant Rub Dr.
One Way In/One Way Out	Copper Cove subdivision
One Way In/One Way Out	Bow Dr, One Way Road, Narrow
One Way In/One Way Out	Copper Cove Subdivision
One Way In/One Way Out	4542 Lakeshore Court
One Way In/One Way Out	Lakeshore Court
One Way In/One Way Out	Copper Cove Dr
One Way In/One Way Out	Duchess Dr
One Way In/One Way Out	Jaquima Dr
Traffic Bottlenecks	Copper Cove Dr
Traffic Bottlenecks	Copper Dr at O'Byrnes Ferry
Traffic Bottlenecks	O'Byrnes Ferry
Traffic Bottlenecks	Kiva Dr at Tomahawk at Lakeshore Court at Lakeshore Dr
Traffic Bottlenecks	Kiva Dr at Little John Road
Traffic Bottlenecks	Little John Road at Kiva Dr
Traffic Bottlenecks	Little John Road at Copper Cove Dr
Traffic Bottlenecks	Little John Road

Flooding	Pool Station Road
Flooding	Milton Rd
Narrow Roadway	Copper Cove Dr
Narrow Roadway	Arrowhead St in Copper Cove Subdivision
Narrow Roadway	Pin dropped on Kiva Dr
Narrow Roadway	O'Byrnes Ferry Road Bridge
Other	Lake Tulloch bridge

** Road identified by community members and copied verbatim

Appendix C

Potential Shelters Complete List

Category	Name	Address	Community
Animal Services	Calaveras Animal Services	t 901 Jeff Tuttle Drive	San Andreas
Firgrounds	Firgrounds	2465 Gun Club Road	Angels Camp
School	Albert Michelson Elementary School Grade K-5	196 Pennsylvania Gulch Rd	Murphys
School	Angels Creek Community Day School	1219 Rasberry Ln	Angels Camp
School	Arnold High School	874 Henry Rd #4	Arnold
School	Avery Middle School Grade 6-8	4545 Moran Rd	Avery
School	Bret Harte Union High School District	323 South Main St	Angels Camp
School	Bret Harte Union High School Grade 9-12	364 Murphys Grade Road	Angels Camp
School	Calaveras County Office of Education	185 S. Main St	Angels Camp
School	Calaveras High School Grade 9-12	350 High School Street	San Andreas
School	Calaveras Unified School District	3304 Hwy 12 Bldg.B	San Andreas
School	Community Day School	1605 Blagen Rd	Arnold
School	Copperopolis Elementary School Grade K-6	217 School Street	Copperopolis
School	Gold Strike High School Grade 10-12	501 Gold Strike Rd	San Andreas
School	Hazel Fisher Elementary School Grade K-5	1605 Blagen Rd	Arnold
School	Home School Academy	196 Pennsylvania Gulch Rd	Murphys
School	Jenny Lind Alternative High School Grade 9-12	11618 School Street	Jenny Lind
School	Jenny Lind Elementary School Grade K-6	5100 Driver Rd	Valley Springs
School	Mark Twain Union Elementary School District	981 Tuolumne Av	Angels Camp
School	Mark Twain Union Elementary School Grade K-8	646 Stanislaus Ave	Angels Camp
School	Mokelume Hill Elementary School Grade K-6	8350 Highway 26	Mokelumne Hill
School	Mountain Oaks School	924 Church Hill Rd Unit B1&B2	San Andreas
School	Mountain Ranch Community School	3667 Whiskey Slide Rd	Mountain Ranch
School	Oakendell Court School	3585 Hawver Road	San Andreas
School	Rail Road Flat Elementary School Grade K-6	298 Rail Road Flat Rd	Rail Road Flat
School	Rite of Passage -ATCS	10400 Fricot City Rd	San Andreas
School	San Andreas Elementary School Grade K-6	255 Lewis Av	San Andreas
School	Sierra Hills Education Center	501 Gold Strike Rd	San Andreas
School	Special Education Administration Unit	185 S. Main St	Angels Camp
School	Toyon Middle School Grade 7 & 8	3412 Double Springs Rd	Valley Springs
School	Transition Program	255 Lewis Av	San Andreas
School	Vallecito High School	3670 Church St	Vallecito
School	Vallecito Union School District	4545 Moran Rd	Avery
School	Valley Springs Elementary School Grade K-6	240 Pine St	Valley Springs
School	West Point Alternative High School Grade 9-12	54 Bald Mountain Rd	West Point
School	West Point Elementary School Grade K-6	54 Bald Mountain Rd	West Point
City/Town/Community Hall	Mokelumne Hill Town Hall	8283 Main Street, Mokelumne Hill, CA, 95245	Mokelumne Hill
City/Town/Community Hall	San Andreas Town Hall	24 Church Hill Rd	San Andreas
City/Town/Community Hall	Angels Camp City Hall	200 Monte Verda St	Angels Camp
City/Town/Community Hall	American Legion Post 376	2769 Upper Dorray Rd	Glencoe
City/Town/Community Hall	Blue Mountain Coalition for Youth and Families	364 Main St	West Point
City/Town/Community Hall	West Point Community Hall	22283 State Rte 26	West Point
City/Town/Community Hall	Jenny Lind Memorial Hall	189 Pine St	Valley Springs
City/Town/Community Hall	Masonic Hall	384 Church St	Murphys
City/Town/Community Hall	Ebbetts Pass Moose Lodge #1123	1965 Blagen Rd	Arnold
City/Town/Community Hall	Native Sons of the Golden West	389 Main St	Murphys
City/Town/Community Hall	Faith Lutheran Church	65 Mitchler St	Murphys
City/Town/Community Hall	Mountain Ranch Youth Center	7869 Whiskey Slide Road	Mountain Ranch
City/Town/Community Hall	Mountain Ranch Community Hall	8049 Washington St	Mountain Ranch
City/Town/Community Hall	Rail Road Flat Community Hall	250 Railroad Flat St	Rail Rd Flat

Appendix D

Climate Debrief Interview Summary

REFERENCE NO.

CALAVERAS COUNTY EVACUATION AND NEEDS ASSESSMENT AND PREPAREDNESS PLAN

Climate Debrief Interview Summary Report

MARCH 2022

Dewberry

ORIGINAL

SUBMITTED BY
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Climate Debrief Interview Summary Report

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1. Introduction

The Calaveras County Council of Governments is developing an Evacuation and Access Needs Assessment and Preparedness Plan for Calaveras County. In support of this effort, Dewberry conducted climate debrief interviews with stakeholders who experienced recent hazard events, including wildfires, winter storms, flooding, and mudslides. The objectives of the climate debrief interviews were as follows: (1) interview relevant public officials, first responders, and other stakeholders in the region who could provide input on recent extreme climate events; (2) examine key challenges and constraints for evacuation and access, evaluate strategies employed, and discuss opportunities for planning and response moving forward; and (3) examine key successes and challenges experienced in any evacuation processes. The Dewberry team extended email invitations to 25 different stakeholders representing various organizations and roles in natural hazard management and response in the County. Table 1 summarizes the list of interview participants. A total of four interviews with seven different participants was conducted between February 16 and February 22, 2022.

Table 1: Summary of the organizations, roles, and responsibilities of climate debrief interview participants.

Summary of Interview Participants			
NAME	**ORGANIZATION**	**ROLES**	**RESPONSIBILITIES**
Rebecca Callen	City of Angels Camp Mayor's Office	City Administrator	Directs and manages operations of the City of Angels Camp
Nathan Pry	City of Angels Camp Fire Department	Assistant Fire Chief	Assists the Fire Chief in managing operations of the City fire department, including two fire stations
John Osbourn	Calaveras County Office of Emergency Services	Director	Manages coordination of response to large scale emergency incidents and emergency alert systems
Scott Nanik	Calaveras County Office of Education	Superintendent of schools	Oversees all schools in the County and coordinates emergency responses for the schools
Charly Modrell	California Department of Transportation (Caltrans) District 10	Maintenance – Mountain Region Manager	Leads the maintenance and emergency operations team for District 10 that assists with road closures and traffic detours during hazard events
Gregoria Ponce	Caltrans District 10	Chief, Office of Rural Planning	Supports rural planning and grant programs and previously helped with the District 10 climate vulnerability assessment
Scott Hertzog	Copperopolis Fire Protection District	Interim Fire Chief	Oversees operations of the fire department, including two fire stations

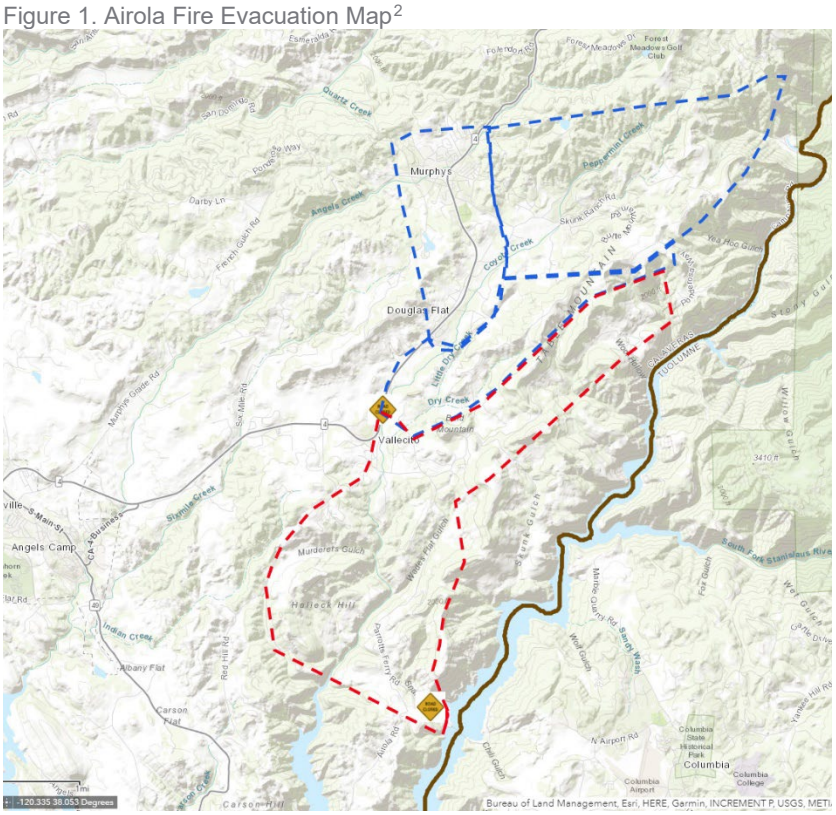
2. Event Details

Interview respondents identified four unique fire events of various scales that impacted Calaveras County in recent years. The wildfire date, duration, area and asset types impacted are summarized in Table 2.

Table 2: Summary of Calaveras County wildfire events noted by interview participants

CALAVERAS COUNTY WILDFIRE EVENTS					
WILDFIRE EVENT	**INITIAL DATE OF FIRE**	**TIME TO CONTAIN FIRE**	**AREA IMPACTED (ACRES)[1]**	**GEOGRAPHIC AREA IMPACTED**	**ASSETS IMPACTED**
Airola Fire	8/25/2021	Around 1 week	639 Acres	Calaveras County near River Canyon	Temporary school closures
Salt Fire	8/18/2020	24-48 hours	1,789 Acres	Calaveras County near Salt Springs Reservoir	Houses impacted, but none lost Temporary road closures
O'Reilly Fire	7/31/2020	3-4 hours	5 Acres	City of Angels Camp	One single-family residence lost Other businesses and residences experienced damage Temporary road closures (Highway 49)
Butte Fire	9/9/2015	36 days	70,868 Acres	Calaveras County	County-wide impacts

Figure 1. Airola Fire Evacuation Map[2]



[1] Acres associated with wildfire impacts for the Airola, Salt, and Butte Fires were obtained from the CAL FIRE incidents map viewer, available at https://www.fire.ca.gov/incidents.
[2] Source: https://www.mymotherlode.com/news/local/1926809/day-two-fighting-airola-fire-in-calaveras-county.html#foobox-1/0/Airolaevacuations.jpg

Figure 2. Salt Fire Map[3]

Figure 3. Image from O'Reilly Fire[4]

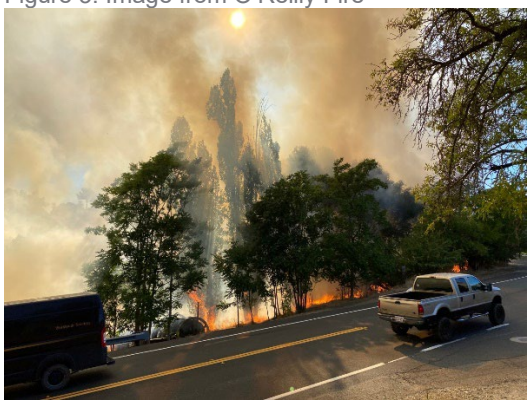
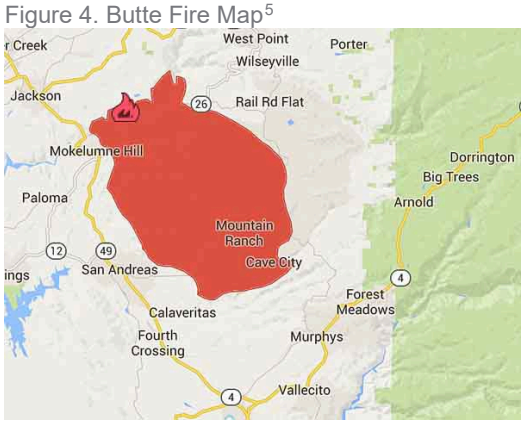


Figure 4. Butte Fire Map[5]



One interview participant noted an additional four wildfire events that have occurred since 2018 where evacuations were considered but ended up not being necessary.

In addition to wildfires, several other types of hazard events were identified by interview participants. These included winter storms, flooding, and mudslides. In 2017, a large winter storm resulted in an extended road closure of a section of Highway 26 for over 30 days. Significant winter storms also occurred in December 2021, although no major highway closures occurred in Calaveras County.

[3] Source: https://www.mymotherlode.com/news/local/1207159/75-percent-containment-on-salt-fire.html#foobox-1/0/saltfire-1.jpg
[4] Source: https://www.mymotherlode.com/news/local/1165540/arson-being-investigated-in-oreilly-fire-in-angels-camp.html#foobox-1/1/OReilly-Incident-fire-in-Angels-Camp-11.jpg
[5] Source: https://wildfiretoday.com/wp-content/uploads/2015/09/Map-Butte-Fire-9-12-2015-CAL-FIRE-570x432.jpg

Figure 5. Image from Highway 26 Road Closure near Mokelumne Hill[6]

3. Event Evacuation and Response

Evacuations occurred during each of the four wildfire events identified by interview participants. While the areas impacted and duration of the wildfire events varied, there were common challenges identified during event evacuation and response. Interview participants highlighted key areas of concern during wildfire events as well as other hazard events and summarized challenges related to road conditions, access for community members and emergency responders, and capacity and resource limitations.

3.1 Evacuation Routes

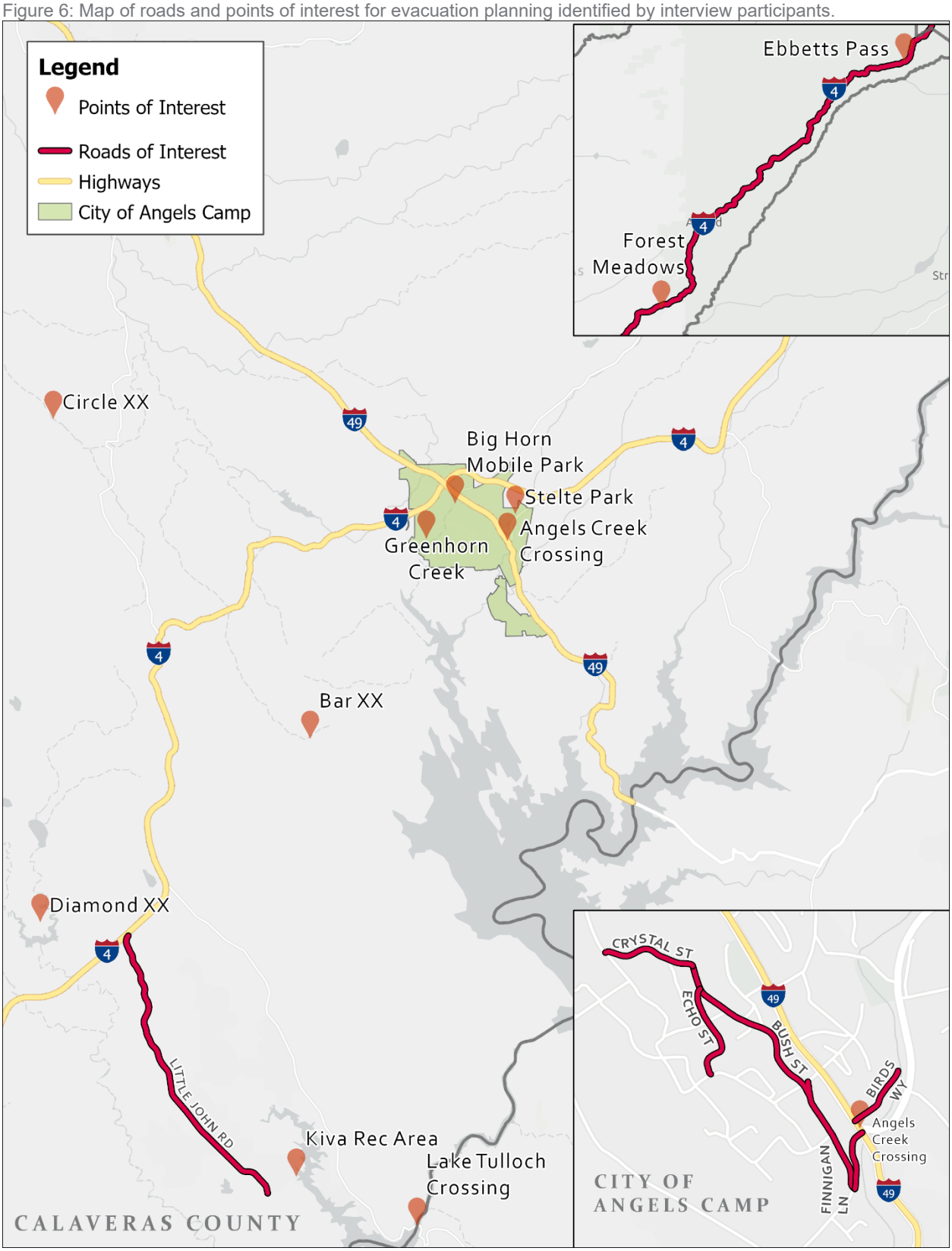
While evacuation routes have been mapped across Calaveras County, these routes have not been documented in an evacuation plan. Interview participants noted roads that are critical for ingress and egress during an emergency event. This includes Highway 4, particularly the upper corridor from Ebbetts Pass to City of Angels Camp. In addition to wildfire concerns, the upper Highway 4 corridor has historically had issues during winter storm events, especially if any trees/limbs or power lines block the ability for snow plows to access this route. Highway 49 was also identified as a concern for evacuations. During the 2020 O'Reilly Fire, Highway 49 was shut down for approximately 3-4 hours. Highway 49 also crosses over Angels Creek on an old two-lane bridge at the southern end of the City of Angels Camp. If this bridge is impacted at all during an event, the only alternative is for people to travel east or west for several miles to be able to evacuate.

Around Angels Camp, interview participants noted several other areas where roadway access is challenging during a natural hazard event, including Birds Way, Finnigan Lane, Bush Street, Echo Street, Crystal Street, and Big Horn Mobile Park. Participants noted several subdivisions with limited access, including Greenhorn Creek and Stelte Park near Angels Camp and Forrest Meadows near Ebbetts Pass. Many of these subdivisions have gated access points, which can pose challenges in emergency situations.

In the Copperopolis Fire District, specific areas mentioned with limited access routes include Little John Road, Kiva recreational area, Diamond XX, Circle XX, and Bar XX neighborhoods. In addition, there is a bridge over Lake Tulloch that provides the only exit route to Tuolumne County. There have been several occasions where a truck has hit the bridge abutment, requiring closure of the bridge and restricting access to this evacuation route. If critical bridge crossings like these are impacted, major re-routings could cause significant traffic delays during an evacuation event.

[6] Source: https://www.mymotherlode.com/wp-content/uploads/2019/02/hway26e-1.jpg

Figure 6: Map of roads and points of interest for evacuation planning identified by interview participants.



3.2 Road Condition Challenges

Given the historic infrastructure of the County, especially in the City of Angels Camp, roads are often narrow and not built to modern standards. This causes challenges for simultaneously trying to provide access for emergency responders and residents trying to evacuate. The City of Angels Camp also has a two-lane bridge, last refurbished over 70 years ago, that crosses over Angels Creek along Highway 49. This route is critical to southbound evacuation during a natural hazard event, and interview participants noted there is a need for an alternative route.

Across Calaveras County, poor road pavement conditions or unpaved roads can also be a challenge. In communities with homeowner associations (HOAs), the roads can be privately maintained, and in select areas, emergency access roads for the community subdivisions are unpaved or gated.

3.3 Access Challenges

For several subdivisions, only one paved road provides access to the community. This creates challenges with traffic flow and re-routing in the event of a road blockage. Secondary hazards, such as fallen trees or limbs, power lines, and mudslides can limit road access. During the winter storms of 2017, a mudslide occurred that created a road blockage and trapped a vehicle along the route. When road blockages occur, participants noted there is a lack of alternative roads for re-routing, or limited redundancy. In addition to secondary hazard road blockages, parked cars along the narrow streets of the City of Angels Camp can restrict roads to one-way access. Community access gates also create access barriers to residential subdivisions.

3.4 Capacity and Resource Challenges

Staff capacity, including the amount of people on duty, can be a limiting factor for emergency response within Calaveras County. Participants noted that communities rely on each other for routine needs to address capacity and resource challenges. The start of the COVID-19 pandemic in 2020 also exacerbated staffing challenges in select situations. For example, during the winter storm events in December 2021, Caltrans experienced staffing shortages from COVID-19 impacts that affected response capabilities. The Copperopolis Fire Protection District also experienced staffing shortages in summer 2021 when extreme heat caused exhaustion issues. COVID-19 limited who could be on duty at the time, resulting in staffing challenges.

In remote areas of Calaveras County, water access is limited. For example, during the Salt Fire, portions of the County were impacted where no fire hydrants are available, and water had to be sourced from elsewhere. For winter storm events, there are additional resource considerations for residents who may be snowed in. One interview participant noted the importance of pre-event messaging to ensure people have enough water, food, and fuel to withstand multiple days of potentially being stuck at home during a winter storm event.

4. Coordination Between Responding Groups

Multiple agencies and organizations are involved with response to hazard events across Calaveras County. These include local municipal departments, such as Calaveras County Office of Emergency Services (OES) and City of Angels Camp Fire Department, state agencies, such as the California Department of Transportation (Caltrans), California Highway Patrol (CHP), and California Department of Forestry and Fire Protection (CAL FIRE), and non-profit groups. Interview participants shared successes and challenges with coordination between responding groups during previous hazard events.

4.1 Successes

A major success noted by multiple interview participants was that no one was hurt during the majority of the hazard events that were discussed. Across these events, people were able to evacuate quickly enough to avoid harm. While some assets were destroyed or damaged, none of the interview participants identified any critical infrastructure impacted during any of the events.

Participants highlighted the successes of the City of Angels Camp, Calaveras County, and CAL FIRE coordination in responding to the 2020 O'Reilly Fire and containing it within 3-4 hours. During the 2020 Salt Fire, an interview participant noted the dispatch and mutual aid plan across the County worked seamlessly and helped secure resources from outside of the County. Communication throughout the Calaveras County Schools system worked well during the 2021 Airola Fire, and updates were delivered to parents and students almost daily.

At the state level, Caltrans relies on CHP and the local Sheriff's Office to provide information on where traffic control support is needed. During winter storm events, this has supported Caltrans teams with quickly providing road signage and distributing updates through Changeable Message Signs (CMS).

4.2 Challenges

Given the large extent of the 2015 Butte Fire, many jurisdictions, agencies, and organizations were involved in coordinating a response. At the time of the Butte Fire, mutual aid agreements did not exist across Calaveras County, which caused challenges in coordinating a response. Since 2015, mutual aid agreements have been established to improve response coordination.

Non-profit organizations, such as the American Red Cross, have also provided volunteers or resources to establish emergency shelters and aid in post-event recovery. Participants noted a better mechanism needs to be established for coordination between local governments and volunteer organizations to improve effectiveness of these efforts.

Across Calaveras County, there are currently limitations with communication between emergency operations/command centers and first responders in the field during a hazard event. First responders will relay conditions to the emergency command center to initiate evacuations. The County is researching the potential to migrate to a cloud-based system, such as Zonehaven, that would streamline communication of conditions and evacuation requests. The Sherr[illegible]office also plays a role in directing people where to evacuate, adding a third level of coordination. Law enforcement can communicate via dispatch radio; however, Caltrans does not have the same capability and noted a better line of communication with first responders would be helpful. Caltrans interview participants noted that communication generally has to go through their traffic management center, which takes more time and may result in resources not being deployed as quickly as if direct communication went to the emergency operations staff.

4.3 Opportunities for Improvement

The creation of an evacuation plan can help identify roles and responsibilities for all agencies involved in coordinating evacuations and response during hazard events. Currently the County and City lack a plan for routine training drills and exercises focused on natural hazard incident planning and response. Several participants emphasized the importance of training and opportunities for improved frequency of training offerings. Caltrans has full emergency operation capabilities, but that is not always communicated to local partners. By involving Caltrans in County training drills, the resources Caltrans offers could be better understood and utilized by local partners. Non-profit organizations involved with event response could also be included in these drills to support improved coordination.

Participants noted that local knowledge of previous event responses has been lost with staff turnover. Hazard planning and response training resources could help address this gap and support knowledge transfer between staff.

Interview participants also noted opportunities to improve outreach with community members around actions they can take before and during a hazard event. For example, the Copperopolis Fire District is preparing an outreach campaign to encourage individual actions that promote fire safe communities, such as maintaining defensible space and having an evacuation plan. Key audiences include HOAs, road committees, and community groups. Subdivision HOAs across the County can also support improved access during a hazard event by having a plan for opening gates and maintaining emergency access roads.

5. Communication with the Community

During recent hazard events, responding agencies used various methods for communicating with the community. The methods and messages depended on the hazard, timing of the event, and whether evacuation was required.

5.1 Existing Communications Tools

5.1.1 Everbridge

The main communication alert system used by Calaveras County OES is the Everbridge system (CALAVERAS ALERT Emergency Notification Program). This system allows Calaveras County OES to alert residents and businesses by telephone, cell phone, text message, email and social media when there is a threat to the health or safety of Calaveras County residents, and is used when evacuation alerts are necessary.

The Everbridge system can be effective in communicating alerts to the community, but it requires people to sign up for system alerts. As of February 16, 2022, the Everbridge system had 21,062 individual contact points (which represents about half of the 45,292 population for the County). Alerts can be sent to the whole system or portions depending on their location. For example, in the case of the O'Reilly Fire incident, an Everbridge evacuation notice was sent out to just over 200 contacts in the affected area. When evacuation orders are lifted, the Everbridge system will rebroadcast to the same contacts. In addition, the system does geofencing. This means that if you are an Everbridge customer and have the Everbridge app, it will notify you with alerts if you happen to be in an affected area when an event happens (even if you are not a resident of that area).

5.1.2 Nixle

The Calaveras County Sheriff's Office utilizes the Nixle community notification service. This web-based service is a geographic-based public notification system for residents of Calaveras County. An address is required as the basis for sending messages relevant to the neighborhood. Once registered, residents can receive email and text messages alerts from the Sherriff's Office. Similar to the Everbridge system, it requires users to sign up in order to receive any notifications.

5.1.3 Social Media

Some of the public agencies within Calaveras County leverage social media platforms for communicating with the community during hazard events or evacuations, though this generally is done on an as-needed basis. For example, Calaveras OES did leverage social media releases during the O'Reilly Fire incident after the Everbridge alert was sent out. The City of Angels Camp has plans to revamp their website and will be creating a Facebook page to help keep people notified for future events through those methods.

Residents tend to share information through social media platforms like Facebook, Nextdoor, and others. Several interview participants noted that community members may share details about a fire or road closure much faster than responding agencies can share information. Due to the nature of social media, this information can be shared and updated very quickly across the community.

5.1.4 Door-to-Door or Word of Mouth

When evacuations are necessary during hazard events, responding agencies often will go door-to-door in affected areas to ensure that residents are informed and able to evacuate. In some cases, this is done by the Sherriff's office, but police and fire departments are also often on the scene and able to communicate directly with residents by going door-to-door. With fire events being very dynamic and rapidly changing, going directly to residences and businesses is often the most efficient way to communicate information. This method is also used in some cases with events that have more time for planning and response, such as winter storms or flooding. For example, in areas that are known to flood within the City of Angels Camp (e.g., Birds Way), responding agencies may go to

residences ahead of time to let people know where they may be able to go for temporary housing needs in the case of displacement.

Several interview participants noted that they also received information about hazard events through informal communication with other community members. In the case of a fire, for example, community members may hear from their neighbors or others in the area that an evacuation is occurring, a road is closed, etc. Informal word-of-mouth communication is frequently used by community members to share rapidly changing information as these events unfold.

5.2 Communications Challenges

As noted above, the main alert notification systems used by Calaveras County are Everbridge and Nixle. While these systems can be effective in sending out evacuation alert notifications or other important communication updates during hazard events, they have several limitations. The first is that these systems are primarily organized by the County, so other responding agencies (such as City of Angels Camp staff, fire protection districts, or other County departments) need to coordinate with the County to send out messages. Secondly, while these systems are geofenced, they require enrollment in order for community members to receive alerts. As noted by one of the interview participants, the number of Everbridge contacts currently only represents about half of the population of the County. In addition, tourists and visitors to the area may not be enrolled in the system and therefore would not receive any alerts during evacuations. Several interview participants noted that having a system that pushes notifications out to any cell phones within the region would reach more of the community during hazard events.

Another communication challenge is the cell phone reception throughout the County. There are many areas with limited or no cell phone reception, including a portion of downtown Angels Camp. This challenge can pose issues with communication, not only across responding agencies who are actively coordinating in the field, but also with residents and visitors who may need to receive alert notifications or hear from neighbors that they need to evacuate. Many people have gotten rid of their home phone lines, so cell phones are the main method of communication for community members. Those who do have home phone lines may be impacted if the power goes out or these communication lines are damaged, and therefore prevent transmission of notifications.

Many of the stakeholders interviewed are aware of communications challenges and emphasized that connecting directly with community members is often the best way to provide information in a rapidly changing emergency event. Those who work for responding agencies often know where cell phone reception is spotty, or know particular areas where residents might not be receiving alert notifications. Responding agencies focus on going door-to-door or reaching out directly to community members in those locations to make sure they are evacuating, have a plan in place, or know where to go. However, as people who work for the responding agencies turn over, this learned information may be lost.

More visitors and seasonal residents have been coming to the area, especially as Covid has allowed more people to work from home. Several interview participants noted that many of these people are not necessarily prepared for the types of hazard events that happen in the region, especially when they have not experienced regular winter storms, fires, etc. Communicating with these new community members can pose a challenge, especially if they have not signed up for emergency alerts or if responding agencies are not as aware of where they are located.

6. Conclusions

Calaveras County experiences various types of hazard events, including wildfires, winter storms, mudslides, and flooding. The most recent major county-wide hazard event that had significant impacts on evacuation was the Butte Fire in 2015. However, there have been smaller events that did require evacuation in portions of the County in more recent years, such as the Airola, O'Reilly, and Salt Fires, recent winter storms, and flooding events especially in Angels Camp. Some of these events had challenges with evacuation or access, especially in areas with narrow roadways.

Various interview participants noted that emergency planning for hazard events has improved significantly since the Butte Fire. In 2015 during the Butte Fire, the County OES was not fully functioning yet, but this event also crossed jurisdictional boundaries, requiring significant coordination. Many lessons were learned during this event, especially as roadways became backed up during the evacuation. Improvements have been made with planning, mutual aid agreements, and communication systems. However, continued improvements to emergency planning will help as the community prepares for hazards in the future.

While the County has mapped evacuation routes, currently a formal evacuation plan does not exist. Identifying problem areas for ingress and egress is a first step in planning for improved evacuations. Many roadways throughout the County are narrow, older, are in poor condition, or have access constraints (e.g., gated subdivisions). Some of these aspects are difficult to change but can be taken into account when planning for evacuations. While major damages and threats to human safety were avoided in past hazard events, future planning will have to consider worst-case scenarios to adequately plan for events.

Regular maintenance of roadways and defensible space can help keep evacuations clear and potentially reduce the threats of hazards or post-event hazards. These efforts require resources and funding, which can be a challenge. Exploring grant opportunities or other programs to support roadway maintenance and improvements will be important to support these needs.

Hazard events require coordination from many different groups. In recent events, the County OES has helped provide organization, structure, and resources to respond to hazards. The County OES coordinates very closely with other County offices, the Sheriff's Office, fire districts, City of Angels Camp staff, California Highway Patrol, Caltrans, and CAL FIRE. Mutual aid agreements support this coordination and allow for resources to be put into place quickly when an emergency event occurs. As noted by several interview participants, there are also some state resources that the County can leverage that historically have not been used in past events, such as mobile units, portable bridges, mapping capabilities, communication systems, and other resources available from Caltrans and utilities.

Additional training, planning exercises, and continued relationship building and communication between responding groups will be very important. Knowledge transfer will also be important to consider with any staff turnover across these responding agencies. Planning exercises or "mock events" will help responding agencies to identify any challenges or gaps that should be addressed before a major hazard occurs. These types of exercises can also be extremely useful for public education and training to help the community understand what to do in the case of an evacuation.

Communication with community members will always have challenges because of the dynamic, rapidly changing nature of hazard events, as well as the rural aspects of the County. Existing communication systems like Everbridge and Nixle provide a rapid notification alert that can help blast information out quickly. Continuing to develop more robust communication systems and improving coverage will support information sharing and alerting residents and visitors in the event of an emergency.

Regular communication and outreach can also support community awareness-building. Pre-planning education, training, and outreach will help residents and visitors understand how to evacuate, where to evacuate to, and potential problem areas. Various agencies do regular outreach and education for the community, and these efforts can continue to emphasize the importance of not only emergency planning, but also potential mitigation strategies (such as maintaining defensible space around homes). All of these efforts will be important to consider as hazard events evolve in the future.

Appendix A. Climate Debrief Interview Questions

Objectives

- Interview relevant public officials, first responders, and other stakeholders in the region who could provide input on recent extreme climate events (such as wildfires, flooding, landslides/mudslides, extreme winter storms).
- Examine key challenges and constraints for evaluation and access, evaluate strategies employed, and discuss opportunities for planning and response moving forward.
- Examine key successes and challenges experienced in any evacuation processes.
- Identify how COVID-19 has impacted extreme climate event response, and lessons learned for managing future events given ongoing pandemic management issues.

Questions for Interview Participants

- Please describe any recent large-scale hazard events that required evacuation or had transportation access impacts which you have been responsible for responding to or been affected by in your professional role. Include information about:
    - Hazard type (e.g., wildfires, flooding, landslides/mudslides, extreme winter storms)
    - Date(s)
    - Geographic area impacted
    - Assets impacted
    - Approximate duration of impact

For these discussions, we will focus on events that required evacuation or transportation access. Please let us know if there are specific events you'd like to focus on or if you would like to speak more generally across the types of events.

Event Preparation, Communication, and Coordination

1. If there was time to prepare for the event, what strategies were used in preparation for this event?

2. What communication methods were used to notify people about how and when to evacuate?
    - Were they informed where to evacuate to?
    - Were there any challenges in communication?
    - How did people know when they could return to their homes/businesses?

3. Was coordination with other agencies, groups, or jurisdictions necessary? If so, who?

Event Evacuation and Access

4. When evacuation was required during an event, how well did the evacuation routes function?

5. Were people informed about where to evacuate to?
    - If to a central location, did the access points to that location become backed up? For how long/how far?

6. Were there any road conditions that impacted the use of evacuation routes? (e.g., unmaintained defensible space, narrow roadway widths, poor pavement condition)
    - If so, how were individuals re-routed?

7. Were there any post-event secondary hazards (e.g., standing burned trees, mudslides) that impacted evacuation or transportation routes?
    - What impact did they have (e.g., detours, temporary closures)?

8. Did most people evacuate using a personal vehicle or was transportation required/provided?

9. Were there any challenges in evacuating particular groups of people? (e.g., senior populations, those with mobility issues)

- If so, how were they evacuated (e.g., types of vehicles)?

Lessons Learned

10. What do you see as the 3 biggest successes in preparing for and responding to this event?

11. What do you see as the 3 biggest challenges in preparing for and responding to this event?
    - How do you plan on addressing the challenges you've identified?

12. Are there any ways that planning, training, or exercises could be improved for this type of event in the future?

13. Did COVID-19 have any impact on the event response? Can you share any lessons learned for managing future events given ongoing pandemic management issues?

Appendix B. Climate Debrief Interview Notes

B.1. John Osbourn, Calaveras County, and Nathan Pry, City of Angels Camp

Date: February 16, 2022, 2-3 pm PT

Participants: John Osbourn, Director of Emergency Services for Calaveras County and Nathan Pry, City of Angels Camp Fire Marshall/Deputy Fire Chief

Hazard Events

Please describe any recent large-scale hazard events that required evacuation or had transportation access impacts which you have been responsible for responding to or been affected by in your professional role.

- Hazard type: Fire
- Date(s): 2020
- Geographic area impacted: Within city limits of Angels Camp
- Assets impacted: 1 residence lost, not occupied, had some business damages
- Approximate duration of impact: 1 day (fire contained within about 3-4 hours), but 1 week incident time

Nate: Within City of Angels Camp we have only had one recent incident that meets this criteria – a wildfire within the city limits; required evacuations but other events have not. The wildfire occurred in 2020 (about 1.5 years ago). We lost a single-family residence, luckily it was not occupied and was already in a deteriorated state when it burned. Other businesses and single-family residences had damages, maybe a vehicle or two. The fire was extinguished within a day, but the incident spanned over a week or so (mopping up, doing damage assessment, etc.). The cause of the fire was not determined – insufficient evidence to move forward.
John: That fire was known as the O'Reilly incident. It was within the WUI but more urban than anything else, and was an extremely fast moving fire. Because of its location and topography within the City, it presented significant threat to the City itself.
Nate: The fire was about less than 10 acres in size. There is a pocket of open land about 15 acres in size that sits in the middle of the community; fire consumed most of this open area (or more than half), but fortunate that it did not turn into a conflagration across houses and the community. Not a large extension of wildland beyond that point, but there was definitely the potential of it continuing house-to-house.

Event Preparation, Communication, and Coordination

1. **If there was time to prepare for the event, what strategies were used in preparation for this event?**

(N/A – response only)

2. **What communication methods were used to notify people about how and when to evacuate?**
    - **Were they informed where to evacuate to?**

Nate: Some of the areas surrounding the incident did need to be evacuated, the majority of this happened by people going door-to-door knocking (officers and firemen).
John: We sent out an Everbridge evacuation message to 200+ contacts. People were not told a specific area to evacuate to, they were just told to leave the area.

- **Were there any challenges in communication?**

John: The fire unfolded very quickly. It went from a small spot fire to a house being impacted within 3-4 minutes.

- **How did people know when they could return to their homes/businesses?**

John: When we lift any evacuation notices, we rebroadcast through Everbridge after the event to the original set of contacts that we used. In addition to that, we use geofencing. If you are an Everbridge

customer and have the Everbridge app, and say you're from Kentucky but happen to be in Angels Camp when something like that happens, it will push a notification to your phone if you're an Everbridge customer. Or if you live here locally and say your phone was off or you were out of the area, when you come back into that geofence it will push that notification out to you. We always make sure we follow up an evacuation notice with a 'you can go home now' follow-up message.

3. **Was coordination with other agencies, groups, or jurisdictions necessary? If so, who?**

Nate: Red Cross was contacted, but not really used because no one was really displaced. Primary coordination was between the City and the County and their various departments, but also CHP and probably Caltrans.
John: Caltrans, CAL FIRE, City of Angels Camp, local fire districts.
Nate: Local fire districts were there - Copperopolis, Murphys, Altaville Melones, San Andreas.
John: Because we closed off a state highway, CHP and Caltrans were involved. Angels Camp is a small police department (10-12), so there was mutual aid from the Sheriff's office, which meant that my office stood up an EOC and started putting those people into the same room. Fortunately our guys on the ground got out in front of the fire and got it stopped before we really got rolling like Nate said. American Red Cross was contacted, and they may have made it to the EOC but I don't think they stood anything up because the fire got extinguished quickly.
Nate: Coordination between CAL FIRE was really good, they were able put some assets in place, like aircraft that we needed very quickly.

Event Evacuation and Access

4. **When evacuation was required during an event, how well did the evacuation routes function?**

Nate: Evacuation routes didn't function all that well – we are an old mining community, so several of the residential streets are very narrow, they were originally built for horse and wagon. So trying to get responders in while trying to get residents out posed a challenge. There were some parked cars along those streets which made it harder. Had to shut down the highway, so there was a back-up there in turning vehicles around (like logging trucks or larger commercial vehicles). So that was a challenging in getting them to turn around. But once we got them out of the area, the routes seemed to function okay because it was a small event.
John: One of the problems that we foresaw (but didn't encounter because we stopped the fire) was because of where the fire started, there was no real alternative route to 49 in that particular part, especially for large commercial vehicles that would not be able to traverse the smaller residential streets. We were starting to see that swirl effect where people are going in circles around the incident just trying to get past it but they just couldn't. So that is just a feature of that particular incident. On a broader scale, we have mapped evacuation routes but in my 3 years, I have never seen an evacuation plan. It is important to acknowledge that now that we don't really have much of a plan. Part of that is we never know which direction the fire is coming from. Hope to have a more refined set of guidelines that will allow us to do some evacuation planning through this effort with Dewberry.

5. **Were people informed about where to evacuate to?**
    - **If to a central location, did the access points to that location become backed up? For how long/how far?**

As noted above, people were not told where to evacuate to.

6. **Were there any road conditions that impacted the use of evacuation routes? (e.g., unmaintained defensible space, narrow roadway widths, poor pavement condition)**
    - **If so, how were individuals re-routed?**

As noted above, narrow roadway widths were the main challenge.

Nate: Large vehicles pretty much just had to park on the side of the road until we could open up the road so they could get through.

John: And that just accentuates the problem – you have log trucks stacked up and no one can get around them. It could have become a serious thing had we had an extended attack and mop-up, but the whole incident was 3-4 hours until we contained the fire. Highway was also shut down about 3-4 hours.
Nate: Back-up probably was no more than a mile long, probably more like 0.5 mile.
John: Once word got out that the highway was closed, people could re-route long before then and avoid the area, which a lot of folks did. The problem that we had was that there wasn't really a way to do that right in the vicinity of the event.
Nate: Defensible space and pavement conditions were good. Parked cars were really the only problem.

7. **Were there any post-event secondary hazards (e.g., standing burned trees, mudslides) that impacted evacuation or transportation routes?**
    - **What impact did they have (e.g., detours, temporary closures)?**

Both: None.

8. **Did most people evacuate using a personal vehicle or was transportation required/provided?**

Both: No transportation was provided, all personal vehicles.

9. **Were there any challenges in evacuating particular groups of people? (e.g., senior populations, those with mobility issues)**
    - **If so, how were they evacuated (e.g., types of vehicles)?**

Nate: There was one residence where someone was disabled, luckily that person did not need to be evacuated. Planning was started on how to get that person to where they needed to be, but did not end up having to evacuate. It was a single person at a residence.

Lessons Learned

10. **What do you see as the 3 biggest successes in preparing for and responding to this event?**

Nate: Biggest success is that even though we haven't trained on this and don't have a really good plan, the agencies worked well together to make it happen in a short amount of time.
John: Agree, the amount of resources we were able to bring to bear made a significant impact. The interactions we were able to have with the community – within moments of us broadcasting the Everbridge alert, we followed that up with social media and traditional media releases that helped spread the word to folks who don't normally use those channels on a regular basis. It's the organic nature of social media that it is grassroots, so I think our communication was effective.

11. **What do you see as the 3 biggest challenges in preparing for and responding to this event?**

Nate: Being a rural city and county, the amount of people we have on duty on any daily basis, and they are spread out throughout the County, so getting them to the scene in a relatively quick time period is a challenge. Having the manpower to fulfill all of the necessary needs.
John: I would broaden that and say the number of resources is always a challenge. We routinely rely on each other for "routine" needs. In a perfect world that shouldn't be happening, but it happens in our rural world on a daily basis.
Nate: Due to our old road infrastructure, the area does not support better roads in some of these areas. It's already built, but it was not built in the standards it needs to be for modern times; it is what we have to work with and that's a challenge.
    - **How do you plan on addressing the challenges you've identified?**

Nate: We've talked about trying to help ourselves out by having an ordinance where residents would not be allowed to park alongside the street on some of the narrow streets, so that we can best utilize what's there without these parked vehicles. I don't see our staffing or assets getting better anytime soon, just because of funding.

12. **Are there any ways that planning, training, or exercises could be improved for this type of event in the future?**

Nate: This was a good event to open the eyes for those of the community as well as those at the City to show the need for planning and training for incidents like this on a regular basis. We can utilize what we saw and what we have been talking about for creating a plan. And it may not be in that specific area, but we can use that to start the discussion of – if we have an incident here, and we need to shut down the highway, we would immediately start to reroute people this direction, and we would plan for this area to be the evacuation center, etc. Those types of discussions.
John: The current construction of a good portion of our roads, especially in the City of Angels Camp, does not meet modern building standards, were built for horse-drawn carts. It's also important to pay attention to vegetation management on the sides of the roads; this has an effect on our biggest threat of wildfire, but this also has an effect on our ability to move large pieces of emergency equipment around.
Nate: It emphasizes the need to get important information out as soon as possible and communicate to as many people as quickly as possible, as the event allows. For this event, we didn't have much time. But if we had a flooding event where we knew we were going to receive a lot of rainfall, we could start pushing out more advanced information and have people thinking about a plan ahead of time, or having people leaving the area earlier.

13. **Did COVID-19 have any impact on the event response? Can you share any lessons learned for managing future events given ongoing pandemic management issues?**

Nate: No not for this event.

Other Questions

Any other events of note?
John: The biggest two threats to the County are wildfire and extreme weather events; there is a transportation component to both of them. In our planning, I can foresee a need to have a Highway 4 plan in place for the upper Highway 4 corridor. Not only for wildfire, which is by far the most prevalent threat, but also for winter storms. Obviously, you can't drive away from heat very well, but you can drive away from snow. The Highway 4 corridor is the area most affected by the top two threats that we face. Extreme weather is mostly for winter storm for transportation aspects. Heat is also a consideration for people, especially as people want to escape the heat, but they usually would go up the hill. But if you live up the hill and 75 is the normal and 105 is what it is, that's a heat event for you as well.

Do winter storm events require evacuation?
John: It usually poses the opposite problem. People are often trapped in their homes, run out of fuel or food, and we may be unable to get to them in a timely manner or something inhibits the snow plow and we have to extract them to a safe location.

Are there aspects of the routes that make them difficult for access in those winter events?
John: Highway 4 is difficult because it is a 2-lane highway; can fit 40,000 people down this road but it will take a long time, that's an issue for mass evacuations (like if we had a big wildfire). On the flip side, limbs and power lines across the roadway affect our snow plowing ability. We start running into kinks like Caltrans berming the County roads, and so we have to go dig the County berm out from the snow plow blowing snow onto the roadway. And we have to deal with the lines and trees that are commonly down. This last year was worse than the year before because drought weakened trees that we had near roadways, trees fell across the roadway, collected power lines, and then it's difficult for us to get that plowed.

Have portions of those roads been closed during winter events?
John: Yes, most of them.

Is it easy to re-route people?
John: No; while we are concerned with making sure residents are safe, have their medications, etc., people from the San Joaquin Valley come up in their Prius with their wire chains to play in the snow. In the last two winter cycles we've had, we noticed a great influx in the number of people visiting their vacation homes or secondary homes during the winter. We have heard numerous accounts of companies

saying they will never go back to the office, will always be remote. So then people from the Bay Area may be moving into their vacation homes at 4,500 ft elevation, having never really been there in January or December when the snow falls, and were very poorly prepared from personal preparedness and a resiliency standpoint. It's an anomaly that we don't really know how to solve quite yet. They don't have an understanding that 3-4 ft of snow is common, but they may be unaware since they were previously visiting in the summer.

Is there education or awareness building done about having the right cars/tires for winter?
John: We do winter storm preparedness education. A feature of Everbridge is you can opt in to receive weather alerts, including winter storms. We try to get information out if there is a storm looming, encourage everyone to make sure they have enough fuel, food, and water to get through at least a 72-hour period. But a lot of the time what we're finding is that 72-hour number is pretty short.

Any other considerations you want us to capture – any areas that pose particular issues for evacuation or transportation?
John: The upper Highway 4 corridor is really paramount to me; even as far back as the Butte Fire. In that fire, there was bumper-to-bumper traffic downslope from Ebbetts Pass to at least Angels Camp which lasted for hours - heard reports for as many as 3-4 hours to reverse that 30-40 miles. There is a 'demon' stoplight in Murphys that people attribute the back-up to, but I think it's more that it's capacity issues with getting people through basically one lane. It's narrow and windy, so don't think that we could do reverse flow, because we still have to have a way to get equipment up the hill. I don't see contra flow working well. At some point, the only thing we could do to try to relieve that is try to attack it from two fronts – maybe through very early and timely evacuation notices through Everbridge system; and then at some point if you are up the slope, if you are east or north of that point, you get sent over the hill to Bear Valley. But I don't know how to determine that cutoff point – where that would be effective. Another concern is more people moving to the area, and what impact that will have on evacuations.

Nate: There is a need for an alternative route where Highway 49 goes over Angels Creek in the south end of the city. It is a two-lane bridge that is old, and if that is impacted in any way, the only alternative to leave the City is east or west to get south. It's several tens of miles east or west before you can start going south. There is a need for additional road to go south in case that bridge is impacted by an event. The bridge was refurbished in the 1920s or 1930s. Getting resources in or people out is a challenge if that bridge is impacted in any way. It would be pretty easy using Highway 4 to get on the other side of the creek, but there is not any way to get south once you are on the other side of the creek, except for going across that bridge.

We also have several subdivision problem areas. There is a subdivision called Greenhorn Creek that was added in the 1990s, and is adjacent to the older part of the City. Three emergency access roads that connect the subdivision to the City; highlight the need for those emergency access points to be upgraded to actual streets or roadways to increase evacuation routing and traffic flow. That is a subdivision of about 400 homes, with only one paved way in or out. Those emergency access points are gated, requires someone to go and physically open that gate to allow circulation. In a community that does not have much staffing to begin with, to break someone off of incident response to go open the gates would be a challenge. Stelte Park is another subdivision with one way in and one way out, another emergency access road that is not pave, is also gated.

John: Meadow Bar is like that too, right?

Nate: Yes. Forrest Meadows.

John: Pretty interesting to me, being new to the County, that in subdivisions there are a lot of roads that are not County-maintained, to the point of entire communities. It is hard for the HOA to maintain the roads alone, let alone the escape routes that hardly ever get used. Communities have responsibility for maintaining those roads.

On the community HOA roads, are they also responsible for plowing of those roads in winter events?
John: Yes.

What is the coverage of Everbridge system within the community?
John: We devised a map overlay of our County by fire mapping standards, so we broke the County down into 2x2 mile squares. We are able to look at those and interact seamlessly with CAL FIRE. The downside is that it is essentially a homegrown GIS layer or story board, so the problem is it's difficult to get shapes out of them. At some point we are hoping to migrate to a more cloud-based system like Zonehaven, so that we can have people in the field can look at it on whatever device they have, determine areas that need to be evacuated, and send that information to the EOC via the cloud. That is a feature we are looking to upgrade on the alert and warning side. As of this very moment, we have 21,062 individual contact points in our Everbridge system. The County population is 45,292 (as of the last Census).

B.2. Scott Hertzog, Copperopolis Fire Protection District

Date: February 18, 2022, 1-2 pm PT

Participant: Scott Hertzog, Interim Fire Chief, Copperopolis Fire Protection District

Background: Scott has been at the Copperopolis Fire District since 2013; was a paramedic and now interim fire chief. Background with CAL FIRE before that. Most experience has been in Copperopolis in southern portion of Calaveras County. Don't venture out to due to tax measure restrictions. Small department with 2 fire stations. Area covers 1,400 square miles. Have homes, golf courses, lakefront property mixed in with the wildland environment, some vegetation comes right up to homes. Significant amount of homes in the WUI.

Hazard Events

Please describe any recent large-scale hazard events that required evacuation or had transportation access impacts which you have been responsible for responding to or been affected by in your professional role.

- Hazard type: Salt Fire
- Date(s): July/August 2020
- Geographic area impacted: Near Salt Springs Reservoir
- Assets impacted: Homes impacted, but none lost
- Approximate duration of impact: Several days (fire under control within first 24-48 hours, containment took several days to a week)

Scott: It has been almost 2 years since the most significant fire in the district. Don't get a lot of the weather events that happen elsewhere; the area is right at the 1,000 ft level so did not experience the "snowmaggedon" in recent winter event. Most recent event was a vegetation fire out in Salt Springs Reservoir, called the Salt Fire. It was on the border of the district, so had a challenge with getting resources there because it is 20 miles from nearest fire station. It is a one and a half lane road that is not well maintained where the fire occurred; caused access problems with ingress/egress. A lot of livestock in that area. Only two entrances into the fire. Had resources coming in from all over Calaveras and Tuolumne; eventually they did a strike team request from a more southern region to get anyone they could to come down to it. With these one and half lane roads you have issues with people trying to evacuate, also people trying to get into their homes to make sure everything is safe. No hydrants/zero water out there. No steady water source for rural fire departments.

No homes lost, maybe an outbuilding or two lost to the fire. But more of the problem was people who live in that area were waiting at the last minute to know if they had to evacuate, trying to get animals and livestock out as well. Few businesses out there, just a few wineries. Two wineries that were closed for the season so minimal workers out there.

Fire was controlled within the first 24-48 hours, but took several days to a week after to completely extinguish the fire. Within 48-72 hours, people were allowed to come back to their homes. Typically Sherr[illegible] office (or CHP, depending on where it is), they are monitoring roadblocks and they allow reside[illegible] back in to that area.

Event Preparation, Communication, and Coordination

1. **If there was time to prepare for the event, what strategies were used in preparation for this event?**

N/A, not much time to prepare

2. **What communication methods were used to notify people about how and when to evacuate?**

Scott: At the fire department level, we do not have a reverse 911 system within Copperopolis Fire Protection District, but the Emergency Command Center (ECC) has the ability to talk to the Sheriff's office to do the reverse 911, calling out to land lines. Not 100 percent sure that that is the direct path it takes, but our primary responsibility is life, so if we see homes or people in harm's way, we notify them right away. If it's something we can get into quicker and not need to evacuate, we can go right to fire's edge. So you don't know until you are there. Most of the time the residents will have their own community-based notification where they often share information with each other – they may use Next Door, Facebook, cell phone chain, email, text, and may even ride from house to house on ATVs or horses to let their neighbors know. A bit like the old west in that sense, especially in that area. But for us in that initial dispatch, we can request through the ECC to start evacuations, especially when we get aircraft over the fire and we need to let people know to get out, so it is often an ongoing event with multiple people involved.

- **Were they informed where to evacuate to?**

Scott: Generally the Sheriff's office will tell people where to evacuate to (e.g., they may set up evacuation center in town square – depends on size and location of the fire).

- **Were there any challenges in communication?**

Scott: I'm generally at the station while everyone is at the scene, just listening to everybody. We operate off a tactical channel and a command channel, so it can get cumbersome. The tactical channel is just meant for the troops on the ground working, and the command acts as the in-between for the command center and other resources, so you have two different channels going on. For evacuations, we would just say – we need evacuations ordered for X, Y, Z streets, and the ECC will confirm it, and then get support from Sheriff's office. I don't know how well that unfolded. There were probably only about 20 homes in that area, so can't say for certain how that played out. But generally there are some folks that will stay at their property no matter what, and others will leave as soon as possible. There were more updates on social media quicker than I would get it from guys on the fire line, so that aspect of today's technology is vastly faster than we can be.

- **How did people know when they could return to their homes/businesses?**

Scott: When a major event happens the Sheriff's office goes into unified command – each department has representation. Everyone comes together morning briefings generally about plans for what's going on; may say today we will open things back up to the public, so that will get disseminated there.

3. **Was coordination with other agencies, groups, or jurisdictions necessary? If so, who?**

Scott: Every fire district in Calaveras had an engine present at one point or another (minus Ebbetts Pass). Outside agencies were brought in via CAL FIRE through the mutual aid agreement; brought in and rotated as shifts. I believe Amador County had some engines out there as well.

Event Evacuation and Access

4. **When evacuation was required during an event, how well did the evacuation routes function?**

Scott: I was not there for the evacuations, but there was only two ways in and out and roads are very narrow. It's hard because fire is so dynamic and changing, you can develop a plan and implement it but within seconds that plan is gone. So having the versatility of multiple plans or evacuation routes in place would be the best option. I didn't hear or see anything about issues of access because of roads being blocked or cars backed up on the roadway for that particular fire. In general, certain areas are tough, but you have to make it work.

5. **Were people informed about where to evacuate to?**
   - **If to a central location, did the access points to that location become backed up? For how long/how far?**

N/A

6. **Were there any road conditions that impacted the use of evacuation routes? (e.g., unmaintained defensible space, narrow roadway widths, poor pavement condition)**
   - **If so, how were individuals re-routed?**

Scott: Pavement can be a problem, roads are very old out there and some of the roads are maintained by road committees, or the owners of the land out there, some are County-maintained. Like everything

else in California, the roads aren't the best and could definitely use some attention out there. They spray painted about every pothole for about 10 miles there.

7. **Were there any post-event secondary hazards (e.g., standing burned trees, mudslides) that impacted evacuation or transportation routes?**
    - **What impact did they have (e.g., detours, temporary closures)?**

Scott: It was so far off the main road, that it wouldn't have affected the main roads. But maybe driveways or access roads there were some burned trees that had to be felled or dropped. I did not hear any reports of mudslides.

8. **Did most people evacuate using a personal vehicle or was transportation required/provided?**

Scott: Everyone evacuated on their own.

9. **Were there any challenges in evacuating particular groups of people? (e.g., senior populations, those with mobility issues)**
    - **If so, how were they evacuated (e.g., types of vehicles)?**

Scott: People who are physically disabled can be input into the system as needing help, but not necessary for anyone in the area of this event.

Lessons Learned

10. **What do you see as the 3 biggest successes in preparing for and responding to this event?**

Scott: Our mutual aid system in the County is effective; got resources going right away and updated as the fire progressed. Were even able to call in resources outside of the County; three different agencies in the state SRA. The dispatch was correct, resource orders were correct; dispatch and mutual aid plan worked seamlessly.

11. **What do you see as the 3 biggest challenges in preparing for and responding to this event?**

Scott: Location was the only real downside given the access issues; had this been closer to the main road rather than 10-12 miles off, it would have been a different outcome. Most of the resources came in from the north side, other entrance is on the south.
    - **How do you plan on addressing the challenges you've identified?**

Scott: No major challenges to address there.

12. **Are there any ways that planning, training, or exercises could be improved for this type of event in the future?**

Scott: Nothing really to do differently in that case. Only a handful of roads in that area so you can't get too confused; rolling gas oak woodland area so it's pretty apparent where things are.

13. **Did COVID-19 have any impact on the event response? Can you share any lessons learned for managing future events given ongoing pandemic management issues?**

Scott: July/August 2020 was when event occurred. Because it was 100+ degrees, we had several people going down from heat exhaustion and fatigue, and because of Covid we were limited by how many people could be on duty at the time. Not sure how many people were out that day because of Covid, but it had indirect impacts.

Other Questions

Any particular areas that could pose problems within the area?

Scott: Area off of Little John Road that accesses the golf course and Kiva that is a boat launch and recreation area; that is a dead end. If there was a rapidly moving fire towards it, there would be access egress challenges. It is a 2-lane paved road with no shoulder. A lot of one-way road within those streets.

Everything is a dead end, multiple courts. Were a fire to occur in that area, there could be several issues with evacuation. Only saving grace is it is farther from everything else so it would be 15 minutes for next truck to get in, 30-40 minutes for second wave of engines to come in. That is definitely a point that has been brought up in the past by residents here. The district supervisors were going to build a bridge out towards Knight's Ferry with a land grant that fell through, so now residents in that corner are going to have a challenge getting out to the main road, but once on the main road they should be okay to get out safely (two lane paved road). But that is an area of concern.

Another place - Diamond XX, similarly has two ways in. It is 20 acre parcels with moderate to fair condition roads. So spread out, intermixed roadways with oak woodlands with 2-4 ft tall grass. It's another access egress issue; get several fires out there a year. Luckily able to catch them before they grow to significance, biggest several years ago was a couple hundred acres.

Another one – Circle XX, near where Salt Fire was. And Bar XX. All one way in, with multiple homes on 20 acre parcels. Access to get there is 20-30 minutes, and once you're there the roads get really narrow so with a fire engine you will be hard pressed to find a spot to switch off. And in those outside areas there are no hydrants out there, and the access gets really narrow. We've gotten really lucky in the past few years that we've been able to control and contain with the aircraft resources getting there quicker. But those three – Diamond, Circle, and Bar XX and the Kiva/Little John area are the 'hot points' you could say that could use some attention.

There is a bridge over Lake Tulloch that separates Tuolumne and Calaveras. I'd say 3-5 times a year we have a big rig tractor trailer that hits the bridge or abutment or guardrail, which can close bridge for several hours, down to one lane or both lanes. We've gotten lucky that there's been no fire at the same time, because that's the only exit route to Tuolumne County. Just past the bridge, we typically lose another tractor trailer – either logs or lumber – tip over probably once or twice a year on average. If that happened during a fire, no one could exit to 108, everyone would have to re-route down 4 up to 49.

Any other challenges?
Scott: See the value of defensible space – that's what helps save peoples home. Did defensible space inspections in previous work – unfortunately people are seeing the impact of not having defensible space. That makes our job easier to focus on the bigger picture rather than having to focus on one neighborhood. We don't have the people, personnel, or equipment to dedicate to every area. Everyone needs to do their part. Hurdles: it's expensive, labor intensive and some people just don't have the means or are disabled, though there are some help programs out there. I will be meeting with stakeholders to do outreach to educate on how to be a fire safe community. This might include Lion's Club, Red Hat ladies, HOAs, road committees.
Have not made contact with them yet, but we are planning to this summer. Getting the message out there is important so that when fires do occur, homes and people will be fine if they stay in their home, or have a plan on where/how to evacuate (no matter where fire is coming from) and backup plans.

Anything else you'd like to share?
Scott: It really comes down to the roads at the end of the day in my opinion – whether it's public or private. It's unfortunate, but we have to make do with what we have.

What outreach have you done with stakeholders on fire safe communities?
Scott: I am new in my role, so haven't done the outreach yet. But it is my plan to work on bringing the district more together. There are a lot of road committees here – it is their form of an HOA. So there is the Rocky Road committee, which is the Diamond XX folks; Black Creek HOA; Copper Cove HOA; Poker Flat HOA; Copper Valley, which encompasses town square and Saddle Creek Golf Course; Copper Meadows HOA; Calypso Bay HOA; Lion's Club; and Red Hat. Those are the ones I've gathered on my list just through meeting and talking to people so far. Will start getting that going next month, before summer kicks off.

B.3. Scott Nanik, Calaveras County Schools, and Rebecca Callen, City of Angels Camp

Date: February 18, 2022, 2-3 pm PT

Participants: Scott Nanik, Calaveras County Superintendent of Schools and
Rebecca Callen, City Administrator, City of Angels Camp

Background: Scott oversees all of the schools, coordinate all of the emergency responses for the schools; conduit between OES and the schools. Rebecca has experience from all over the County; worked for Calaveras County through 2019, worked with CCWD until December, then came to City of Angels Camp just a few weeks ago.

Hazard Events

Please describe any recent large-scale hazard events that required evacuation or had transportation access impacts which you have been responsible for responding to or been affected by in your professional role.

Scott: Have been here all the way back to Butte Fire (occurred before John Osbourn's position existed), have been through several floods and washouts, heavy winter storms; most recent event was Airola Fire this last summer.

- Hazard type: Airola Fire
- Date(s): August 2021
- Geographic area impacted: was burning in the river canyon
- Assets impacted: schools
- Approximate duration of impact: almost 1 week

Scott: With the Airola Fire, had to decide if it came up the canyon, it would've been coming up the backside of some of our schools. Our transportation for the most part is down in Angels Camp. Decided to close schools rather than risk leaving them open. If the fire jumped the highway, there is no way to get buses up there to evacuate school sites. Typical for our area is one way in and one way out. That was something the local fire guys had not thought of (schools). Since OES was created, having schools on there has been an important piece. Fire lasted almost a week.
(Note that Scott's answers to specific questions below correspond with the Airola Fire).

Rebecca: In all of my roles, have been involved in any emergencies that occurred. But since I just started at the City, I talked to staff with what experiences they have had. But I live in the City so I have experience as a member of the public here. A lot of our City staff who are in response capacity are also still relatively new so have not had a lot of experience with any major issues. Except for our Fire Chief. Our Fire Chief and Public Works Director have both experienced various emergencies that have happened here. Public Works focuses more on winter storms. City of Angels Camp is a historic city and has a lot of very aged infrastructure, very small roads not built for current construction requirements. When winter storms do occur, it does create a lot of flooding and erosion issues. Angels Camp is very hilly, not a lot of flat space, especially in historic areas. It is very steep, homes are then built up on terraces, so erosion in those areas during a winter storm event can be pretty drastic. There is a creek that runs through the City of Angels, have had issues if flow is really high, we have had to have evacuations on a road called Birds Way. There is only one way into and out of Birds Way, so there have had to be evacuations back there. Even if evacuations don't have to happen, those homes flood on the lower floors. What we try to do if we know a major storm event is going to happen, we reach out to those residents to make sure they are prepared or that they cannot be there when the storm events do occur. We try to help make sure they can relocate somewhere else, maybe another family member, or will point them to any County temporary housing or shelter if those are set up.

There is a road called Finnigan Lane – runs along Angels Creek. If Angels Creek is overflowing, those areas will flood. There are two ways to get in and out, depending on where you are, but we are always mindful of that.

Wildfires: We had the Airola Fire, also the O'Reilly Fire in 2020 – that one required formal evacuation, we coordinated with the County OES and law enforcement. We used Calaveras Alert and Nixle. Evacuated 3 streets in our City. Have had 4 other moderate-sized wildfires from 2018 to present where we considered evacuations but didn't have to.

We did implement a new weed abatement ordinance to work with property owners to make sure we have clearing, so that if there is a fire we have ability to not have as much property damage.

In all cases, whether flooding or fire, we do have an issue with emergency equipment access and evacuation routes. In the case of the O'Reilly Fire, it was going right down the middle of the City of Angels, so everyone went to the back roads to try to get out, and people could not get out of their driveways. Roads are single lane or single and a half; in addition, we cannot get a fire truck up in some of those areas, couldn't get a dozer up in some of those areas. So things pop up anytime there is an evacuation or a major event. We really are restricted by egress/ingress, because there often really is only one way in and one way out. That is primarily in the older part of our city, west of Highway 49.

We also have Big Horn Mobile Park – can be an issue getting people out, because it is just one road that goes around, so it gets completely congested.

Another issue is on a lot of skinny streets, if homeowners have cars parked there, you cannot get a fire truck through.
(Note that Rebecca's answers to specific questions below address various hazard events, including Airola and Butte Fires, as well as flooding events).

Event Preparation, Communication, and Coordination

1. **If there was time to prepare for the event, what strategies were used in preparation for this event?**

(N/A – response only for Airola Fire)

2. **What communication methods were used to notify people about how and when to evacuate?**

Scott: I communicate directly with the superintendents, and then they send out communications through their systems. For my own office, we use Remind as a connecting source for all employees. Everbridge system is primarily used through County government.

Rebecca: For flooding events when we do have evacuations, we do a lot of knocking on doors. A lot of people back there are tenants so could change, there is not a great way for us to always know who is living back there. So we generally just have to go knock on their doors to let them know.

- **Were they informed where to evacuate to?**

Scott: They opened a couple of evacuation centers down the hill in Angels Camp. We use the Mark Twain Elementary School gym in Angels Camp for that. We start to point people there – if they chose to evacuate. There were some mandatory evacuations; the community does a pretty good job of absorbing people that need to evacuate, so it is more of our at-risk population (low income, couch surfers, temporary housing) that is at our shelters. They evacuated animals to our fairgrounds.

- **Were there any challenges in communication?**

Scott: No, worked really well in the case of the Airola Fire.

Rebecca: We are also the utility for everyone for water and sewer. We have not leveraged that contact information in terms of outreach. Most outreach historically has been door-to-door and flyers. We're not a huge city, but that does take time, so when you're in an emergency situation, it's hard to get information.

During the O'Reilly Fire, I heard about it at work when I was in San Andreas, and as an Angels Camp resident, I had to go to other people's Facebook pages and reach out to people who work in the city myself to try to figure out what was going on, or what was the best way for me to get home, or if where I live was in any evacuation area. We do have a shortfall there; we need to figure out a better way of reaching out to our population.
Scott: When we have smaller incidents that are not County-wide, our Nixle Red Alert system does not geocache cell phones in use in the area. We've got a lot of tourists in the area, and we have no way to alert them if there is an emergency. We need a way to reach everyone's cell phone in the area to get a message to them.
Rebecca: What we have found is that most people have dropped their home phone line and only have a cell phone. County OES did outreach over a month or two for people to enroll their cell phones, but it is up to the population to enroll. But if you are a tourist here, you aren't going to go to our Everbridge to enroll your cell phone. So we need the technology to be able to grab everyone who is pinging off a tower around here and alert them. The two problems are the tourists and there are the people who dropped their home lines and so are no longer on the list. So if they haven't enrolled, we don't have any way of contacting them.

Rebecca: The County really controls Nixle and the Everbridge system – we don't control that, so we have to rely on them. So it depends on who is in charge of the system for the type of collaboration that we get.

- **How did people know when they could return to their homes/businesses?**

Scott: Did almost daily updates with parents and students via email and phone system.

Rebecca: From my understanding, same people who let people know to evacuate will reach out and give them a call to let people know when to return. We are planning to revamp our website here at the City; we don't have a Facebook page, so we are going to get that up and running. Planning to leverage more communication that route so that we can keep the population notified.

3. **Was coordination with other agencies, groups, or jurisdictions necessary? If so, who?**

Scott: Public health was involved, because of need to manage that during Covid. American Red Cross took over the shelter – that created some challenges when it came to shutting it down. Some communication issues between County and Red Cross not getting the okay to shut down the facility, wouldn't accept that directive from the County. Shelter ran for 3-4 days longer than it should have.

Are there challenges in coordinating with agencies when a hazard crosses boundaries?
Rebecca: For the Butte Fire, absolutely. For the more recent emergencies, because we have had an OES at the County, that piece has gone a lot better. A lot more coordination because we learned from that event. As you have staff turnover in these respective jurisdictions, we need a way to continue to train and educate those newer people on how this all has to work. For the Butte Fire, that was the biggest downfall. They had all these things in place during Old Gulch Fire (in the 1990s), but between that and 2015, everyone at the County had turned over. There had been no training, and no one knew where the Emergency Operations Plan was, or if there even was one. It would be helpful for our OES to lead the charge and make sure that there is training available for all of the jurisdictions so that we in leadership know who we need to contact, who's on first, etc.

Event Evacuation and Access

4. **When evacuation was required during an event, how well did the evacuation routes function?**

Scott: Evacuation in this case functioned well because we had time and the routes were open. If the highway gets blocked, it can get ugly, if it is a major event it overloads the highway completely.

Rebecca: If an evacuation is necessary, tourists often have no idea how to reroute in the area. Generally what happens is we will ask for assistance from a mutual aid perspective (whoever we can get) to stage and direct traffic. The Butte Fire was tough because it was the entire County. So in Angels Camp it was just City fire and police, because the County was trying to evacuate other pieces of the County first.

At that time, we did not have mutual aid agreements with all of the entities during the Butte Fire – had to work on putting those together while the fire was still burning, but those pieces are in place now.

5. **Were people informed about where to evacuate to?**
    - **If to a central location, did the access points to that location become backed up? For how long/how far?**

As noted above, there were some evacuation centers in Angels Camp and there were no issues with backups.

6. **Were there any road conditions that impacted the use of evacuation routes? (e.g., unmaintained defensible space, narrow roadway widths, poor pavement condition)**
    - **If so, how were individuals re-routed?**

Scott: No, there are narrow roads but it didn't create any problems.

7. **Were there any post-event secondary hazards (e.g., standing burned trees, mudslides) that impacted evacuation or transportation routes?**
    - **What impact did they have (e.g., detours, temporary closures)?**

Scott: No, because most of the scar was on the water side of the reservoir.

8. **Did most people evacuate using a personal vehicle or was transportation required/provided?**

Scott: Mostly personal vehicles. We don't have a robust transit system that can be activated. School buses are secondary after students are taken care of, no event where that's been needed.

9. **Were there any challenges in evacuating particular groups of people? (e.g., senior populations, those with mobility issues)**
    - **If so, how were they evacuated (e.g., types of vehicles)?**

Scott: Mobility issues can be a big issue, but really not in designated areas, it is home by home. Have a very small ESL population in the County, so that's not an issue.

Lessons Learned

10. **What do you see as the 3 biggest successes in preparing for and responding to this event?**

Scott: Nobody got hurt. It worked really well, it was not a huge event, which allowed us to work together and figure some things out on the communication pieces; team came together quickly.

11. **What do you see as the 3 biggest challenges in preparing for and responding to this event?**
    - **How do you plan on addressing the challenges you've identified?**

Scott: None that I can think of.

Rebecca: As a resident during the Airola Fire – I saw the flames and thought, I probably shouldn't drive down that way, so I went a different way. But during the Butte Fire in 2015, that was horrid. We didn't have a functioning OES really. The schools were frustrated because there was just a complete lack of communication.
Scott: We evacuated kids – took them home on school buses and dropped them in evacuation zones. That's how bad it was.
Rebecca: They bussed kids to the fairgrounds, and the fairgrounds were no longer an evacuation site, it was where all the emergency response people were at that point, so it was a total cluster. I know from working at the County, and from being a resident of the County and living in Angels Camp, no one knew what was going on. That fire – even though it started in Amador, no one thought it could get to Angels Camp. By the time I got to Angels Camp, we were trying to get people out of County offices, part of Angels Camp was evacuated. But I didn't know that until I got home. So we've come a long way since 2015, but that was a real tough one. A lot of changes have been put into place because of that Butte Fire, but we still have some pretty significant gaps. And we are always contemplating the whole

ingress/egress, especially in historic areas in our planning, to see if there are ways we can incorporate that hazard mitigation into potential grant opportunities that would help us identify grant funding so that we could expand different ingresses and egresses, but it's been pretty challenging and hard to do that.

12. **Are there any ways that planning, training, or exercises could be improved for this type of event in the future?**

Scott: Not really training, it's really just a communication issue, working with other agencies and schools just to coordinate because it's all so fluid. We are going to still with our plan of having just one person communicate to the group from OES, seems to work smoothly.

(See planning and training improvements noted by Rebecca above)

13. **Did COVID-19 have any impact on the event response? Can you share any lessons learned for managing future events given ongoing pandemic management issues?**

Scott: Did not have a huge response to need for shelter, but that could have been a challenge. Shelter did have limitations on number of people and spacing considerations.

Other Questions

Any other particular problem areas?
Rebecca: Birds Way and Finnegan are the two streets that always have issues with flooding, because those are the two streets right on the creek. Other areas: Bush, Echo, and Crystal were heavily impacted with the O'Reilly Fire. Those are all in historic part of Angels Camp – all on steep slopes with very narrow roads. Those roads were right in the path of that fire. If we hadn't got as quick assistance as we did with air support, it would have gone right through Angels Camp, would have been all through the historic streets. Once you get into the middle of downtown, you cannot get out.

Any challenges that need to be addressed as we look towards future hazard events?
Scott: Emergency routes system are not communicated well and don't know how well the public will respond to being told – don't come down the hill and take a back road that is dirt to get out. I'm really concerned about how that plays out in a crisis. It's a great system, and it's probably our best alternatives, but how we communicate it is my biggest concern. We don't have any way to monitor it to route people in that direction. We could not get people here fast enough during the Butte Fire; if we get another one of those, there's no way. We're just lucky that everyone on Highway 4 – that no one died, because it went across Highway 4, which was a parking lot. So we need to re-train our public.
Rebecca: Having a more robust communication system is really important. Benefit of being in the City is we don't have cell reception issues – except some areas in downtown we have a few issues. So if you're downtown, you might not get the call because there is a dead spot for cell phones in downtown. Unlike the rest of the County where there are whole swaths of dead spots across the county for cell phones. Everyone who is not registered for the notification system or doesn't have a home phone, we don't have a great way of communicating with them.

Have there been any evacuation practice exercises?
Both – no.
Rebecca: That's the missing piece with our OES. What I fear is if we don't plug that hole and another Butte Fire happens, we will have the same problems. While there are some people who are around now during that fire, we might not be around for the next one. We need to train the next group, who may not have experienced the Butte Fire.

Other lessons?
Rebecca: The other thing during Butte Fire was we relied heavily on non-profits, church organizations, etc. (County-wide). There was an enormous amount of outreach and support, but it is still important that it needs to be managed. Very well intended people that showed up to volunteer, but there has to be a better mechanism in place to manage that response. Not just about training people in the schools and government, but also about training the public or volunteer groups who would support in an emergency.

B.4. Gregoria Ponce and Charly Modrell, Caltrans

Date: February 22, 2022, 8-9am PT

Participants:
Gregoria Ponce. Chief, Office of Rural Planning Caltrans District 10 Planning
Charly Modrell, Mountain Region Manager, Caltrans District 10 Maintenance

Background:

- Gregoria assists rural cities and counties in planning their infrastructure, implementing community visions, and applying for grants related to scenario planning, complete streets, and traditional planning components. Gregoria helped support the District 10 climate vulnerability assessment.
- Charly Modrell oversees maintenance operations and is part of the emergency operations team for District 10.

Hazard Events

Please describe any recent large-scale hazard events that required evacuation or had transportation access impacts which you have been responsible for responding to or been affected by in your professional role.

- Hazard type: Winter storms, floods, mudslides and the Butte Fire
- Date(s): Significant winter storm in 2017; Butte Fire 2015
- Geographic area impacted: Calaveras County and other areas in District 10
- Assets impacted: Road impacts for winter storms; extensive impacts from Butte Fire
- Approximate duration of impact: Not specified

Charly: We have not had any serious events in the last few years, but we did have the Butte Fire in 2015. We have had some flooding and mudslide activities. There were significant storm impacts in December of 2021, no major closures on our highways, and we were pretty much able to keep our ingress/egress open during that event.
There was a huge winter storm event in 2017, and a section of Highway 26 was closed down for a significant amount of time and we had to detour folks (shut down for over 30 days). We also worked to keep people informed and provide ingress/egress. When county roads have difficulty, they look towards Caltrans to keep roads open.
As far as the Butte Fire, we had Highway 26 shut down for a significant period and had to keep ingress and egress for emergency crews. Our role is to have those road closures in place and take the burden off of law enforcement or fire crew. We also have some responsibility if there is damage to roadway infrastructure and responding to immediate hazards, such as fallen trees.

Event Preparation, Communication, and Coordination

1. **If there was time to prepare for the event, what strategies were used in preparation for this event?**

Gregoria: Certain counties have local emergency preparedness plans and we, Caltrans, are asked to provide input as to our role, in their plans *(response submitted prior to interview)*.

2. **What communication methods were used to notify people about how and when to evacuate?**
    - **Were they informed where to evacuate to?**
    - **Were there any challenges in communication?**
    - **How did people know when they could return to their homes/businesses?**

Charly: We rely on the Sheriff's office/highway patrol for communication. We work a lot with the highway patrol. We provide traffic control that is requested. The only information we provide to public will be what's passed on from the Sheriff's Office or County emergency services. We re-share messages on social media, tweet, and use CMS (changeable message) signs.

3. **Was coordination with other agencies, groups, or jurisdictions necessary? If so, who?**

Charly: We are very open with CAL FIRE and the other local gov staff as well. 2017 was a big year, same with the Butte Fire, so there were cooperators meetings where we had representation.

Event Evacuation and Access

4. **When evacuation was required during an event, how well did the evacuation routes function?**

Charly: 2017 was not a full evacuation situation, but the Butte Fire was. Previously folks have been re-routed up Highway 4, and the re-routing could have been better coordinated. We provide crew and detour, but we do not lead evacuation. We do have full emergency operation capability, but this is not necessarily recognized or realized by partners. Our EOC could provide maps, engineering technology, mobile unit, or a portable bridge. We have a lot of resources that could be utilized, but it is not always communicated well. We can do more than just traffic control.

Have practice events happened?

Charly: We do them occasionally, but since COVID, we have not really had one. We generally do this on an annual basis. This would be helpful for new staff as well and learning what everyone has in terms of resources and capabilities.

5. **Were people informed about where to evacuate to?**
    - **If to a central location, did the access points to that location become backed up? For how long/how far?**

As noted above, Caltrans does not lead evacuation efforts.

6. **Were there any road conditions that impacted the use of evacuation routes? (e.g., unmaintained defensible space, narrow roadway widths, poor pavement condition)**
    - **If so, how were individuals re-routed?**

Charly: There were other smaller scale slides and flooding areas due to weather conditions. There are not many alternatives, and that is always a challenge in these rural communities. There is not a lot you can do, but communication is important. Power outages, limited cell service, also create communication challenges.

7. **Were there any post-event secondary hazards (e.g., standing burned trees, mudslides) that impacted evacuation or transportation routes?**
    - **What impact did they have (e.g., detours, temporary closures)?**

See Question 11 response.

8. **Did most people evacuate using a personal vehicle or was transportation required/provided?**

(N/A)

9. **Were there any challenges in evacuating particular groups of people? (e.g., senior populations, those with mobility issues)**
    - **If so, how were they evacuated (e.g., types of vehicles)?**

(N/A)

Lessons Learned

10. **What do you see as the 3 biggest successes in preparing for and responding to this event?**

Charly: For the 2017 winter storm event, the response was quick. It was really impressive how quickly we got an emergency contractor out there to start repairs, how quickly we got the road shutdown, and got signs in place. The teams did a great job on instant response.

11. **What do you see as the 3 biggest challenges in preparing for and responding to this event?**

Charly: We did have a secondary incident. Having a little more foresight to focus on the larger picture of other potential hazards outside of the direct impact area would have been helpful. The secondary incident was another mudslide up the road and someone was stuck. No one was injured, but having a person trapped in between was hard.

- **How do you plan on addressing the challenges you've identified**?

Charly: Relationship building is super important because Counties may not recognize the capabilities we have. Caltrans can be an afterthought after decisions are made. Law enforcement can communicate via radio, but we do not have the same capability on the radio network. Something to work on would be a better line of communication between us and first responders.

12. **Are there any ways that planning, training, or exercises could be improved for this type of event in the future?**

Gregoria: Include Caltrans in field training/simulation with other emergency responders. This would include communication, and also finding where are the 'dead comm zones' as this would reduce communication coverage (response submitted prior to interview).

13. **Did COVID-19 have any impact on the event response? Can you share any lessons learned for managing future events given ongoing pandemic management issues?**

Charly: With the December storms, there were challenges with heavy snows and trees coming down. We were short staffed because of COVID effects. Our goal is to provide 24-7 coverage, but we were a little light on staff, and this affected our ability to respond directly.

Other Questions

Did you have any involvement with the 2020 O'Reilly Fire response?
Charly: We were involved very minimally, I found out about it through a personal call that the highway was shut down. We were able to provide support, but direct communication about the highway shutdown did not happen.

Do you have general suggestions or thoughts on how evacuation could be done better for Calaveras County?
Charly: We do dam exercises with local dams, so we know what the emergency actions plans are for all of them. We do not have a copy of Calaveras County plan and that would help us. We are working with another county on an exercise currently, and we are more than willing to provide support and help.

Do you have thoughts on how to keep potential climate change impacts in mind as we are looking at evacuation and transportation needs for Calaveras County?
Gregoria: I think there is some information about priorities from the vulnerability assessment that may help inform this, and I'd like to think more about this.
With regards to emergency preparedness plans, we can think beyond Caltrans, and ask how is Calaveras coordinating with their neighbors? Emergencies don't have boundaries. Also, how can dead comm zones be evaded? Dead comm zones are when you look geographically, there are communication dead zones where this is no coverage. The tower could not be picking up. How can that be bridged? What can be done? In the times when it matters, it is often too late.

Also consider doing an inventory of what is Calaveras doing for a community emergency response team? What capacity does Calaveras have in terms of organizational citizenry?

Additional Notes

Gregoria: Please reach out to GIS staff (Austin) for available vulnerability assessment data layers.

Appendix E

Existing Conditions Report

CALAVERAS COUNTY EVACUATION AND NEEDS ASSESSMENT AND PREPAREDNESS PLAN

Existing Conditions Interim Report

MARCH 2022

Dewberry

ORIGINAL

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Calaveras County Evacuation and Needs Assessment and Preparedness Plan: Existing Conditions Report

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1. Introduction

1.1 Background

The Calaveras Council of Governments (CCOG) was awarded a California Department of Transportation's (Caltrans) Sustainable Transportation Planning Grant in response to Senate Bill 1 (SB 1), the Road Repair and Accountability Act of 2017. The SB 1 grant funding is intended to support and implement Regional Transportation Plan (RTP) Sustainable Communities Strategies (SCS). Because wildfires in the west are moving faster, growing larger, and behaving with unprecedented fire activity, the CCOG and many rural northern California communities recognize the investments in evacuation route resiliency and function is a cost-effective tool in wildfire response. Calaveras County experienced this modern style of fire activity with the Butte Fire in 2015 and learned how inadequate existing evacuation routes were.

The CCOG has also participated in an Extreme Weather and Natural Disaster Prevention and Response Strategies Needs Assessment Program with funding provided by Caltrans's Adaptation Planning Grant program. The Assessment Program developed response strategies and recommended actions to mitigate potential natural disaster risks (primarily wildfire) within Amador and Calaveras counties. In response to the plan the CCOG needs information for these key actions:

- Understand the evacuation routes that serve several high-risk communities and identify potential ingress / egress impairments that may impact use of these routes during emergencies. These impairments include unmaintained defensible space, narrow roadway widths, and poor pavement condition.
- Identify and document structural and vegetation related issues that impair evacuation routes along roadsides, roadways and shoulder widths and roadway turnouts and identify opportunities for vegetation management / expansion of defensible space along evacuation routes.
- Examine how climate vulnerability may impact roadside drainage ditches and drainage under-crossings (culverts, bridges). Of these, the most critical need is the maintenance of defensible space along roadway evacuation routes.
- Create a forum for resiliency stakeholders to conduct annual or biannual meetings to advance the discussion of improving the road network for extreme weather events. This forum can be used to coordinate emergency preparedness, resiliency planning and implementation efforts. Stakeholder discussions of what is, and is not, working, create mutual efficiencies for pursuing grants, prioritizing resiliency projects, and engaging in public outreach and participation efforts.
- Share community training materials to educate residents about the importance of defensible space, preparing for an evacuation, and knowing where to get information in the event of an evacuation.

Evacuations may necessitate the relocation of the affected population to other parts of a locality, to adjacent localities, to another part of the state. The evacuation of large numbers of people from vulnerable areas will stress the capabilities of road networks, potentially increasing the time necessary to evacuate the threatened risk area. Re-entry to the area post-event is also a critical component requiring an assessment of the road-network, debris remaining in the area, and critical facility operational status and capacity. CCOG seeks to improve the ability of their service area to respond to evacuation needs and plan for the safe return of their communities.

1.2 Project Overview

To help address County emergency and evacuation planning needs, the CCOG has launched a new project called the Evacuation and Access Needs Assessment and Preparedness Plan (hereafter called the project). The goal of the project is to build resiliency in the Calaveras County transportation system from the impacts of wildfire, extreme weather, and other events, which are exacerbated by climate

change. The project is developing a plan to facilitate adequate and sustained access to and from high-risk communities in Calaveras County, including the City of Angels Camp, during and after catastrophic events. The focus is on assessing the transportation network's demands, capacities, and deficiencies or needs in responding, recovering, and adapting to catastrophic events. The project is evaluating the potential for wildfires and extreme events to impact the communities and infrastructure at the highest risk.

The project is proceeding in four progressive tasks: an existing conditions assessment, an analysis of hazard risk and vulnerability, an advisory and public outreach campaign, and the development of a final plan. This report presents results from the desktop research component of the existing conditions assessment.

1.3 Existing Conditions Report Overview

This Existing Conditions Report was prepared as part of the overall existing conditions assessment under Task 1 of the project. Data was gathered on existing County conditions, assets, and community characteristics, with a focus on identifying opportunities and constraints, incorporating prior planning and data development efforts, and learning from past extreme weather events. The assessment included:

- Collection and review of emergency plans and hazard mitigation documents, including the draft 2021 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) under development by Calaveras County Office of Emergency Services;
- Identification and mapping of locations and characteristics of roadway assets and transportation network, such as roadway classification and use;
- Identification and mapping of planned land use developments and population characteristics, including disadvantaged community status;
- Identification of climate change projections expected to impact the transportation network, such as precipitation, temperature, wildfire, and dam failure;
- Identification and review of additional case studies, reports, and reference documents.

The remainder of this report is organized into seven sections that overview information that was gathered on the existing Calaveras County conditions. Each section contains language from the MJHMP and other relevant reports. These reports and other sources contain much more detailed information that will inform the next step in the project, which is an analysis of hazard risk and vulnerability. The topics covered in the seven sections are:

- Section 2 - Environment: geography, natural resources, hydrology, and land use.
- Section 3 – Boundaries: major political and natural borders.
- Section 4 – Communities: demographics and vulnerable populations.
- Section 5 – Infrastructure: roads, buildings, and other infrastructure.
- Section 6 – Natural Hazards: risk profile due to hazards that impact evacuation.
- Section 7 – Climate Change: projected changes to local climate and impacts on evacuation.
- Section 8 – Emergency Planning Documents: government emergency and hazard mitigation planning documents.

Appendix A contains maps of existing conditions throughout the County.

1.4 Companion Databases

As a supplement to the Existing Conditions Report, there are two companion databases that archive the most pertinent information that was reviewed for the existing conditions assessment. They are described in Appendix B and Appendix C, respectively, and briefly summarized below.

- Geospatial Database: an ESRI ArcGIS Online geodatabase with the most relevant geospatial data (i.e., shapefiles and raster grids) that were downloaded and reviewed.
- Document Database: set of zipped pdfs that contain the most relevant non-geospatial documents (e.g., reports) that were downloaded and reviewed.

2. Environment

2.1 Geography

Calaveras County is situated in the central Sierra foothills between Yosemite National Park to the east, Lake Tahoe to the northeast, Sacramento to the northwest, and Stockton to the west (see Figure 1 in Appendix A). It is bordered by several lakes and reservoirs, including New Melones Lake to the south, and Camanche and Pardee reservoirs to the north. Mountainous terrains to the east and central parts of the County slope down to valleys in the west.

The County covers 1,037 square miles, or 663,478 acres, and includes the 3.6-square miles incorporated City of Angels Camp as well as multiple unincorporated communities: Arnold, Avery, Burson, Copperopolis, Dorrington, Douglas Flat, Glencoe, Forest Meadows, Mokelumne Hill, Mountain Ranch, Murphys, Paloma, Rail Road Flat, Rancho Calaveras, San Andreas, Sheep Ranch, Tamarack, Vallecito, Valley Springs, Wallace, West Point, and Wilseyville. Calaveras County is considered part of the Gold Country and High Sierra Regions of California. Together with neighboring foothill counties, Calaveras County forms a central part of the Mother Lode Region, an area with remarkably rich mineral deposits, including gold, asbestos, chromite, clay, copper, zinc, limestone, quartz, and tungsten. The unique limestone geology of Calaveras County as part of the “Calaveras Formation” has resulted in the formation of a significant number of caverns throughout the County. These caverns range in size from small openings only a few feet in extent to deep caverns hundreds of feet in length and depth that consist of numerous passageways and rooms that host marvelous formations. The limestone formations also contribute to the formation of sinkholes.

2.2 Natural Resources

Calaveras County has a variety of natural resource assets that to a large extent serve as the basis for the County’s economy and quality of life. These assets include water, critical species, wildlife and plant habitat.

- Non-Native Annual Grasslands – Grasslands provide food for livestock; habitat for birds, squirrels, hares, rabbits, voles, mice, raptors, and hawks. Coyote, red fox, striped skunk, and Virginia opossum are also present.
- Chaparral – Chaparral is a one- to two-layer thick layer of drought-adapted, evergreen shrubs that are 6 to 15 feet tall. These shrubs often form dense thickets that can shade out herbaceous species. If a herbaceous understory is present, it varies seasonally and annually. The chaparral layer is fire-adapted. It is home to many wildlife species.
- Conifer Forests – Several different types of coniferous trees are present in the County and can be sub-divided according to elevation into upper and lower montane mixed coniferous forest. The lower montane forests are commonly referred to as Sierra mixed-conifer forests and include ponderosa pine, black oak, cedar, Douglas fir, canyon live oak, and giant sequoia. There is one grove of giant sequoia in the North Calaveras Grove in the Calaveras Big Trees State Park. The upper montane consists of forests, meadows, aspen, chaparral, and non-forested rock outcrops and provides habitat for a variety of wildlife. Upper montane coniferous trees include red fir, lodgepole pine, and Jeffrey pine.
- Hardwood Forests – Hardwood forests consist of evergreen trees such as evergreen oaks, and madronoe and broad-leaved deciduous trees.
- Seasonal Wetlands – Seasonal wetlands are located throughout the County and provide important functions including groundwater recharge, pollutant filtration, and aquatic habitat and water source for a variety of wildlife species.

2.3 Hydrology

According to the U.S. Geological Survey (USGS), California has 10 hydrologic regions. Calaveras County sits in the San Joaquin hydrologic region, which encompasses the middle portion of the Central Valley bounded by the Sierra Nevada Mountains, the Coast Range, the divide between the American and

Cosumnes river watersheds, and the divide between the San Joaquin and Kings River watersheds. The region also includes portions of the Sacramento-San Joaquin Delta. Although predominantly agricultural, this region has experienced increased urbanization in recent years and is subject to flooding from winter storm events and snowmelt.

2.4 Waterways and Watersheds

Calaveras County contains three major rivers – Mokelumne, Calaveras, and Stanislaus. The rivers carry runoff from the western slopes of the Sierra Nevada westward across Calaveras County, and into the Central Valley. All three rivers are dammed at one or more locations. The lower stretches of the rivers provide irrigation water for valley agriculture and are used for municipal water supply within the County and the surrounding areas. The seven primary watersheds in the County are:

- North Valley Floor
- Middle Sierra
- Upper Calaveras
- Stanislaus River
- San Joaquin Valley Floor
- Gopher Ridge
- Lower Calaveras

In addition to the three major rivers, there are a number of perennial and seasonal creeks throughout Calaveras County (see rivers map in Figure 4 in Appendix A).

2.5 Land Use

Calaveras County consists of a number of small, historic communities established primarily during the Gold Rush period of early California history, separated by large landholdings of agricultural land (primarily used for grazing) and timberland, interspersed with rural residential homes on larger acreage lots of five to twenty acres or more. There are several active and inactive mines in the County along with the recreational resources of several reservoirs, Stanislaus National Forest lands, and Calaveras Big Trees State Park. More recently, more than 20 boutique wineries have been established in the area around Murphys. Approximately 21 percent of the land in the County is publicly owned.

Calaveras County's communities lie primarily along the historic routes of Highways 49 and 12. These include Mokelumne Hill, San Andreas, Valley Springs, and the incorporated city of Angels Camp. State Route 4 is the only trans-Sierra route in the County; Copperopolis, Murphys, and Arnold lie along this route. Other smaller communities include Wallace and Burson in the western end of the County, West Point, Wilseyville, and Mountain Ranch in the north-central part, and Avery and Dorrington on Highway 4.

Calaveras County has historically relied on industries such as timber production, mining, and agriculture for its economy. The historic communities that have grown up around these industries have been the centers of commerce and population for much of the County's history. In more recent decades, beginning in the 1960s and 1970s, manufacturing and resource-based jobs began to decline when the cement plant in San Andreas closed and the timber industry contracted. The economy has shifted in the past several decades to rely more on tourism and service industries, and residential home construction. New residential subdivisions were built near Valley Springs, Copperopolis and along the Highway 4 corridor between the 1970s and 2008 to accommodate growth within the County, which at that time was about 4.8%. The 1996 General Plan land use map designated large areas of land for future residential development throughout western and central parts of the County. However, when an economic crisis struck in 2007-2008, population growth was stagnant and started to decline, pausing new residential construction, which has remained stagnant since that time.

Future land use and growth management strategies in Calaveras County aim to concentrate future development into and toward existing communities away from locations where natural characteristics may limit development (e.g., steep slopes or sensitive habitats), and to areas that have, or can readily be supplied with, adequate public facilities and services. This is done through various policies relating to zoning and minimum development standards and requirements. Zoning designations prescribe allowed land uses and minimum lot sizes for the purpose of supporting efficient infrastructure design, conservation of natural resources, and to avoid conflicting uses.

Existing land use is summarized in the table below.

Table 1. Calaveras County land uses.

CALAVERAS COUNTY LAND USES		
LAND USE TYPE	**AREA (ACRES)**	**PERCENT OF COUNTY**
Coniferous Forest	210,307.7	31.7
Non-Native Annual Grassland	151,975.3	22.91
Foothill Woodland	120,607.6	18.18
Montane Hardwood	79,539.0	11.99
Chaparral	79,782.5	11.57
Lakes and Rivers	14,303.2	2.16
Urban	7,313.2	1.10
Anthropogenic	2,008.1	0.303
Valley Oak Hardwood	246.0	0.037
Riparian Hardwood	226.0	0.034
Seasonal Wetland	87.1	0.013
Drainage	57.0	0.009

3. Boundaries

Calaveras County has been subdivided according to a multitude of natural, political, and administrative boundaries. Many of these boundaries need to be taken into account in the development of County evacuations and emergency preparedness plans. Table 2 describes some of the major County boundaries, which are all included in the supplemental Geospatial Database (see Appendix B).

Table 2. Calaveras County major boundaries.

CALAVERAS COUNTY MAJOR BOUNDARIES (ALPHABETICAL)	
BOUNDARY NAME	**ADDITIONAL DETAILS**
Big Tree State Park	Located in central-eastern part of County
Census Blocks	For year 2000, contains 2,202 blocks
Census Tracts	For years 2000 and 2010, contains 7 and 10 tracts respectively
Communities	Contains 28 communities
Elementary School Districts	Contains 3 elementary school districts
FEMA Flood Zones	Shows 1% and 0.2% floodplains along studied stream reaches
Fire Districts	Contains 11 districts
Fire Severity Zones	Areas designated as Moderate, High, or Very High hazards class
Land Use and Zoning Designations	Designates 357 areas including residential areas and natural resource lands
Parcels	Contains 43,492 records
School Districts	Contains 2 districts, which are different than elementary school districts
Sections	Contains gridded map with 1,636 sections
Supervisors Districts	Shows 5 districts for members of the Board of Supervisors
Tax Rate Areas	Contains 184 tax rate areas, each with unique combination of revenue districts
Townships	Contains gridded map with 53 townships

4. Communities

4.1 Demographics

Calaveras County is home to approximately 45,600 people, and the City of Angels Camp is home to another 4,020 people. The overall population density is about 40 people per square mile. The table below provides selected demographic information.

Table 3. Calaveras County selected demographics.

CALAVERAS COUNTY SELECTED DEMOGRAPHICS	
CHARACTERISTIC	**VALUE/NUMBER OF RESIDENTS**
Median age (years)	51.2
Over 65 years old	28%
Spanish Speakers	1,820
German Speakers	215
French Speakers	175
Other Native American Language Speakers	57
Hebrew Speakers	57
Other languages	36
Disabled	9.5%

4.2 Vulnerable Communities

According to the FEMA National Risk Index for Natural Hazards, the social vulnerability index varies from relatively low to relatively high across the County's ten 2010 census tracts.[1] The census tracts along the southwest border, closer to the Pacific coast, tend to have a lower social vulnerability, while the tracts in the eastern mountainous terrain tend to have higher social vulnerability. The tracts containing the City of Angels Camp also have relatively high social vulnerability.

According to the definition of low-income communities developed for Assembly Bill 1550, most of the County that is north of the Golden Chain Highway (SR 49) are low income communities. Low-income areas are defined as census tracts that are at or below 80 percent of the statewide median income, or at or below the threshold designated as low-income by the California Department of Housing and Community Development.[2] According to the definition and maps developed for Senate Bill 535, there are no disadvantaged communities in Calaveras County.[3]

[1] The FEMA National Risk Index data were accessed on March 17, 2022 at https://hazards.fema.gov/nri/map.
[2] The AB 1550 Low-income Community Maps and low-income community definition were accessed on March 17, 2022 at https://webmaps.arb.ca.gov/PriorityPopulations/
[3] The SB 535 Disadvantaged Community maps were accessed on March 17, 2022 at https://www.arcgis.com/apps/View/index.html?appid=c3e4e4e1d115468390cf61d9db83efc4.

5. Infrastructure

5.1 Transportation Assets

5.1.1 Roads

The County is served by four state highways and numerous secondary roads (see Figure 2 in Appendix A). State Highway 49 is the main north-south route through the County. It meanders through the foothills and extends from Mokelumne Hill in the north through Angels Camp to Melones in the south. State Highway 4 is another major east-west route that runs through the eastern and southern parts of the County. It runs from Bear Valley just east of the County toward the southwest through Angels Camp to Copperopolis and then out of the County toward Stockton. Sixty-one miles of this highway, starting in Arnold and extending into the high Sierras, has been designated a National Scenic Byway by the U.S. Department of Transportation. State Highway 26 is a major east-west route through the northern part of the County. It runs from West Point in the northeast toward the southwest through Valley Springs and Scenic Valley Ranchos. State Highway 12 runs east-west in the northwestern part of the County. It extends eastward from Wallace in the west toward Valley Springs, where it connects with Highway 26.

5.1.2 Airports

Calaveras County is well served by air as well as roads. Fifty airports/ heliports of various sizes and capacities are within fifty miles of Angels Camp. Calaveras County operates its own General Aviation Airport, Calaveras County Airport/Maury Rasmussen Field. It has hangars, tie downs, and aircraft maintenance services. It is located between San Andreas and Angels Camp at an elevation of 1,325 feet. The runway is 3,600 feet long and will accommodate 95% of general aviation aircraft. Columbia Airport (COA) in Columbia and Westover Field Airport (JAQ) in Jackson are two other General Aviation Airports in the area. Columbia Airport, fourteen miles south of Angels Camp, is located within walking distance of the historic town of Columbia in the Sierra Nevada foothills. It sits at an elevation of 2,118 feet and has a lighted 4,650-foot paved runway and a 2,600 foot irrigated turf runway. The Westover Field (Amador County Airport) is located approximately 15 miles northwest of Calaveras County in Jackson. It is at an elevation of 1,690 feet and has a runway that is 3,400 feet long.

5.1.3 Buses

5.1.3.1 School Buses

Calaveras County is home to four school districts plus Calaveras River Academy, Mountain Oaks Charter School, and Building Bridges preschool that have a total of 19 schools that serve approximately 5,300 students. Many of these students use bus service that is available through the schools. The table below shows the number of buses and passenger carrying capacity per school, which might be available to deploy in emergency situations.

Table 4. Calaveras County school bus capacity.

CALAVERAS COUNTY SCHOOL BUS CAPACITY		
SCHOOL	**NUMBER OF BUSES**	**NUMBER OF PASSENGERS**
Vallecito	7	426
Calaveras Unified	47 (including 6 wheelchair accessible)	2386
Bret Harte	11	574
Mark Twain	No Data	No Data
Total	**65**	**3386**

5.1.3.2 Public Transit

Calaveras Connect offers public transportation to users throughout the County. The Red Line, which runs from Arnold to Angels Camp to Valley Springs, provides regular bus service Monday through Friday as well as some dial-a-ride on-demand services. A Saturday Hopper goes between Angels Camp and Murphys, with on-demand service between Murphys and Arnold. The Columbia College Shuttle runs from Angels Camp to Columbia college on weekdays when college is in session. Additional bus service is available on-demand with some restrictions on days for certain parts of the County. The current bus schedule is available at the Calaveras Connect website at http://calaverasconnect.org/.

5.2 Critical Facilities

The 2021 Calaveras County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) adopts FEMA's definition of critical facility and categorizes its facilities accordingly: Essential Facilities, High Potential Loss Facilities, and Transportation and Lifelines.[4] The following are general categories of critical facilities in Calaveras County. The MJHMP describes the number and location of each.

Table 5. Calaveras County critical facilities.

CALAVERAS COUNTY CRITICAL FACILITIES		
ESSENTIAL FACILITIES	**HIGH POTENTIAL LOSS FACILITIES**	**TRANSPORTATION AND LIFELINE**
Hospitals and Medical Facilities	Dams/Levees	Highways, Bridges, and Tunnels
Police Stations	Main Government Buildings	Bus Facilities
Fire Stations		Airports
Emergency Operations Centers		Water and Wastewater Treatment Facilities
Schools		Power Plants and Utilities
Evacuation Shelters		Communication Systems

[4] The MJHMP was accessed on March 17, 2022 from https://calaverasgov.us/Portals/0/Documents/OES/Calveras%20County%20MJHMP%202021%20.pdf?ver=mlEV7IvEQowthblKNO4t6w%3D%3D.

6. Natural Hazards

The 2021 MJHMP provides a comprehensive review of natural hazards across Calaveras County. The analysis used three criteria – extent, probability, and risk rating – to fully understand the potential impacts of these hazards in Calaveras County. Hazard extent refers to the potential severity of a disaster and any secondary events caused by the hazard in the County, and is designated as either catastrophic, critical, limited, or negligible. Hazard probability is the expected frequency of future events, and is designated as either highly likely, likely, occasional, or unlikely.

As part of the development of the 2021 MJHMP, planning and steering committee members were asked to score each hazard using the probability classifications and extent of damage to come up with a score which varies from low to high risk. Table 6 summarizes the extent, probability of future occurrences, and risk ranking for eight hazards that may trigger an evacuation: dam failure, debris flow (landside, mud flow, or avalanche), earthquake, flooding, volcano, or wildfire. Wildfire is the highest risk hazard across Calaveras County with a High Risk ranking. Debris flow and flooding are the next highest risk hazard with a Serious Risk ranking. Dam failure, earthquake, and volcano hazards are Moderate to Low risk ranking. The hazards are summarized using language and information from the 2021 MJHMP in the sections below.

Table 6. Calaveras County hazard risk ranking. (Source: 2021 MJHMP)

CALAVERAS COUNTY HAZARD RISK RANKING			
HAZARD	**GEOGRAPHIC EXTENT**	**PROBABILITY OF FUTURE OCCURRENCES**	**RISK RANKING**
Dam Failure	Limited	Likely	Moderate
Debris Flow - Landslide	Critical	Likely	Serious
Debris Flow - Mud Flow	Critical	Likely	Serious
Debris Flow - Avalanche	Critical	Likely	Serious
Earthquake	Negligible	Unlikely	Moderate
Flooding	Critical	Likely	Serious
Volcano	Negligible	Unlikely	Low
Wildfire	Catastrophic	Highly Likely	High

6.1 Wildfire (High Risk)

Wildfires are an ongoing threat for Calaveras County. The fire season usually runs from early spring to late fall, but this is rapidly changing because of recent droughts and dry conditions. Wildfires in Calaveras County are now possible almost year-round. Fires generally ignite due to some combination of hot weather, an accumulation of vegetation, low moisture content in the air, and anthropogenic activities. These factors, in addition to high winds and drought, increase the chances of wildfire.

Several conditions within the County make it susceptible to wildfires such as its low-lying foothills to the south and west, and in the mountainous areas to the north and east, the terrain and topography are such that fires can spread quickly upslope and suppression equipment is limited. In the brush fields in the central portions of the County, summer temperatures can be very hot and this in combination with winds, and different fuel types (e.g., brush, timber, ladder, ground) can make the perfect wildfire conditions. On the CalFire Fire Hazard Severity Scale, which uses three criteria to assess risk – fuel loading vegetation, fire weather (winds, temperatures, humidity levels, moisture content), and topography (degree of slope) – at least 85 percent of the County is an area of high or very high wildfire severity (see Figure 3 in Appendix A).

The County has a long history of wildfires and potential losses can be very devastating, impacting everything from human life, structures, power lines, and water supplies. Wildfire smoke and haze can also degrade air quality and breathing conditions for at-risk populations. In the natural environment, wildfires can have long-lasting effects through vegetation loss, soil erosion, increasing sedimentation, and reduced natural water storage capacity. The extent of wildfire damage in the County is rated as catastrophic, with more than 50 percent affected and the probability of a wildfire occurring is highly likely. In the National Fire Plan produced by CalFire, all of the major communities in the County were identified as at risk for wildfire based on fuel hazards, probability of fire, and areas of suitable housing density that could create wildland urban interface fire protection strategy situations. Because rural residential development is increasing, more property and people are at risk – approximately 45,000 people in the planning area and the unincorporated areas of the County may be impacted by a wildfire.

6.2 Debris Flow (Serious Risk)

Debris flows are geological phenomena in which water-laden masses of soil and fragmented rock rush down mountainsides. In Calaveras County, there are three basic types of hazardous debris flow: landslides (including rockslides), mud flows, and avalanches. The risk from each is discussed below.

6.2.1 Landslide

A landslide is the breaking away and gravity-driven downward movement of hill slope materials, which can travel at various speeds. In Calaveras County, landslides occur most often on steep slopes in the mountainous eastern part of the County. The 2021 MJHMP assesses the extent of a landslides in Calaveras County as critical and its probability as likely. Approximately 2 percent of the land area of Calaveras County has soil types that are highly susceptible to landslides, and the USGS has developed County-wide maps of landslide vulnerability. Specifically, locations near Jenny Lind and Ebbetts Pass are at greatest risk from landslides. Also, the western edge of New Hogan Reservoir and southwest of Ebbetts Pass have significant areas of soils classified as having severe erosion potential. Landslides in these mountainous areas with high elevations and steep ravines could block major roads and therefore limit access to emergency vehicles. In recent years, the County has had several damaging landslides. In 2015, a heavy rainstorm and high mountain snow in the burned areas from Butte Fire caused over $10,000 in property damage from debris and mud flows. In 2016, heavy rains on State Highway 26 between Mokelumne Hill and Glencoe (within the Butte Fire area), caused over $5,000 in property damage from debris flows. Storms in February 2019 caused a landslide that closed three miles of State Highway 26 for 69 days and cost $3.5 million in repairs.

6.2.2 Mud Flow

A mud flow is a broad term for a mass-movement process characterized by a flowing mass of fine-grained earth material with a high degree of fluidity. Across Calaveras County, mud flows tend to occur on steep slopes in the mountains and can occur without warning. Unlike landslides, mud flows have the potential to impact life and property on a much larger scale. A mud flow can block roads, take down power lines, move buildings off their foundations, and cause injury and death to persons caught in the path. The impact of a mud flow event depends on the amount of land moved, the amount of infrastructure and people present, and the volume of water in an affected waterway. Areas located at the base of stream alluvial fans have extreme susceptibility to flows, as do areas where mud and debris can be channeled such as downslope roads and waterways. This includes any of the major County roads where a flow could wash out a portion of the road or sitting vehicles, making rescue efforts difficult.

Due to their widespread area of occurrence, the extent of a mud flows in Calaveras County is rated as critical and its probability as likely. Several large and disastrous mudslides have occurred in the County, such as the January 1997 event. The slide started near Highway 4 and Cottage Springs as the result of a storm and slid one and a half miles into the Stanislaus River, taking out roads, a bridge, and Forest Service facilities. It is estimated a total of one million cubic yards of mud came down. In 2015, heavy rain and snow in burned areas from the Butte Fire caused road closures and overtopped bridges, totaling over $10,000 in property damage.

6.2.3 Avalanche

An avalanche is a rapid flow of snow down a hill or mountain. Snow can fracture at any point on a slope, but it typically starts higher up on slopes and an avalanche run can take out everything in its path. Several factors affect the likelihood of an avalanche occurring including weather, temperature, slope steepness and orientation, terrain, vegetation, and snowpack conditions. Historically, avalanches occur in California between December and March, but climate change may exaggerate this hazard as events may occur outside this window and weather patterns of heavy snowfalls followed by thawing may increase the likelihood of an event.

Due to its small area of occurrence, the extent of an avalanche in Calaveras County is rated as limited and its probability of occurring as unlikely. The northeast section of the County is most prone to avalanches near Bear Valley in Alpine County along State Highway 4. Avalanches can bury buildings and people in the runout zone, the area where the falling snow and debris finally come to a stop and pile the highest. These events can also bury County roads and vehicles and significantly impact the response time of first responders. The 2021 MJHMP notes that there have been no recorded avalanches to date in Calaveras County. Smaller avalanches do occur in the backcountry areas of the County with no affects and only one avalanche near Lake Tahoe which is outside the County boundaries, was recorded.

6.3 Flooding (Serious Risk)

Flooding results from the rising and overflowing of a body of water onto normally dry land. Calaveras County experiences different types of flooding events: riverine, flash, and stormwater. Riverine flooding occurs when a waterbody exceeds its “bank-full” capacity because of prolonged, heavy rainfall combined with snowmelt. This type of flooding is often characterized by high peak flows and a large volume of runoff. In the County, riverine flooding can happen anytime between November and April from heavy rains (sometimes combined with snowmelt), increased outflows from upstream dams, or heavy flow from streams. There is often enough warning time with riverine flooding to evacuate people to safer areas. Flash flooding are events with enormous volumes of water over a short period of time that happen from heavy rainfall over a small drainage area. Flash floods can pop up very quickly and evacuation time is much more limited – early threat detection and warning is critical. Lastly, stormwater flooding usually occurs in areas that have increased runoff from impervious surfaces and inadequate drainage systems. Calaveras County dramatically drops in elevation from the eastern side (Sierra Nevada) to the western side where rain and snow can contribute to downstream flooding.

The probability of a flood event in Calaveras County is rated as likely, given previous occurrences. The highest at-risk areas are along the Mokelumne and Stanislaus Rivers but the County also has numerous smaller streams, channels, and creeks that can also flood. Overall vulnerability in the County from flooding is high and the extent of a flood event is critical. According to FEMA and Calaveras County 2014 Assessor’s data, there are 730 improved parcels and approximately $222 million of structures and contents in the one percent annual chance floodplain in the County planning area (see Figure 4 in Appendix A). In the unincorporated areas of the County, there are slightly fewer improved parcels and approximately $215 million of structures and contents in the one percent annual chance floodplain. Regarding population at risk, around 1,400 residents of both the County’s planning area and unincorporated areas are at risk from flooding.

According to the draft 2021 MJHMP, there are 14 critical facilities in the one percent annual floodplain in the unincorporated areas of the County from 2010 Federal Emergency Management Act (FEMA) flood insurance rate maps. Several of the facilities are fire and police stations, as well as powerhouses and dam spillway gates and releases.

The County has a history of flooding events and most recently in 2012, 2017, 2018, and 2019. In 2019, for example, Highway 49 was shut down for hours due to flash flooding and many residents were trapped in their homes. The County was included in a federal disaster declaration that year and with each intensifying event, flooding damage costs the County increasingly more and more.

6.4 Dam Failure (Moderate Risk)

Dams are classified into three categories based on their potential hazard to life and property: 1) High

Hazard indicates a failure would most likely result in the loss of life; 2) Significant Hazard indicates a failure could result in appreciable property damage, and 3) Low Hazard indicates a failure would result in minimal property damage and loss of life is unlikely. In the County, there are 18 mapped high-hazard dams, 2 unmapped high-hazard dams, 17 mapped significant hazard dams, 8 mapped low-hazard dams, 7 unmapped unclassified dams, and 1 mapped unclassified dam. Many of the mapped high-hazard dams are owned by utility districts, water districts, and power authorities and should one fail, have the potential to impact more than 1,000 people. There are also 7 high-hazard and 16 significant hazard dams located outside Calaveras County, that if breached, could impact Bear Valley, Pioneer, and other localities inside the County.

The 2021 HMP estimates that it is likely that a catastrophic dam failure will affect Calaveras County, but the extent of a failure would be limited. If any of the County's large dams were to fail – including New Melones, Hogan, Tulloch, Hunters, McKays, Spicer, Camanche, and Pardee – property damage, utility failure, and loss of life could result. Between 10-25% of the County could be impacted by the failure of any one major dam.

There is a history of dam failure in and surrounding Calaveras County. Major historic events include an uncontrolled release from the Melones Dam in 1997, another uncontrolled release from the Don Pedro Dam in Tuolumne County in 1997 that flooded 300 miles, including parts of Calaveras County, and more recently in 2017, storms damaged the Lake Oroville spillways so much that mandatory evacuation orders were issued in Butte, Yuba, and Sutter counties. The 2021 MJHMP provides brief summaries of the potential consequences of dam failures across the County. For example, a sunny day failure of either the Andrew Cademartori Dam or Murphys Forebay could flood approximately 140 residences, roads, and other businesses along Angles Creek before flows would eventually disperse downstream into New Melones Lake.

6.5 Earthquake (Low Risk)

Due to the absence of fault lines, Calaveras County has not experienced any instance of earthquake-related shaking that has registered on the Modified Mercalli Intensity Scale over recorded history. Therefore, the probability of damaging seismic ground shaking is unlikely, and the risk of surface fault rupture is low.

6.6 Volcano (Low Risk)

According to the 2021 MJHMP, volcanic activity in the County is negligible and the probability of future occurrences for a volcanic eruption impacting the County in the next 100 years is unlikely. The greatest risk to Calaveras County from a volcanic eruption is the deposition of ash, as this could affect breathing conditions for certain at-risk populations, such as the young, elderly, and those with respiratory conditions. In the event of evacuation, first responders may prioritize these higher-risk populations. Falling volcanic ash can also disrupt communication infrastructure, transportation, and water supplies and reservoirs.

7. Climate Change

This section describes the projected climate change in Calaveras County and its anticipated impact on natural hazards that drive emergency and evacuation situations. This material uses language and data from two primary sources: the Cal-adapt Local Climate Change Snapshot Tool (hereafter the "Cal-adapt Snapshot Tool")[5] and the 2019 Caltrans District 10 Climate Change Vulnerability Assessment Report (hereafter the "Caltrans Climate Change study").[6]

7.1 Temperature Changes

According to the Cal-Adapt Snapshot Tool, the average annual maximum temperature across Calaveras County is most likely to increase +5.3 °F by the end of the century in a medium emissions scenario (RCP4.5) and +8.8 °F by the end of the century in a high emissions scenario (RCP8.5). As shown in the Figure below, there will be similarly significant increases in other high temperature metrics including number of extreme heat days and number of warm nights.

Table 7. Calaveras County climate change impacts on temperature. (Source: Cal-Adapt Snapshot Tool)

CALAVERAS COUNTY CLIMATE CHANGE IMPACTS - TEMPERATURE				
		CHANGE FROM BASELINE (1961-1990)		
TIME PERIOD	SCENARIO	AVERAGE ANNUAL MAXIMUM TEMPERATURE	EXTREME HEAT DAYS	WARM NIGHTS
Mid-Century (2035-2064)	Medium Emissions (RCP4.5)	+4.1°F	+18 days	+20 nights
	High Emissions (RCP8.5)	+5.1°F	+25 days	+28 nights
End-Century (2070-2099)	Medium Emissions (RCP4.5)	+5.3°F	+27 days	+29 nights
	High Emissions (RCP8.5)	+8.8°F	+53 days	+62 nights

The 2019 Caltrans Climate Change Vulnerability Assessment Summary report identifies several ways in which rising temperatures can impact transportation systems. Water saturation levels and ground conditions can affect foundations and retaining walls. Materials, such as pavements, that are exposed to high temperatures for a long period of time can deform. Higher temperatures could also deteriorate bridge joint seals from expansion, which could impact the bridge structure and accelerate replacement schedules.

An important consideration for the durability and reliability of transportation routes is pavement design. Pavement design considers two primary criteria: average maximum temperature over seven consecutive days, and the change in absolute minimum air temperature. As temperatures are predicted to rise, designers will need to carefully consider design and the design life of an asset. Assets such as asphalt

[5] The Cal-Adapt Snapshot Tool was accessed on 3/19/2022 at https://cal-adapt.org/tools/local-climate-change-snapshot/

[6] The Caltrans District 10 Climate Change Vulnerability Assessment Report was accessed on March 17, 2022 at https://dot.ca.gov/programs/transportation-planning/division-of-transportation-planning/air-quality-and-climate-change/2019-climate-change-vulnerability-assessments.

pavement are replaced every 20 to 40 years depending on use, while bridges are built to last for 50 years or longer. Higher temperatures, in combination with other events heightened by climate change such as increased precipitation or droughts, could all negatively impact the road network in Calaveras County.

7.2 Precipitation Changes

According to the Cal-Adapt Snapshot Tool, climate change is not projected to significantly increase the projected average annual rainfall across Calaveras County. However, precipitation will likely be delivered in more intense storms and produce much smaller snowpack volumes. As shown in Table 8, the maximum 1-day precipitation is projected to increase by as much as 13% by end-century, and the April snowpack volume measured as snow-water equivalent (SWE) is projected to drop up to 92% under a high emission scenario.

Table 8. Calaveras County climate change impacts on precipitation. (Source: Cal-Adapt Snapshot Tool)

CALAVERAS COUNTY CLIMATE CHANGE IMPACTS - PRECIPITATION				
		CHANGE FROM BASELINE (1961-1990)		
TIME PERIOD	SCENARIO	ANNUAL PRECIPITATION	MAX 1-DAY PRECIPITATION	APRIL SNOWPACK VOLUME (SWE)
Mid-Century (2035-2064)	Medium Emissions (RCP4.5)	- 3.2%	+3%	- 69%
	High Emissions (RCP8.5)	- 0.1%	+8%	- 77%
End-Century (2070-2099)	Medium Emissions (RCP4.5)	- 0.4%	+7%	- 77%
	High Emissions (RCP8.5)	- 0.2%	+13%	- 92%

The projected increasing intensity in storms, in conjunction with other changes in land cover and land use, can affect transportation assets in a number of ways such as from landslides, flooding, washouts, erosion, and structural damage. The 2019 Caltrans Climate Change Vulnerability Assessment states that "the primary threat to transportation assets comes not from a higher overall volume of rainfall over an extended period, but rather from larger and more frequent storm events – and their potential for damaging the [state highway system]." Given the widely dispersed population in Calaveras County and its many narrow, mountainous roads, washouts and other road closures from intense precipitation events can make evacuations difficult. Public notification and advance warning systems are critical to timely evacuations.

7.3 Impacts on Wildfire

The projected changes in temperature and precipitation are likely to significantly increase the extent and severity wildfire across Calaveras County. According to the California Adaptation Planning Guide, "warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks…An increase in wildfire intensity and extent will increase public safety risks, property damage, and emergency response costs."[7] The Cal-adapt Snapshot Tool shows the

[7] The 2021 California Adaptation Planning Guide was accessed in March 2022 from https://www.caloes.ca.gov/HazardMitigationSite/Documents/CA-Adaptation-Planning-Guide-FINAL-June-2020-Accessible.pdf#search=adaptation%20planning%20guide

annual average area burned by wildfires across Calaveras County is projected to increase by 80% by the end of the century under a high emissions scenario (see Table 9 below).

Table 9. Calaveras County climate change impacts on wildfire. (Source: Cal-Adapt Snapshot Tool)

CALAVERAS COUNTY CLIMATE CHANGE IMPACTS - WILDFIRE			
TIME PERIOD	**SCENARIO**	**ANNUAL AVERAGE AREA BURNED**	**% INCREASE OVER 1961-1990 BASELINE**
Mid-Century (2035-2064)	Medium Emissions (RCP4.5)	6,963 acres	+16%
	High Emissions (RCP8.5)	7,952 acres	+34%
End-Century (2070-2099)	Medium Emissions (RCP4.5)	8,015 acres	+32%
	High Emissions (RCP8.5)	10,835 acres	+80%

7.4 Impacts on Other Hazards

Compared to wildfire, the effect of climate change on other hazards is generally less significant and more poorly understood. The table below provides a qualitative description of how climate change might affect other hazards based on information in the 2021 MJHMP.

Table 10. Calaveras County climate change impacts on other hazards (Source: 2021 MJHMP)

CALAVERAS COUNTY CLIMATE CHANGE IMPACTS – OTHER HAZARDS	
HAZARD	**MAJOR CONSIDERATIONS**
Dam Failure	- Severe weather causes cracks to the concrete portion of dams and gunite portion of the water delivery flume structures. - As the cracks freeze during cold events and then thaw during heat events, this expansion and contraction can expand/lengthen the cracks and threaten the integrity and stability of the dam, which may result in structural damage.
Flooding	- Flooding could be less likely due to projected drops in soil moisture, or more likely due to projected increases in extreme precipitation events. - The risk of post-wildfire flooding is likely to increase.
Debris Flow	- Debris flows could be less likely due to projected drops in soil moisture, or more likely due to projected increases in extreme precipitation.
Earthquake	- Climate change is not expected to affect earthquakes.
Volcanic Eruption	- Climate change is not expected to affect volcanic eruption.

8. Emergency Planning Documents

The Calaveras County and City of Angels Camp governments have developed several plans that discuss emergency preparedness and evacuation. Appendix C has links to each document.

8.1 Calaveras County General Plan (2019)

The Calaveras County General Plan was developed to guide County growth and promote public health and safety. The plan contains a "Safety Element" section that addresses protecting the County from natural hazards including earthquakes, dam failure, debris flow, flooding and fires. The Safety Element section incorporates the analyses and recommendations of the MJHMP for four different hazards: flood, fire, geotechnical, and emergency evacuation. The Safety Element section is associated with the Calaveras County Emergency Operations Plan (EOP), which plans initial and extended emergency response and the recovery process (as described below).

The Safety Element section sets policies to address the fact that there are "no comprehensive evacuation plans serving most of the County's population (see pg. S8). Emergency evacuation is challenging in Calaveras County due to a highly dispersed rural population, narrow roads, and mountainous terrain. In addition, there are many campgrounds and recreational facilities with season or intermittent occupants. As part of its Implementation Program, the Safety Element aims to improve evacuations and emergency planning with the following measures:

- Identification of general evacuation routes, sites, and centers on the Calaveras County GIS site (labeled S1-C);
- Use Dam Failure Inundation Zone maps to ensure that future developments do not locate high residency structures in the inundation area (S-2D);
- Identify road culverts that are undersized and/or contribute to upstream flooding (S-2E);
- Continue to participate in and support cooperative fire prevention and response planning efforts (S-3G); and
- Identification of wildfire specific evacuation routes and preparation of a consolidated map (S-3V).

8.2 Angels Camp 2020 General Plan (2009)

The Angels Camp 2020 General Plan is a detailed look at the Angles Camp community including land use, housing, economic development, and public services and facilities. Like the Calaveras County General Plan, it contains a Safety Element with a summary of the natural hazards facing Angels Camp and the plans in place to address them. The background information and implementation measures are broadly similar to those in the Calaveras County General Plan.

8.3 Angel Camp Flood Plan 2020

The Emergency Operations and Floodwater Plan outlines a strategy for preparedness, readiness, flood fighting, and recovery in the event of a significant event in the City of Angels. The report highlights areas of potential flooding within the City, properties and businesses that would be impacted, floodwater protection and monitoring strategies, and also summarizes the flood fight plan, evacuation priorities, and strategies for public notification. Flooding is a major concern for the City as an event could be triggered by a significant rainfall event or from overtopping of a manmade dam into Angels Creek. In general, areas along China Gulch, Angels Creek, and Greenhorn Creek have flooding potential. Additionally, hydroelectric facilities are located at Angels and Murphys and any uncontrolled release to Angels Creek could result in a flood event. Occupants of residential and commercial properties impacted by a flood event would be the top priority for evacuation. Because flooding along the Angels Creek corridor could overtop the Angels Creek bridge crossing at Vallecito Road, rescue crews should focus on residences along Angles Creek.

8.4 Calaveras County Emergency Operations Plan

The Calaveras County Emergency Operations Plan (EOP) published by the County's Office of Emergency Services outlines the planned response to extraordinary emergencies associated with natural or human caused disasters. The EOP addresses each phase of an emergency – mitigation, preparedness, response, and recovery. Per the plan, authority and responsibility for evacuations lies with the Calaveras County Sheriff's Office. In conjunction with the Angels Camp Police Department, the California Highway Patrol, the Sheriff's Office will work to:

- Expedite the evacuation of persons from hazardous areas
- Identify evacuation routes
- Control evacuation traffic
- Institute access control measures to prevent unauthorized persons from entering vacated or partially vacated areas
- Secure the safety and well-being of persons in the affected areas of the emergency
- Provide field level coordination of transportation for victims in an emergency.

The California Highway Patrol is responsible for evacuation and movement control on state highways and the local law enforcement agency will primarily control evacuation and movement on other roadways and on off-road areas.

Appendix A. County Maps

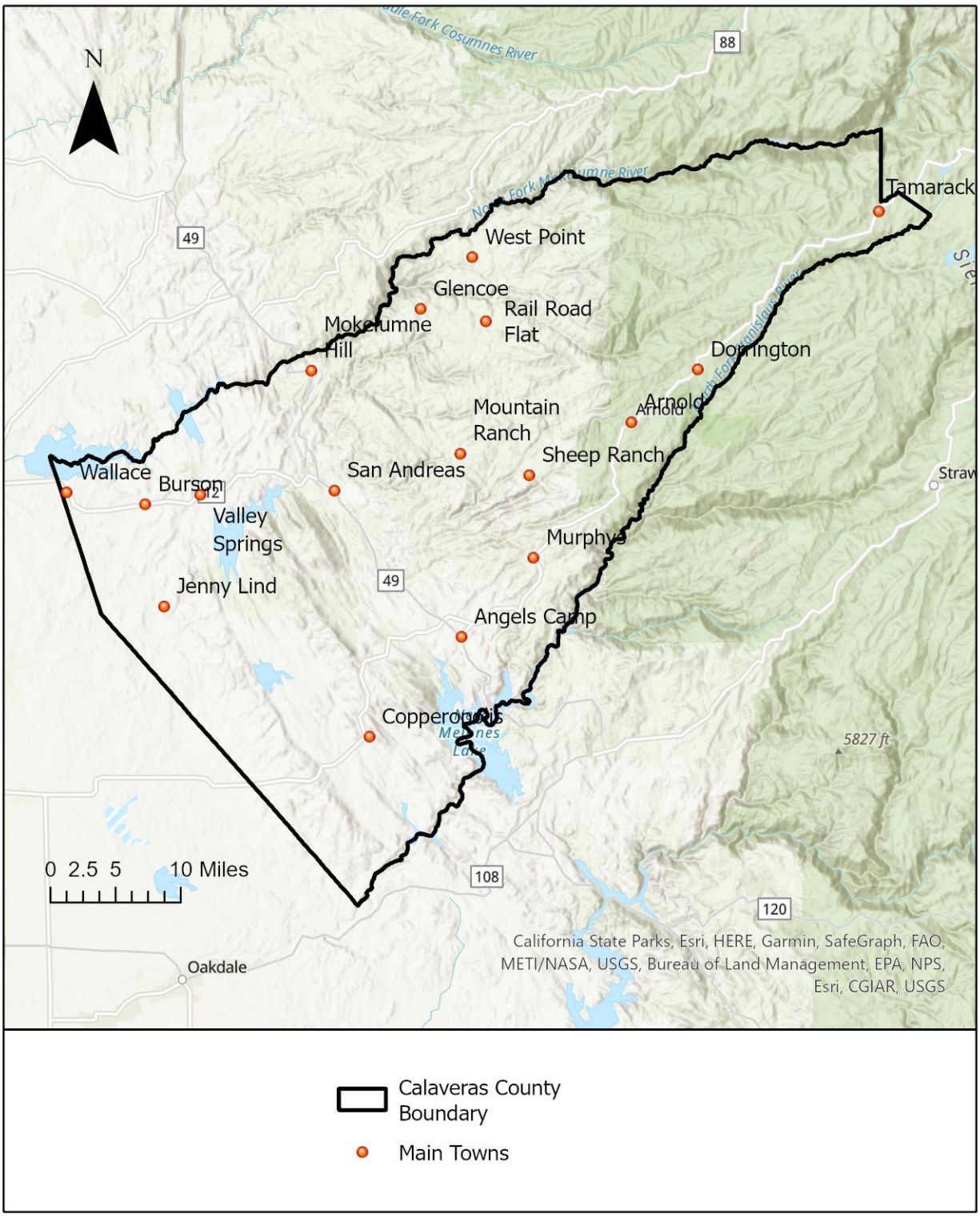

Figure 1. County boundary and main towns.

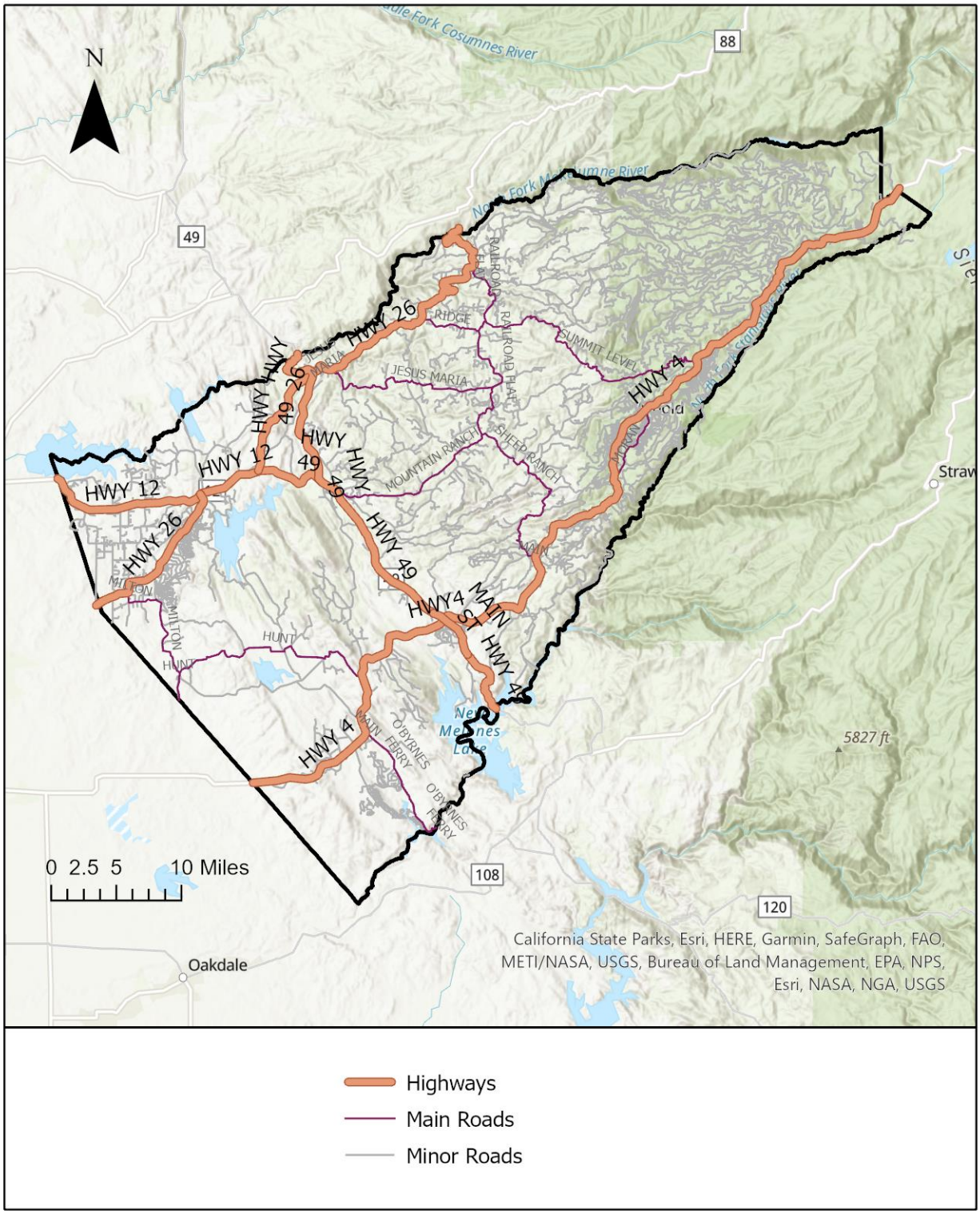

Figure 2. County roads.

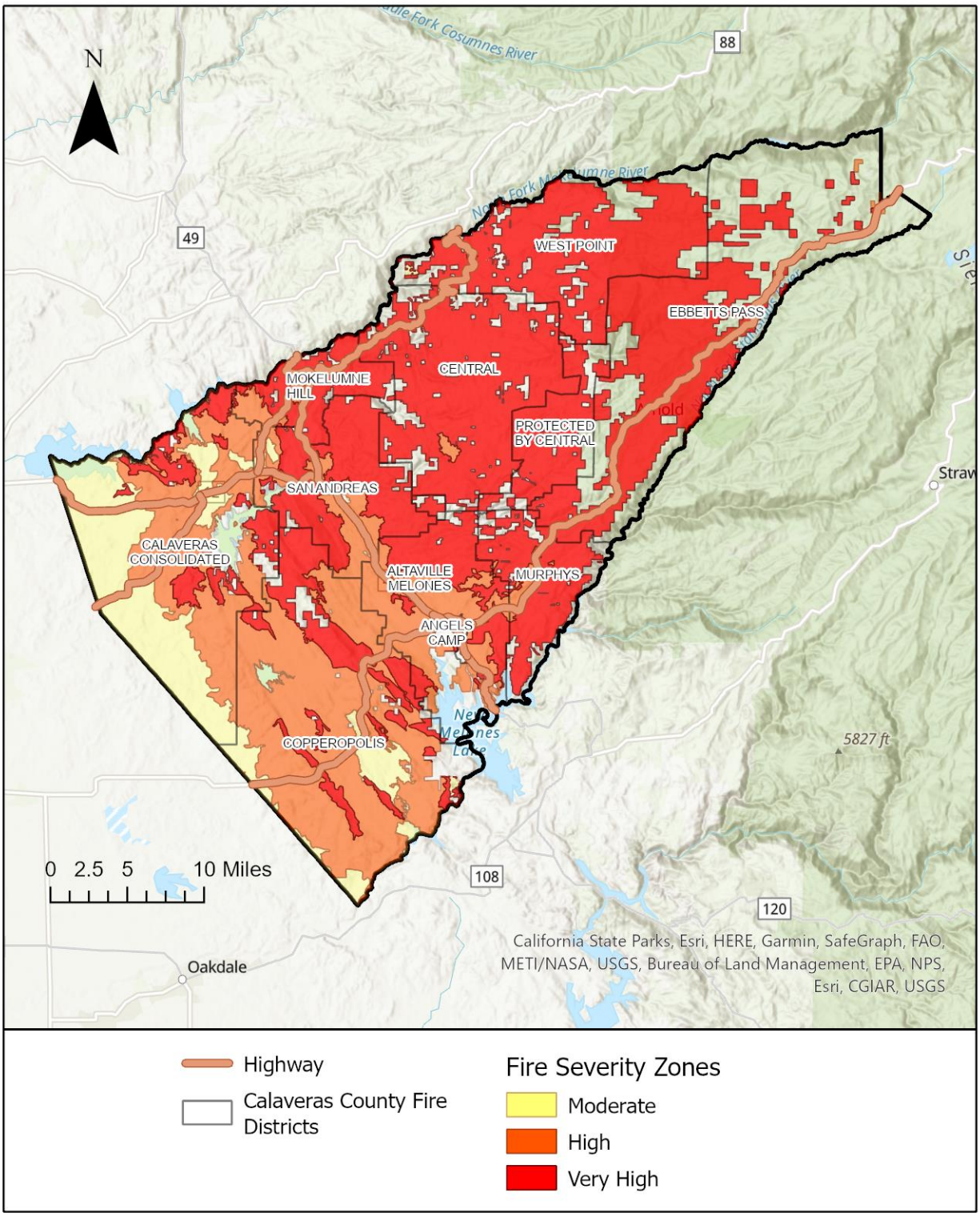

Figure 3. County fire severity zones.

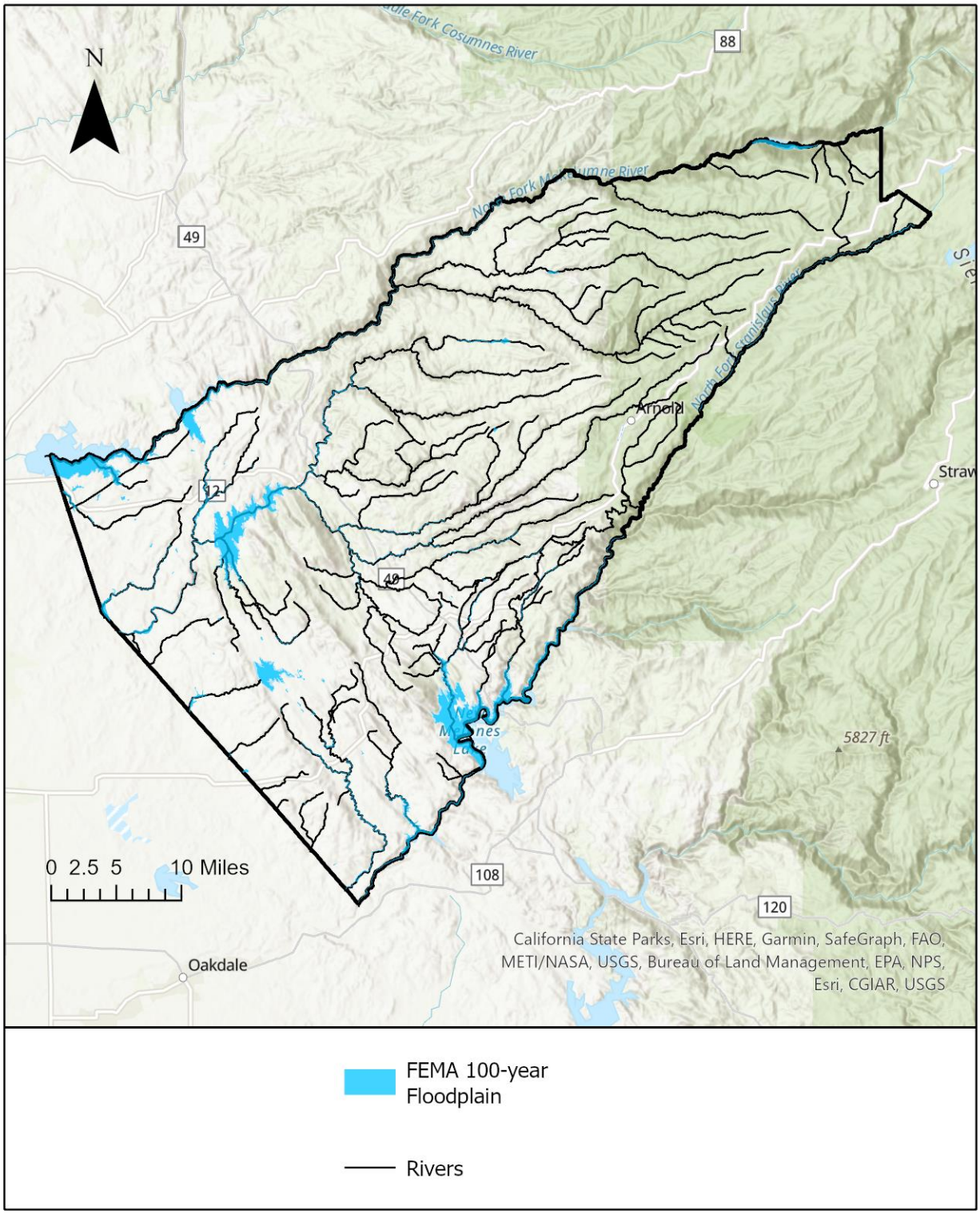

Figure 4. County rivers and FEMA 100-year floodplain.

Appendix B. Supplemental Geospatial Database Contents

A database of geospatial information related to this Existing Conditions Report was developed and archived in an ArcGIS Online Group (link). The archive contains over 40 maps that were downloaded and assembled from various internet sources. The maps will become the base dataset for a subsequent analysis of hazard risk and community vulnerability.

GEOSPATIAL DATABASE CONTENTS	
LAYER NAME	**DESCRIPTION**
Calaveras County Communities	Polygon data containing community boundaries, community names, and community codes.
Angel Camp	Polygon containing Angels Camp city boundary and population.
Big Trees State Park Boundary	Polygon layer including the boundary of Big Trees State Park.
Calaveras County Boundary	Polygon layer showing Calaveras County. Displayed as outline only.
Calaveras County Fire Districts	Polygon layer showing fire district boundaries and names.
Calaveras County School Districts	Polygon layer containing school district boundaries for both school districts in Calaveras County. Different than elementary school district boundaries.
Calaveras County Elementary School Districts	Polygon layer containing elementary school district areas.
Calaveras County Supervisors Districts	Polygon layer containing district boundaries, district numbers, and demographic data regarding population and race.
Calaveras County Tax Rate Areas	Polygon layer containing tax rate areas and identifying codes.
Calaveras County Voter Precincts	Polygon layer containing voter precinct number and supervisor district number.
Calaveras County Land Use November 2019	Polygon layer containing designation name, acreage, general plan code, and APN numbers.
Calaveras County FEMA Flood Zones	Polygon layer showing FEMA flood zones, panels, and quad units.
Calaveras County Zoning Designations	Polygon layer containing zoning codes.
Calaveras County Future Land Use Designations	Polygon layer containing land use designations, codes, labels, and size in acres.
FEMA Panels	Polygon layer containing FIRM ID, panel number, panel type, and identifying codes.
Calaveras County Block Groups 2000	Polygon data including block group number, census tract number, and population in each block group.
Calaveras County Census Blocks 2000	Polygon layer containing census tracts, block groups, population numbers, and demographic information about race, income, age, gender, home size, and more. Data as of 2000.
Calaveras County Census Block Groups 2010	Polygon layer containing data on census tracts, block groups, population, and other identifying features. Data as of 2010.
Calaveras County Census Tracts 2000	Polygon layer showing census tract boundaries and ID. Data as of 2000.
Calaveras County Census Tracts 2010	Polygon data showing census tracts, tract ID, population size, and more identity indicators.
Calaveras County Lakes	Polygon layer containing lake areas, elevation, water type, and names.

Calaveras County Lakes (Main)	Polygon layer containing lake areas, elevation, water type, and names.
Calaveras County Rivers (all)	Polyline data containing all stream data from the Main Rivers shapefile and additional data for tributaries.
Calaveras County Rivers	Polyline layer containing stream names, stream length, water body type, and more identifiers.
Calaveras County Roads (all)	Polyline layer containing all roads from the Main Roads shapefile. Additional data for smaller roadways in the County. Data includes road number, name, direction, number of lanes, surface type, and more data regarding who the roads service.
Calaveras County Main Roads	Polyline layer containing main roads in the County, road number, road name, direction, shoulder condition, number of lanes, class, terrain, and more.
Calaveras County Mileposts	Point layer containing milepost number and date.
CCODS Highways Dissolve	Included in feature layer: Main Roads and Highways.
Calaveras County Main Roads	Included in feature layer: Main Roads and Highways.
Calaveras County 200ft Contours	200 ft contour lines.
Calaveras County Sections	Polygon layer containing section boundaries in Calaveras County, as well as Township, Range, and Section codes.
Calaveras County Townships	Polygon layer containing township, range, and section codes.
Calaveras County Towns (Points)	Point layer containing town names, quads, class codes, class number, population, elevation, lat and long.
Calaveras County 40ft Contours	40 ft contour lines.
County Parcels	Polygon layer containing parcel data for Calaveras County including APN; address; township, range, and section code; home type; supervisory district; fire district; tax district; community; size; and more.
FireSeverityZones_Clip	Polygon layer clipped to Calaveras County containing fire hazard severity zone designations. State resource areas with hazard codes.

Appendix C. Supplemental Documents Database Contents

A database of primary source documents for this Existing Conditions Report was developed and archived in a zipped folder. The table below lists the documents with the current active hyperlinks.

DOCUMENT DATABASE CONTENTS		
ID	**TITLE**	**DESCRIPTION**
1	Angels Camp 2020 General Plan (2009)	The Safety Element of the Angles Camp General Plan addresses natural conditions and human activities that can potentially threaten public health and safety, including emergency planning and evacuation.
2	Amador and Calaveras Counties Needs Assessment for Extreme Weather and Natural Disaster Prevention and Response Strategies (2020)	The report evaluates important evacuation routes serving several high-risk communities and identifies potential ingress/egress impairments that may impact use of these routes during emergencies.
3	Calaveras County Emergency Operations Plan (2019)	The Emergency Operations Plan (EOP) serves as the basis for response as well as recovery efforts and activities within the County. This plan also identifies Emergency Support Functions that represent core emergency response categories performed by agencies and jurisdictions with primary and supporting responsibilities within Calaveras County.
4	Calaveras County General Plan Land Use Element (2019) Safety Element (2019)	The Land Use Element of the Calaveras County General Plan guides the general pattern of development of the County. The Safety Element addresses natural conditions and human activities that can potentially threaten public health and safety, including emergency planning and evacuation.
5	Calaveras County Local Hazard Mitigation Plan Update (2015)	The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Calaveras County developed this Local Hazard Mitigation Plan (LHMP) update to make the County and its residents less vulnerable to future hazard events.
6	Calaveras County Multi-Jurisdictional Hazard Mitigation Plan (2021)	The draft 2021 Calaveras County Multi-Jurisdictional Hazard Mitigation Plan identifies the hazard risks and vulnerabilities for the Calaveras County and identifies mitigation projects and actions to help reduce those risks. It provides for the integration and coordination of planning efforts of Calaveras County, the City of Angels Camp, and the Murphys Sanitary District.
7	Caltrans Climate Change Vulnerability Assessment District 10 Technical Report (2019)	This report, developed for the California Department of Transportation (Caltrans), summarizes a vulnerability assessment conducted for the portion of the State Highway System (SHS) located in Caltrans District 10. Although the SHS can be vulnerable to many different types of disruptions, this assessment specifically examined SHS vulnerabilities from long-term changes in climate.
8	City of Angels Emergency Operations and Floodwater Plan (2020)	The floodwater plan provides guidance for preparedness, readiness, flood fighting, and recovery in the event of a significant flooding event within the City of Angels.

Appendix F

Hazard Risk and Vulnerability Assessment

CALAVERAS COUNTY

Hazard Risk and Vulnerability Assessment

NOVEMBER 23, 2022

Dewberry

FINAL VERSION

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Key Terms

Term	Definition
Asset	A physical structure, such as a road, bridge, or critical facility, that facilitates the provision of essential services, such as evacuation and emergency response, and the movement of goods and people.
Community	A geographic area populated by individuals, businesses, and governmental and non-governmental organizations.
Criticality	An asset's importance to the surrounding community.
Exposure	The likelihood and degree of physical contact between a hazard and an asset or community will occur.
Hazard	A physical event that may threaten assets or communities.
Resilience	The capacity to respond to and recover from an adverse event, such as a hazard.
Risk	The potential for adverse consequences where something of value is at stake and where the occurrence and degree of a hazard are uncertain. [1]
Sensitivity	The degree to which a community or an asset is impacted by exposure to a hazard.
Social Vulnerability	The susceptibility of social groups to adverse hazard impacts, including death or injury, financial loss, or disruption of livelihood. [2]
Stressor	A condition or trend that worsens hazard events.
Vulnerability	The degree to which an asset or community is expected to experience adverse impacts due to hazards.

[1] International Panel on Climate Change. 2018. Annex I: Glossary. https://www.ipcc.ch/sr15/chapter/glossary/
[2] Federal Emergency Management Agency (FEMA). National Risk Index: Social Vulnerability. https://hazards.fema.gov/social-vulnerability

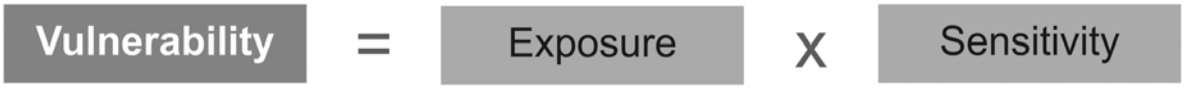
1 Executive Summary

The Calaveras Council of Governments (CalaverasCOG) initiated the Evacuation and Access Needs Assessment and Preparedness Plan ("the Preparedness Plan") to address Calaveras County's emergency and evacuation planning needs. As part of the Preparedness Plan's development, the Hazard Risk and Vulnerability Assessment evaluates the susceptibility of Calaveras County's communities and transportation assets to natural hazards. This assessment supports the identification of high-priority areas and assets for potential strategies to improve the overall resilience of the County's transportation network.

The assessment focuses on impacts to communities and transportation assets, specifically roads and bridges. Because communities and transportation assets are affected by hazards differently, the assessment adopts different technical approaches for each impact type. These distinct approaches are summarized in Section 3.0: Community Assessment and Section 4.0: Transportation Asset Assessment.

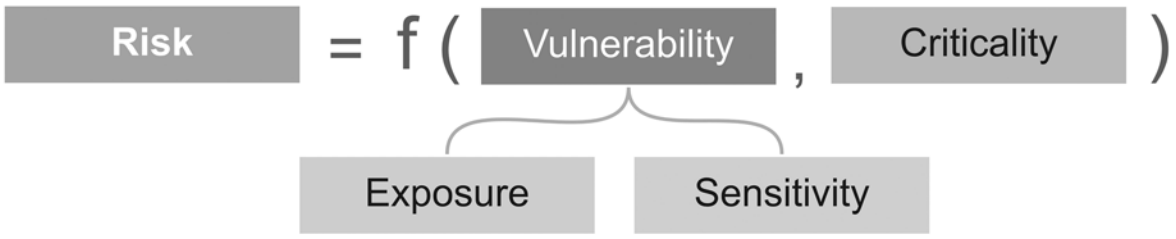
The Community Assessment focuses on impacts to people by examining the vulnerability – the potential to experience adverse impacts – of Calaveras communities. Vulnerability is a function of exposure and sensitivity. Exposure refers to the likelihood and degree of physical contact between a hazard and a community, whereas sensitivity refers to a community's ability to cope with hazard exposure. Sensitivity incorporates demographic information, such as socioeconomic status and disabilities and access and functional needs, that influence a community's ability to prepare for, respond to, and recover from hazards. Exposure and sensitivity are equally weighted to produce a single Vulnerability Score for each community.

Figure 1. Community Assessment Approach



The Transportation Asset Assessment focuses on the impacts to the County's overall transportation network by examining the risk to roads and bridges. Risk examines to what degree an individual asset's vulnerability to hazards will impact the larger transportation network. An asset's vulnerability is determined by examining physical exposure to hazards and sensitivity to withstand potential impacts, characterized by structural conditions. To measure risk, this assessment examines vulnerability and criticality, referring to the importance of an asset to the larger transportation network. Criticality is weighted heavier than vulnerability to produce a single risk for each asset that reflects its significance to the overall transportation network.

Figure 2. Transportation Asset Assessment Approach



A total of 18 different indicators were identified and used to assess exposure, sensitivity, and, for transportation assets, criticality (Table 1). Some indicators were applied to both the Community and Transportation Asset Assessment, whereas several others were only used where applicable. For example, the local wildfire severity rating was one of the indicators used to assess both community and asset exposure, the pavement condition index was one of the indicators used to assess asset (road) sensitivity, and the average annual daily traffic (AADT) was one of the indicators uses to assess asset criticality. More details on data sources and methods can be found in the following sections.

Table 1. Component-Indicator Matrix for Community and Transportation Assessments

		INDICATOR	COMMUNITY ASSESSMENT	TRANSPORTATION ASSESSMENT	
				ROADS	BRIDGES
COMPONENT	EXPOSURE	Flood Exposure	X	X	X
		Wildfire Severity	X	X	X
		Debris Flow Sensitivity	X	X	X
		Projected Precipitation Change	X	X	X
		Projected Temperature Change	X	X	X
		All-Hazard Annualized Loss	X		
	SENSITIVITY	Social Vulnerability	X		
		Disadvantaged Status	X		
		Economically Distressed Area	X		
		Road Surface		X	
		Pavement Condition Index		X	
		Bridge Age			X
		Structural Condition			X
		Scour Condition			X
	CRITICALITY	Average Annual Daily Traffic		X	X
		Road Type		X	
		Detour Distance			X

Both assessments use a relative framework that assigns scores compared to the rest of Calaveras County. For example, a community's exposure to the flood hazard is determined by the percentage of land area within the 1% or 100-year FEMA floodplain. Among Calaveras communities, this percentage ranges from 0% to 25%. The percentages are reclassified into five score groups based on the actual distribution of the data. Communities are assigned scores from one, containing the lowest percentage values within the County (including 0%), up to five, containing the highest percentage values (including 25%). This reclassification produces final scores that categorize communities based on their flood exposure relative to all other communities in the County.

1.1 Results

A total of 28 Address Communities and 1,134 Public Land Survey System (PLSS) Sections were each assigned a Vulnerability Score from 1 (lowest vulnerability) to 5 (highest vulnerability). Similarly, 9,275 road sections, which represent 2,470 miles of roadway including local roads and highway, and 105 bridges were assigned a Risk Score from 1 (lowest risk) to 5 (highest risk). Table 2 lists the highest vulnerability Address Communities and the highest risk roads and bridges, along with each one's exposure to the hazards and stressors considered in this assessment. The report and an appendix contain maps with the geographic distribution of all scores across the county. In addition, supplemental e-files include the score of all the individual components and indicators so users can further understand the drivers for each score.

1.2 Limitations

This Hazard Risk and Vulnerability Assessment relies on readily and the best available datasets identified by the assessment team. Due to gaps and limitations in the available data, this assessment may be missing important aspects of vulnerability and overall risk. For example, there was limited data on the structural conditions of County bridges, roads, and critical facilities. In recognition of these data gaps and the inherent difficulty in using a single scoring metric to capture the many facets of vulnerability, the assessment results are intended to supplement but not replace local professional judgment about the condition, vulnerability, and risk to County communities and transportation assets.

Table 2. Summary Matrix for Community and Transportation Assessments Results

		COMMUNITY / ASSET	CLASS	HAZARD EXPOSURE				
				FL	WF	LS	TM	PR
COMMUNITY ASSESSMENT	NAME	Mountain Ranch	Highest Vulnerability	Lowest	Highest	High	Moderate	Moderate
		Dorrington	High Vulnerability	Lowest	Highest	Highest	Moderate	High
		Douglas Flat	High Vulnerability	Low	Highest	Highest	Low	Moderate
		West Point	High Vulnerability	Low	Moderate	Highest	Highest	High
		Wilseyville	High Vulnerability	Low	Highest	High	High	High
		Sheep Ranch	High Vulnerability	Lowest	Highest	High	Moderate	Moderate
		Vallecito	High Vulnerability	High	High	Highest	Low	Moderate
		Rail Road Flat	High Vulnerability	Lowest	Highest	Highest	High	Moderate
TRANSPORTATION ASSESSMENT	ROADS	HWY 4 in Murphys	Highest Risk	Highest	Highest	High	Moderate	Moderate
		HWY 4 in Vallecito	Highest Risk	Highest	Highest	Lowest	Low	Moderate
		HWY 4 in Arnold	Highest Risk	Lowest	Highest	High	Moderate	High
		HWY 49 in San Andreas	Highest Risk	Highest	Moderate	Lowest	Moderate	Moderate
	BRIDGES	State Route 4 at Angels Creek	Highest Risk	Moderate	High	High	Low	Moderate
		Unnamed Road at Blue Creek	Highest Risk	Low	Highest	Lowest	Highest	Highest
		Monge Ranch Road at Coyote Creek	Highest Risk	High	Highest	Lowest	Low	High
		Railroad Flat Road at Esperanza Creek	Highest Risk	Moderate	Highest	Moderate	High	High
		Sheep Ranch Rd at Mckinney Creek	Highest Risk	Highest	Highest	Lowest	Moderate	Moderate
		Schadd Road at Middle Fork Mokelumne River	Highest Risk	Moderate	Highest	Lowest	High	Highest
		Sheep Ranch Rd at Oneil Creek	Highest Risk	Highest	Highest	Lowest	Moderate	High
		Sheep Ranch Rd at San Antonio Creek	Highest Risk	Highest	Highest	Lowest	Moderate	High

Notes: Exposure to hazards represents one component of the Community and Transportation Assessments. Hazards are abbreviated as the following: Flooding (FL), Wildfire (WF), Landslide (LS), Temperature Increase (TM), and Precipitation Increase (PR). For roadways, the assessment analyzed road segments, which have varying hazard exposure. For instances where multiple segments fall in the highest risk class, Table 2 shows the maximum hazard exposure score for each road segment.

2 Overview

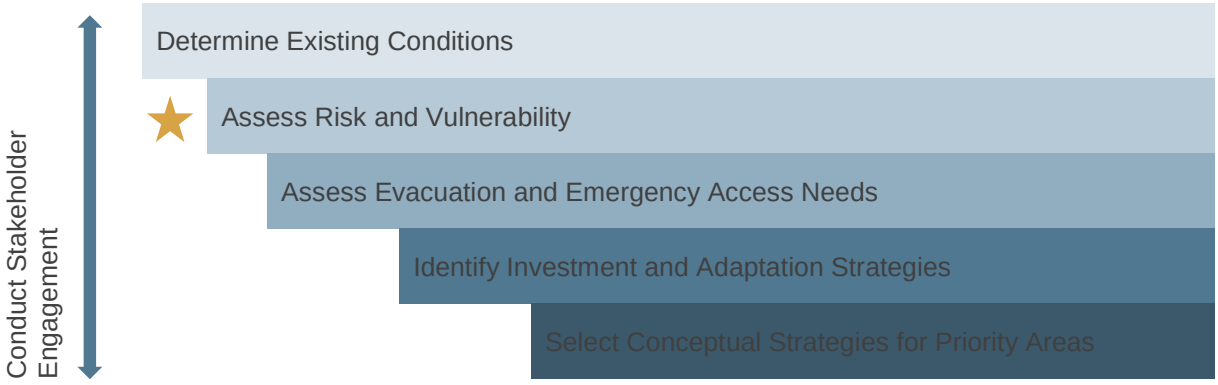
The following section provides a broad overview of the Hazard Risk and Vulnerability Assessment, including its purpose, relationship to related efforts, and overall approach.

2.1 Background

The Hazard Risk and Vulnerability Assessment is an effort initiated by the Calaveras Council of Governments (CalaverasCOG) to evaluate the susceptibility of Calaveras County's communities and transportation assets to natural hazards. A key focus of this assessment is to identify areas within the County and its communities and assets that may experience adverse impacts due to natural hazards that impair the County's ability to facilitate evacuations and emergency response activities.

This assessment informs the development of the Calaveras County Evacuation and Access Needs Assessment and Preparedness Plan ("the Preparedness Plan") by identifying priority areas and assets expected to experience more severe natural hazard impacts. This process aims to ultimately identify strategies for these high-risk areas and assets to improve the resilience of the County's transportation network (Figure 3.).

Figure 3. Calaveras County Evacuation and Access Needs Assessment and Preparedness Plan



2.2 Assessment Approach

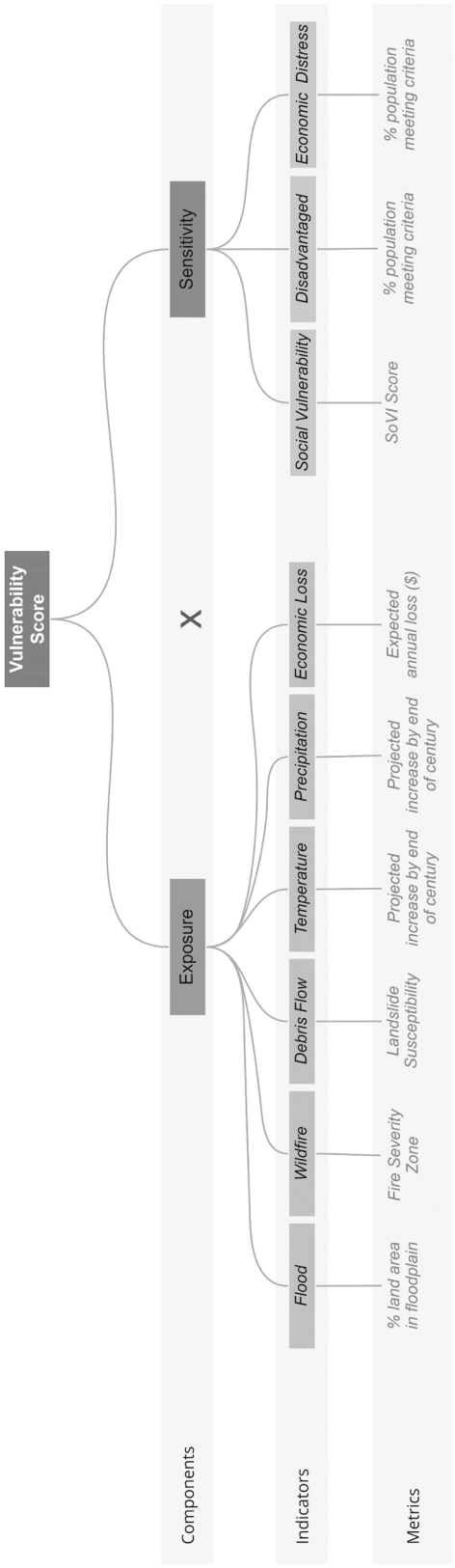
This Hazard Risk and Vulnerability Assessment focuses on potential adverse impacts of hazards to **communities** and **transportation assets**, defined as the following:

Communities
Geographic areas populated by individuals, businesses, and governmental and non-governmental organizations.

Transportation Assets
Physical structures, including roads and bridges, that facilitate the provision of essential services, such as evacuations, emergency response, and the movement of goods and people.

A community's susceptibility to hazards differs from that of transportation assets. For example, a community's potential to endure adverse effects involves examining social factors that contribute to inhabitants' capability to prepare and respond to hazards. In contrast, a transportation asset's potential to endure adverse effects is a function of physical attributes, like age. In recognition of these differences, this assessment adopted two separate sets of metrics to characterize both types of impacts.

Figure 4. Assessment Approach Overview



A key output of this assessment is a final score indicating a community's or transportation asset's susceptibility to hazard impacts. This score comprises multiple components that contribute to a community's or asset's overall likelihood of enduring damage or disruption due to a hazard. Each component is characterized through a set of indicators that represent the scale of potential impacts. Indicators are quantified by specific metrics that quantify potential impacts. Figure 4. illustrates the overall assessment approach, using the Community Assessment as an example.

The framework and methods for communities and assets are found in Section 0: Community Assessment and Section 4.0: Transportation Asset Assessment. Where the assessment adopts identical components, indicators, or metrics, the Community Assessment describes the approach, and the Transportation Asset Assessment refers to that initial description.

3 Community Assessment

The Community Assessment examines the susceptibility of Calaveras County's geographic communities and their residents to potential hazard impacts by characterizing ***vulnerability***. Vulnerability refers to the overall degree to which a community is expected to experience adverse impacts due to hazards. Vulnerability is a function of two components, exposure, and sensitivity, defined as the following:

- **Exposure** refers to the likelihood and degree to which physical contact between a hazard and a community will occur. This component incorporates hazard characteristics, such as frequency, intensity, geographic scale, and external factors that affect event severity.
- **Sensitivity** refers to the degree to which a community can cope with hazard impacts. This component incorporates the composition of the community that influences its capability to prepare for, respond to, and bounce back after a hazard event.

Each component is comprised of multiple indicators that are quantified through metrics. Metrics use readily available datasets that provide information consistently across geographic areas. Each community is assigned a metric score ranging from a value of one (lowest relative to the County) to five (highest relative to the County). Metrics are weighted equally and then averaged to produce a single component score ranging from one (lowest exposure or sensitivity relative to the County) to five (highest relative to the County). The component scores are multiplied to produce a single Vulnerability Score (Figure 5.).

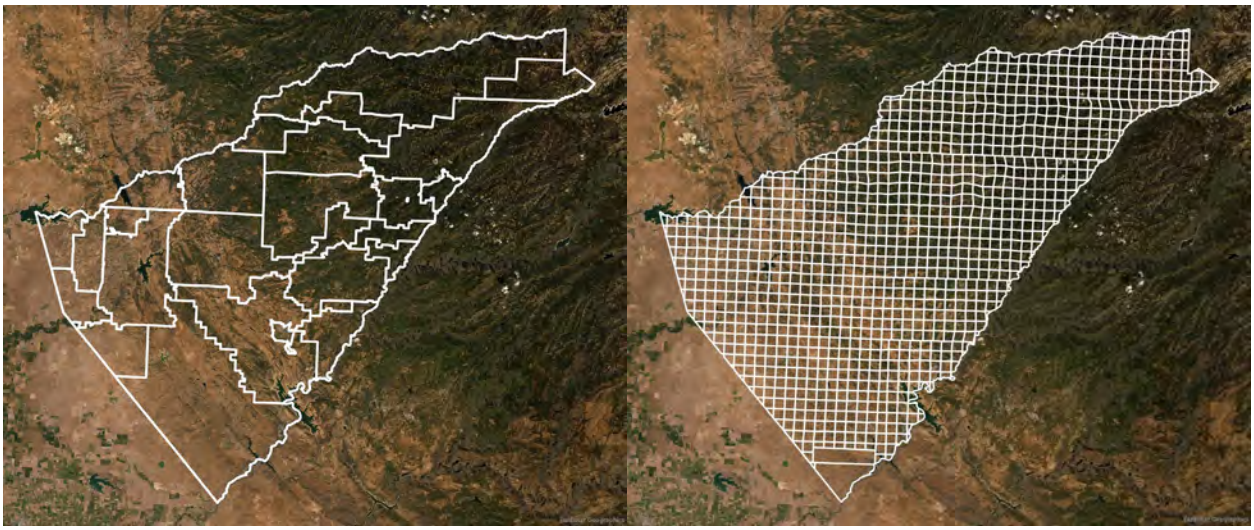
Figure 5. Community Assessment Components

For the Community Assessment, this process is applied to two geographic scales, Address Communities and Public Land Survey System (PLSS) sections (Figure 6.), which are defined as the following:

- **Address Communities** as defined by the County in the Calaveras County Open Data Portal. These areas include named communities that are both incorporated and unincorporated. Applying the assessment process to Address Communities can be useful for communicating results to established communities and for planning purposes. However, these areas vary widely by size and shape.
- **PLSS Sections** as defined by the County in the Calaveras County Open Data Portal. The PLSS Sections were delineated by the California Department of Conservation's Geologic Energy Management Division (CalGEM) to support permitting workflows. They are used in this analysis because they can showcase the spatial distribution of community vulnerability in a nearly uniform, high-resolution grid space.

The following section outlines the Community Assessment process by component, providing a summary of indicators and metrics, and concludes with a summary of the results.

Figure 6. Address Communities (left) and PLSS Section (right) for the Community Assessment



3.1 Exposure

Exposure refers to the likelihood and degree to which physical contact between a hazard and a community will occur. Total exposure is characterized by a community's exposure to hazards and stressors. Exposure is the extent to which communities are exposed to hazards that tend to trigger evacuations in Calaveras County. Stressors are conditions that exacerbate hazards, complicating evacuations, such as projected future changes in temperature and precipitation patterns.

3.1.1 Exposure to Hazards

According to the 2021 Calaveras County Multi-Jurisdictional Hazard Mitigation Plan (HMP), Calaveras County is affected by the following 12 hazards:

- Climate Change
- Dam Failure
- Debris Flows (Landslides, Mud Flows, Avalanches, and Erosion)
- Drought
- Earthquakes
- Flooding
- Land Subsidence (Sinkholes)
- Severe Weather – Extreme Heat
- Severe Weather – High Wind and Tornados
- Severe Weather – Winter Storms and Extreme Cold
- Volcano
- Wildfires

This assessment focuses on hazards that meet the following three criteria: the potential to trigger an evacuation, the availability of spatial exposure data, and the high risk it poses to Calaveras County. Of the 12 hazards in the HMP, the following three hazards met these criteria: flooding, wildfires, and debris flow. The HMP's risk assessment process ranked wildfires as high risk and flooding and debris flow as serious risks to the region (Table 3). In addition, these three hazards were all identified as priority hazards in a series of climate debrief interviews that were completed as part of this project. See the project report "Climate Debrief Interview Summary Report" for more details

Table 3. Hazard Risk Rankings [3]

HAZARD EVENT	GEOGRAPHIC EXTENT	PROBABILITY OF FUTURE OCCURRENCES	RISK RANKING
Debris Flow (including landslides, mudflow, and avalanches)	Critical	• Likely	• Serious
Flooding	Critical	• Likely	• Serious
Wildfire	Catastrophic	• Highly Likely	• High

3.1.2 Exposure to Stressors

The intensity, frequency, and geographic scale of hazards are influenced by stressors, which refer to conditions or trends that worsen events. These stressors contribute to a community's hazard exposure and affect Calaveras County's ability to facilitate evacuations and emergency services. Stressors are represented by three indicators: precipitation trends, air temperature trends, and economic loss.

Changes to a region's climate, such as precipitation amounts or air temperatures, can create more suitable conditions for floods, wildfires, and debris flow events. The assessment incorporates projections for changes to average annual maximum temperature and annual precipitation.

Economic losses due to hazards create significant post-event stress to communities. Economic losses refer to the average annual damage or harm to buildings, people, and agriculture incurred by any hazard event. The assessment uses estimates of annual economic loss from FEMA's National Risk Index.

3.1.3 Metrics

Each hazard event and stressor contribute to a community's exposure (Figure 7.). This section defines and describes the process of quantifying each indicator through metrics.

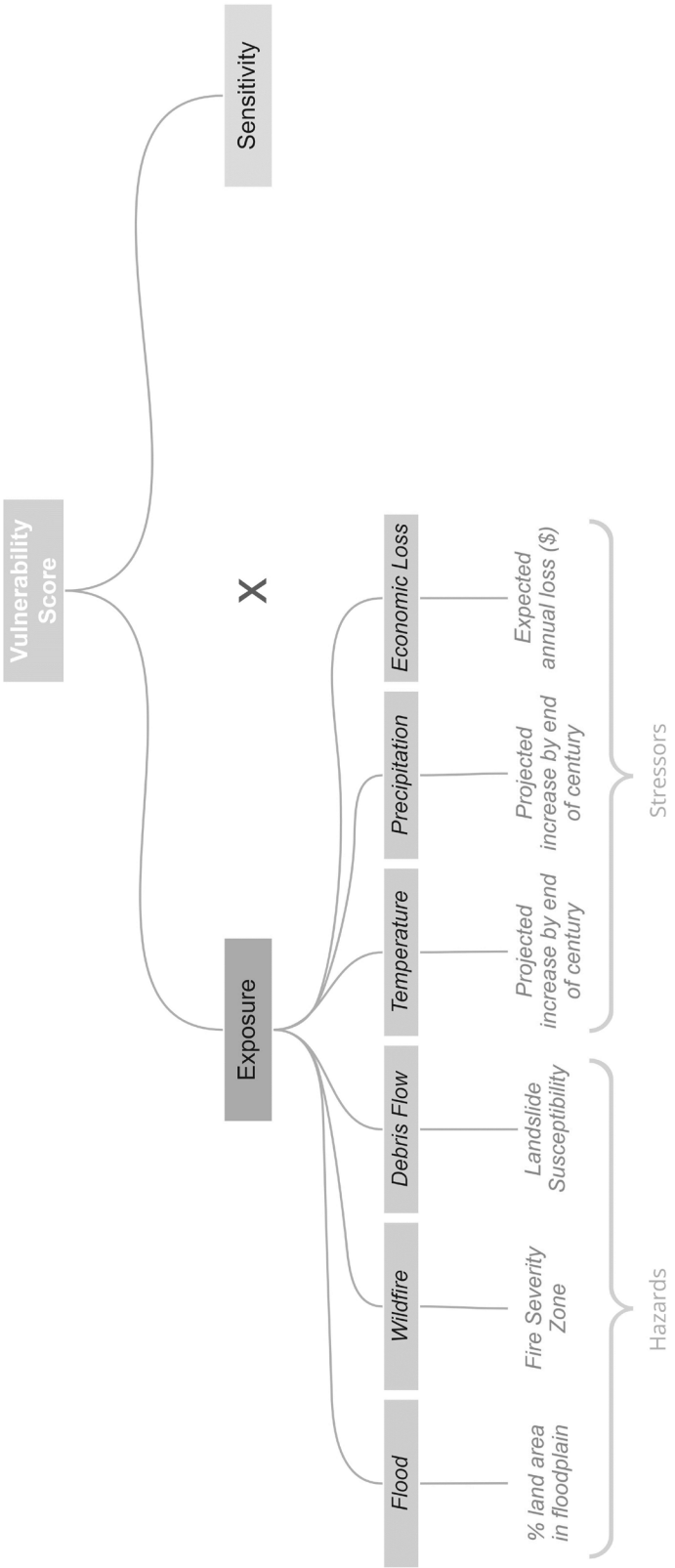
Metrics leverage different datasets and raw values to indicate community exposure, as outlined in Table 4. All metrics are assigned relative scores compared to the rest of Calaveras County, from one (indicating low exposure) to five (high exposure).

The assessment uses readily available datasets that provide scores continuously across geographic areas. An area-weighted average is calculated to produce a single score for each geography to adapt these scores to Address Communities and PLSS Sections.

For example, each community's exposure to flooding is measured using a flood exposure indicator. The metric for the flood exposure indicator is the percentage of land area in each community boundary that is within the 1% or 100-year FEMA floodplain. Among the County's 28 Address Communities, the percentage varies from 0% to 25%. The percentages are reclassified into five score groups, from one containing the lowest percentage values (including 0%) to five containing the highest percentage values (including 25%).

[3] Calaveras County. 2021. "2021 Calaveras County Multi-Jurisdictional Hazard Mitigation Plan."

Figure 7. Community Exposure



The reclassification from the raw metric values to the indicator score uses a statistical clustering algorithm called K-means, similar to the natural breaks or Jenks classification symbology frequently used in standard GIS software. The algorithm assigns the lowest grouping of communities a score of one, the next lowest grouping a score of two, and so forth. The groups vary in size depending on the natural distribution of the data.

Table 4. Community Exposure Metrics

	INDICATOR	SOURCE	DATASET	METRIC
EXPOSURE TO HAZARDS	Flood Exposure	FEMA	Special Flood Hazard Areas (see Appendix A Map 1)	• Percentage of land area within the floodplain
	Wildfire Severity	California Department of Forestry and Fire Protection	Fire Hazard Severity Zones (see Appendix A Map 2)	• Area-weighted average of Fire Severity Zone score
	Debris Flow Susceptibility	US Geological Survey	Landslide Susceptibility (see Appendix A Map 3)	• Area-weighted average of landslide susceptibility class
EXPOSURE TO STRESSORS	Temperature Change	Cal-Adapt Local Climate Change Snapshot Tool	Annual Maximum Daily Temperature Projection (see Appendix A Map 4 and 5)	• Area-weighted average of the projected increase in air temperature under RCP8.5 [4] by the end of the century (2070-2099)
	Precipitation Change	Cal-Adapt Local Climate Change Snapshot Tool	Annual Precipitation Projection	• Area-weighted average of the projected increase in rainfall under RCP8.5 by the end of the century (2070-2099)
	All-Hazards Economic Loss	FEMA	National Risk Index (see Appendix A Map 6)	• Area-weighted average of the expected annual loss (in dollars) due to a hazard event of any type occurring

3.1.3.1 Methods

This section briefly describes each indicator and the methods adopted to quantify its associated metric's value.

[4] Representative Concentration Pathways are standardized scenarios used to model climate impacts. These scenarios represent different trajectories for greenhouse gas concentrations in the atmosphere. Of these scenarios, RCP8.5 reflects the highest future concentrations and is referred to as a high emissions scenario. This assessment selected RCP8.5 as a conservative "business-as-usual" scenario to highlight areas and assets with the potential to become increasingly vulnerable to adverse hazard impacts.

Flood Exposure

Flooding occurs when water levels in rivers, streams, and other waterbodies rise due to prolonged precipitation and overflows onto normally dry land. A community's flood exposure is measured by the percentage of the land area contained with the 1% annual chance floodplain, delineated by Special Flood Hazard Areas (SFHAs). The 1% annual chance floodplain refers to the geographic area that will be inundated by a flood event with a 1% probability of occurring or being exceeded in any given year. The FEMA Flood Zones shapefile was downloaded from the Calaveras County GIS website.[5]

Communities that contain significant land area within the floodplain are more likely to be exposed to flooding than those with no or limited area. Address Communities and PLSS Sections are assigned scores from one (no-to-limited land area in the floodplain) to five (significant land area in the floodplain).

Wildfire Severity

Wildfires are unplanned fires in natural areas that typically ignite due to multiple factors, including air temperatures and moisture content, presence of vegetation, wind direction and strength, drought conditions, and human-initiated activities. Wildfire exposure in the vulnerability assessment is determined by Fire Severity Zones, including Moderate Hazard, High Hazard, and Very High Hazard. The zones are determined based on potential fuels, fire-weather conditions, and terrain, and they represent potential fire hazard exposure to structures and other infrastructure assets. The Fire Severity Zones shapefile was downloaded from the CAL FIRE website.[6]

Address Communities and PLSS Sections tend to contain multiple zones. Zones are reassigned a numeric value of zero (no Fire Severity Zone present) to three (Very High Hazard) to attribute a single score to these geographies. An area-weighted average is calculated based on the proportion of each Fire Severity Zone contained within community boundaries. Address Communities and PLSS Sections are assigned scores from one (lowest average wildfire severity) to five (highest average wildfire severity).

Debris Flow Susceptibility

Debris flows occur when large masses of soil and fragmented rock become loose and rapidly move down mountainsides or steep slopes, endangering development in its path. Three types of debris flow events affect Calaveras County: landslides (including rockslides), mudflows, and avalanches. Landslides occur when hill slope materials break away due to heavy rainfall or snowmelt, erosion, weakened materials, or earthquakes. Mudflows occur when heavy rainfall, snowmelt, or high groundwater levels flow through cracked bedrock or cause extensive erosion, triggering the downward movement of soils or sediments. Avalanches refer to the fast, downward movement of snow and occur when snow fractures due to multiple factors, including water, temperature, slope orientation and steepness, vegetation, and snowpack conditions. All three types of events can occur with little warning and have the potential to harm communities in their paths.

The assessment uses landslide data as an approximation for debris flow susceptibility. The US Geological Survey's Landslide Susceptibility dataset evaluates exposure to debris flow events. This dataset evaluates an area's vulnerability to potential landslide incidences based on slope and soil type. Areas are assigned one of five classifications from Low Incidence to High Incidence. The landslide susceptibility raster was downloaded from the California Department of Conservation GIS server.[7]

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[5] Downloaded from https://opendata-calaveras-gis.opendata.arcgis.com/search?groupIds=dd58ddc80c424fa9bbeb68057ce1c2fd on January 6, 2022.
[6] Downloaded from https://frap.fire.ca.gov/mapping/gis-data/ on January 6, 2022.
[7] Downloaded from https://gis.conservation.ca.gov/portal/home/item.html?id=87289025c11d4ba7ae65f0f472bf7c2d on April 29, 2022. Reference: Wills, C. J., Perez, F. G., and Gutierrez, C. I., 2011, Susceptibility to deep-seated landslides in California: California Geological Survey, Map Sheet 58.

Address Communities and PLSS Sections tend to contain multiple classes. An area-weighted average is calculated based on the proportion of each class contained within community boundaries to assign a single score to these geographies. Address Communities and PLSS Sections are assigned scores from one (lowest average landslide susceptibility) to five (highest average landslide susceptibility).

Temperature Change

Temperature change refers to the difference in the average annual maximum temperature between baseline historical observations (1961 to 1990) and the end of the century (2099) under a high emissions scenario (RCP8.5). By 2099, Calaveras County's average annual maximum temperature is expected to be 8.8° Fahrenheit hotter than that witnessed between 1961 and 1990. Temperature increases are expected to intensify the extent and severity of wildfires and debris flow across Calaveras County. Hotter seasonal temperatures, reduced snowpack, and earlier snowmelt will collectively create more potential fuel and suitable conditions for wildfires to ignite and spread. Temperature increases will accelerate snowmelt rates, elevating the risk for potentially severe debris flow as soils become saturated and water accumulates along slide planes between soil layers.

Cal-Adapt provides temperature change projections in an approximately four-mile-by-four-mile gridded raster.[8] An area-weighted average is calculated to assign a single score to each Address Community and PLSS Section. Address Communities and PLSS Sections are assigned scores from one (limited increase) to five (high increase).

Precipitation Change

Precipitation change refers to the difference in the annual precipitation between baseline historical observations (1961 to 1990) and the end of the century (2099) under a relatively high emissions scenario (RCP8.5). By 2099, Calaveras County's average annual precipitation is expected to fall 0.2%, and snowpack volume is expected to fall 92% compared to levels recorded between 1961 and 1990. Reduced precipitation and snowpack are expected to intensify the extent and severity of wildfires across Calaveras County by creating more potential fuel for wildfires to ignite and spread.

Cal-Adapt provides precipitation change projections in an approximately four-mile-by-four-mile gridded raster.[9] An area-weighted average is calculated to assign a single score to each Address Community and PLSS Section. Address Communities and PLSS Sections are assigned scores from one (limited change) to five (significant change).

All-Hazards Economic Loss

Economic loss is the expected annual loss in dollars due to hazards in any given year. These losses include damage to buildings and agriculture and impacts to people, measured by fatalities and injuries. Using data from the National Risk Index, the assessment incorporates economic loss scores for 18 hazards down to the census tract level. An area-weighted average is calculated to assign a single score to each Address Community and PLSS Section. Address Communities and PLSS Sections are assigned scores from one (limited economic loss) to five (high economic loss). The data was downloaded from the FEMA website.[10]

[8] Downloaded from https://cal-adapt.org/tools/maps-of-projected-change/ on April 26, 2022. Reference: Pierce, D. W., Kalansky, J. F., & Cayan, D. R. (2018). Climate, drought, and sea level rise scenarios for California's fourth climate change assessment. California Energy Commission and California Natural Resources Agency.
[9] Ibid
[10] Downloaded from the FEMA National Risk Index web viewer at https://hazards.fema.gov/nri/map# on March 17, 2022.

3.2 Sensitivity

Sensitivity refers to the degree to which a community can cope with hazard impacts. This component incorporates indicators related to community composition that influence its capability to prepare for, respond to, and bounce back after a hazard event.

3.2.1 Community Characterization

A community's sensitivity is determined by the shared social characteristics of its residents, captured by specific demographic indicators that are known to amplify hazard impacts, such as median household income, poverty rates, or access to a vehicle. Communities with populations that exhibit higher rates of these characteristics are more likely to experience adverse hazard impacts.

3.2.2 Metrics

The assessment leverages three indicators that capture different demographic information to quantify community sensitivity (Figure 8.). The following section defines and describes the process of quantifying each indicator through a specific metric.

The metrics leverage datasets and raw values to indicate community sensitivity, as outlined in Table 5. All metrics are assigned relative scores compared to the rest of Calaveras County, from one (indicating low sensitivity) to five (high sensitivity).

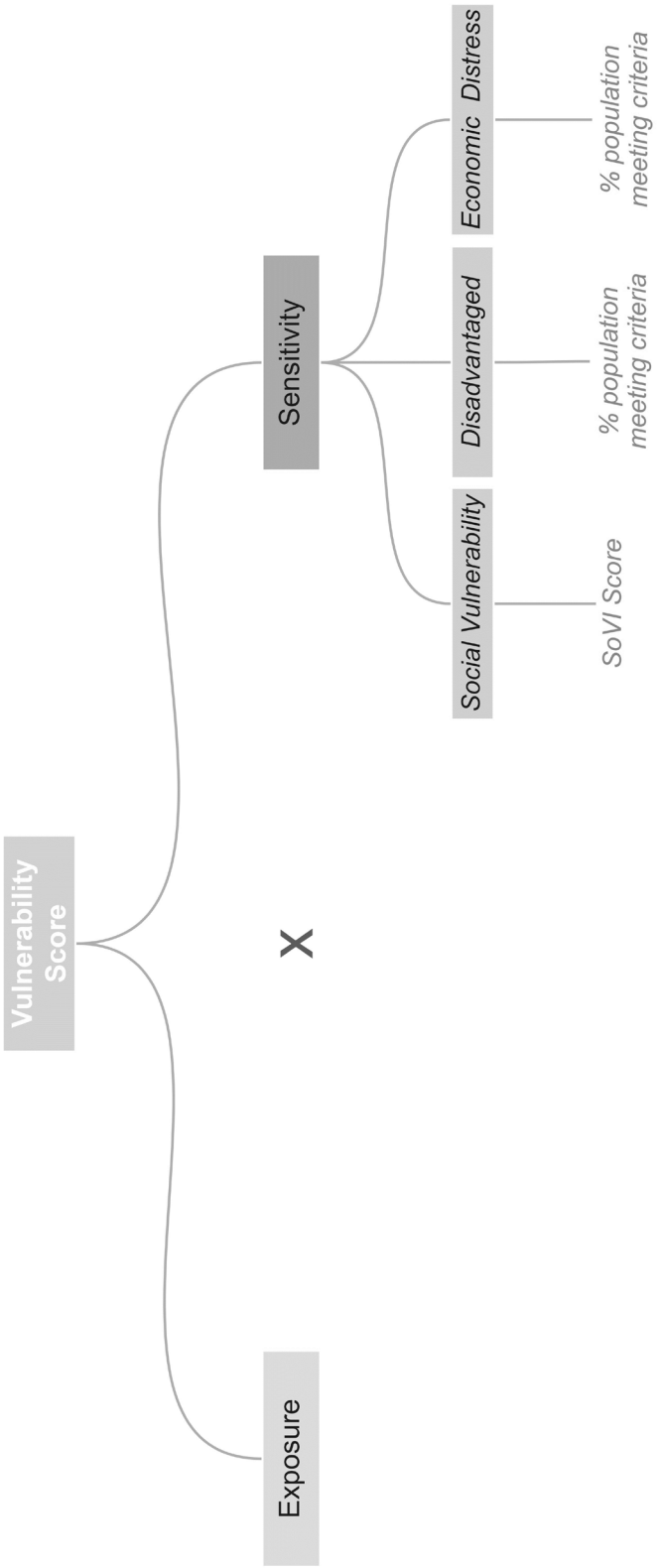
Table 5. Community Sensitivity Metrics

INDICATOR	SOURCE	DATASET	METRIC
Social Vulnerability	University of South Carolina's Hazards and Vulnerability Research Institute (HVRI)	Social Vulnerability Index (SoVI) (see Appendix A Map 7)	• Area-weighted average of SoVI score
Disadvantaged Status	Census Bureau	2013-17 American Community Survey 5-year Estimates (see Appendix A Map 8)	• Percentage of the population in a census block that meets the criteria for Disadvantaged Community Rating
Economically Distressed Areas	Census Bureau	2013-17 American Community Survey 5-year Estimates	• Percentage of the population in a census block that meets the criteria for Economically Distressed Community Factor

3.2.2.1 Methods

The following section briefly describes each indicator and the methods adopted to quantify its associated metric's value.

Figure 8. Community Sensitivity



Social Vulnerability

Social vulnerability refers to the susceptibility of social groups to adverse hazard impacts, including death or injury, financial loss, or disruption of livelihood. Multiple demographic factors determine a community's SoVI score. Specifically, these factors include income, poverty rates, race and ethnicity, vehicle access, housing tenure, English proficiency, age, disabilities, and access and functional needs. The SoVI data was downloaded as part of the FEMA National Risk Index.[11] The SoVI score is a national dataset developed by the University of South Carolina's Hazards and Vulnerability Research Institute.[12]

SoVI assigns scores down to the census tract level. An area-weighted average is calculated to assign a single score to each Address Community and PLSS Section. Address Community and PLSS Section are assigned scores from one (low social vulnerability relative to the rest of the County) to five (high social vulnerability).

Disadvantaged Status

Defined by the California legislature, disadvantaged communities refer to census tracts that meet one of two thresholds: tracts with median household incomes at or below 80% of the statewide median income; or those with median household incomes at or below the "low income" threshold identified by the California Department of Housing and Community Development.[13]

Each Address Community and PLSS Section is assigned a score based on the percentage of its area that meets these criteria, from one (lowest percentage share relative to the rest of the County) to five (highest percentage).

Economically Distressed Areas

Economically distressed areas refer to communities exhibiting low population densities, higher unemployment relative to the state, and annual median household incomes less than 85% of the statewide median household income.[14]

Each Address Community and PLSS Section is assigned a score based on the percentage of its area that meets these criteria, from one (lowest percentage share relative to the rest of the County) to five (highest percentage).

3.3 Vulnerability

3.3.1 Vulnerability Approach

Vulnerability refers to the degree to which a community is expected to experience adverse impacts due to hazards. This component incorporates indicators related to community composition that influence its capability to prepare for, respond to, and bounce back after a hazard event.

For exposure and sensitivity, metrics are averaged across indicators to produce a single composite score for each component. These component scores are multiplied to produce a single Vulnerability Score (Figure 9.). The following section summarizes the Community Assessment results and highlights key findings.

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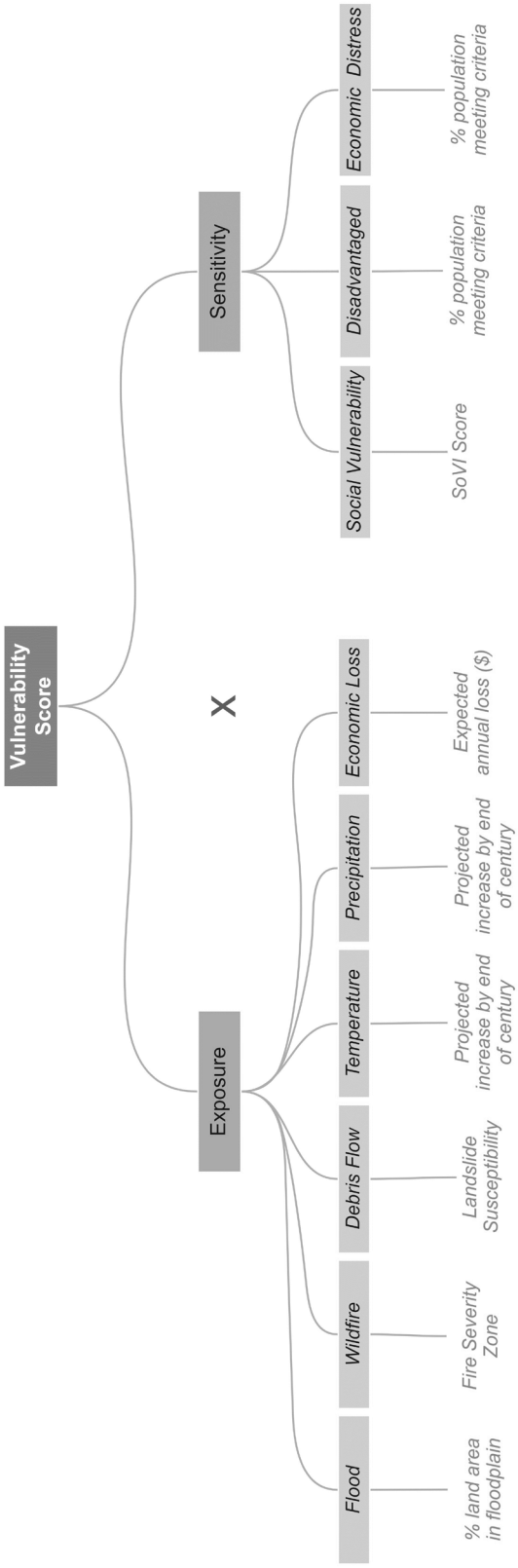
[11] Downloaded from the FEMA National Risk Index web viewer at https://hazards.fema.gov/nri/map# on March 17, 2022.
[12] The method for developing the SoVI score is described at https://sc.edu/study/colleges_schools/artsandsciences/centers_and_institutes/hvri/documents/sovi/sovi_recipe_2016.pdf. Accessed on 11/1/2022.
[13] California Legislature. 2016. "Assembly Bill No. 1550: Disadvantaged Communities." https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB1550
[14] California Legislature. 2014. "Assembly Bill No. 1471: Water Quality, Supply, and Infrastructure Improvement Act of 2014." https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1471

Figure 9. Community Assessment Components and Indicators



3.3.2 Address Communities Results

The following section summarizes the Community Assessment results for Address Communities, organized by component.

3.3.2.1 Exposure

Address Communities exhibiting the highest hazard exposure are rural and/or higher elevation areas northeast of State Route 49 (Map 1). These communities include Dorrington, West Point, San Andreas, Mountain Ranch, Sheep Ranch, Paloma, Mokelumne Hill, and Vallecito. Higher exposure scores were driven primarily by high exposure to landslides and wildfires. Note that the wildfire severity rating was not available in all areas including parts of Hathoway Pines and Avery communities, which resulted in a lower apparent wildfire severity score, and a lower overall exposure score. The wildfire severity rating map shows all of the areas with missing data. Future work could aim to fill data gaps with better information.

3.3.2.2 Sensitivity

Address Communities exhibiting the highest sensitivity are rural areas located centrally in the County (Map 2). These communities include Douglas Flat, White Pines, Wilseyville, Mountain Ranch, Glencoe, and Rail Road Flat. High sensitivity scores were driven by a high concentration of census tracts meeting the thresholds for Disadvantaged Communities and Economically Distressed Areas.

3.3.2.3 Vulnerability

Mountain Ranch received the highest Vulnerability Score of all Address Communities due to high exposure to wildfire and landslides and high sensitivity, driven by the Disadvantaged Communities and Economically Distressed Area indicators. Most communities exhibiting high vulnerability are primarily rural communities to the north of the County (Map 3). In contrast, communities exhibiting the lowest vulnerability are those in more developed areas along the County's southwestern boundary. Some of these communities exhibited moderate exposure but received the lowest sensitivity scores.

3.3.3 PLSS Sections Results

The following section summarizes the Community Assessment results for PLSS Sections, organized by component.

3.3.3.1 Exposure

Overall, sections exhibiting the highest hazard exposure are in the central and northeastern portions of the County, whereas those with the lowest are predominately located to the southwest (Map 4). High exposure in the northeastern sections was driven primarily by high landslide exposure and more significant expected changes to both annual temperatures and precipitation amounts.

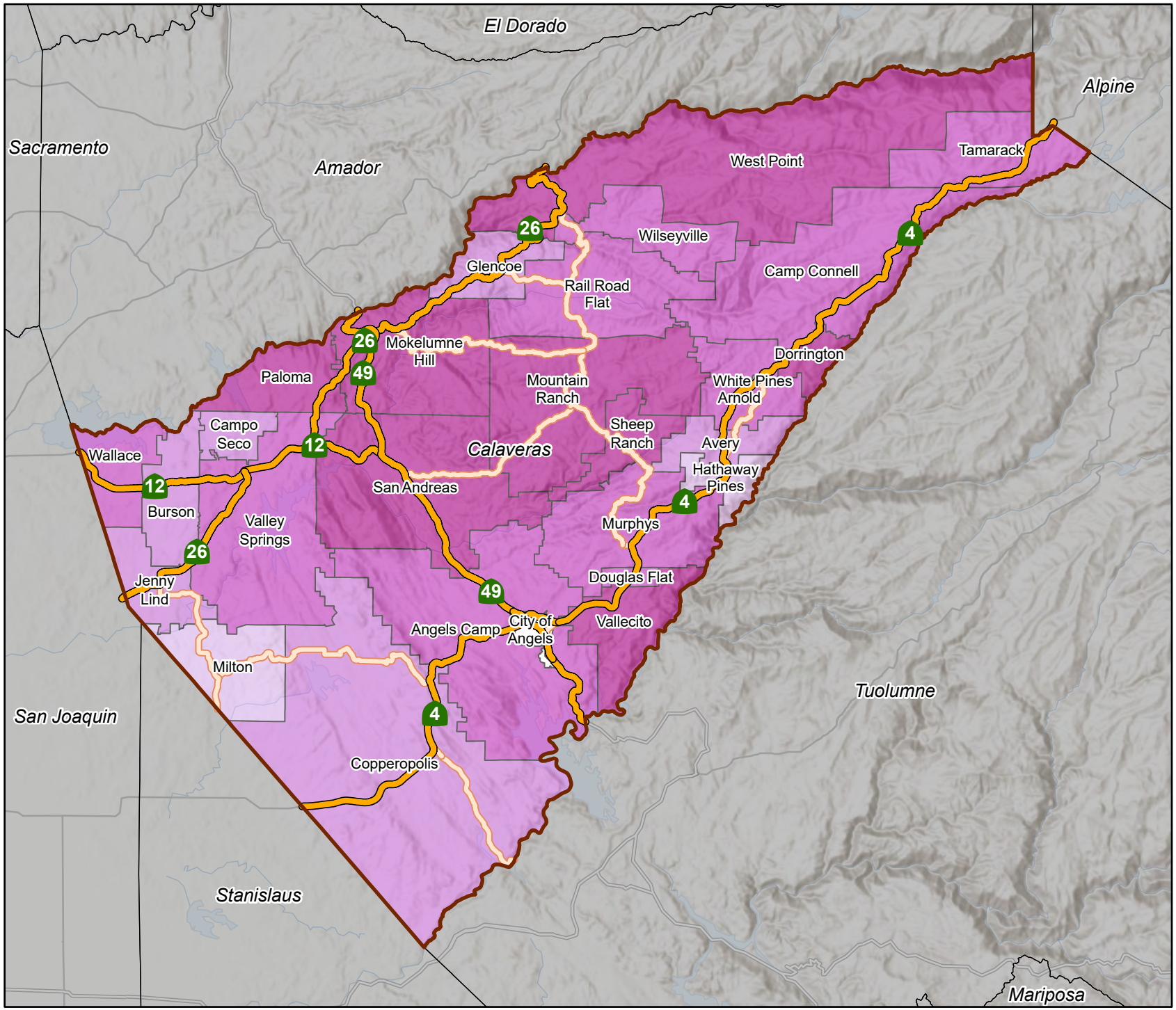
3.3.3.2 Sensitivity

Sections exhibiting the highest sensitivity are located centrally in the County (Map 5). This pattern aligns with the Address Communities results, except for sections covering San Andreas, Murphys, Angels Camp, and City of Angels. The higher resolution approach shows that some areas within these Address Communities may exhibit higher sensitivity to hazards than the entire community.

3.3.3.3 Vulnerability

Sections exhibiting the highest Vulnerability Scores are located centrally in the County (Map 6). These sections exhibited among the highest exposure scores and tended to have the highest sensitivity scores within the County. These sections cover areas that are primarily rural and located in higher elevations. Sections exhibiting the lowest vulnerability tend to be clustered in more developed areas along the County's southwestern boundary. Some of these sections exhibited moderate exposure but received the lowest sensitivity scores.

Map 1: Address Community Exposure



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County
- Highway
- Major Road

Exposure Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

Dewberry

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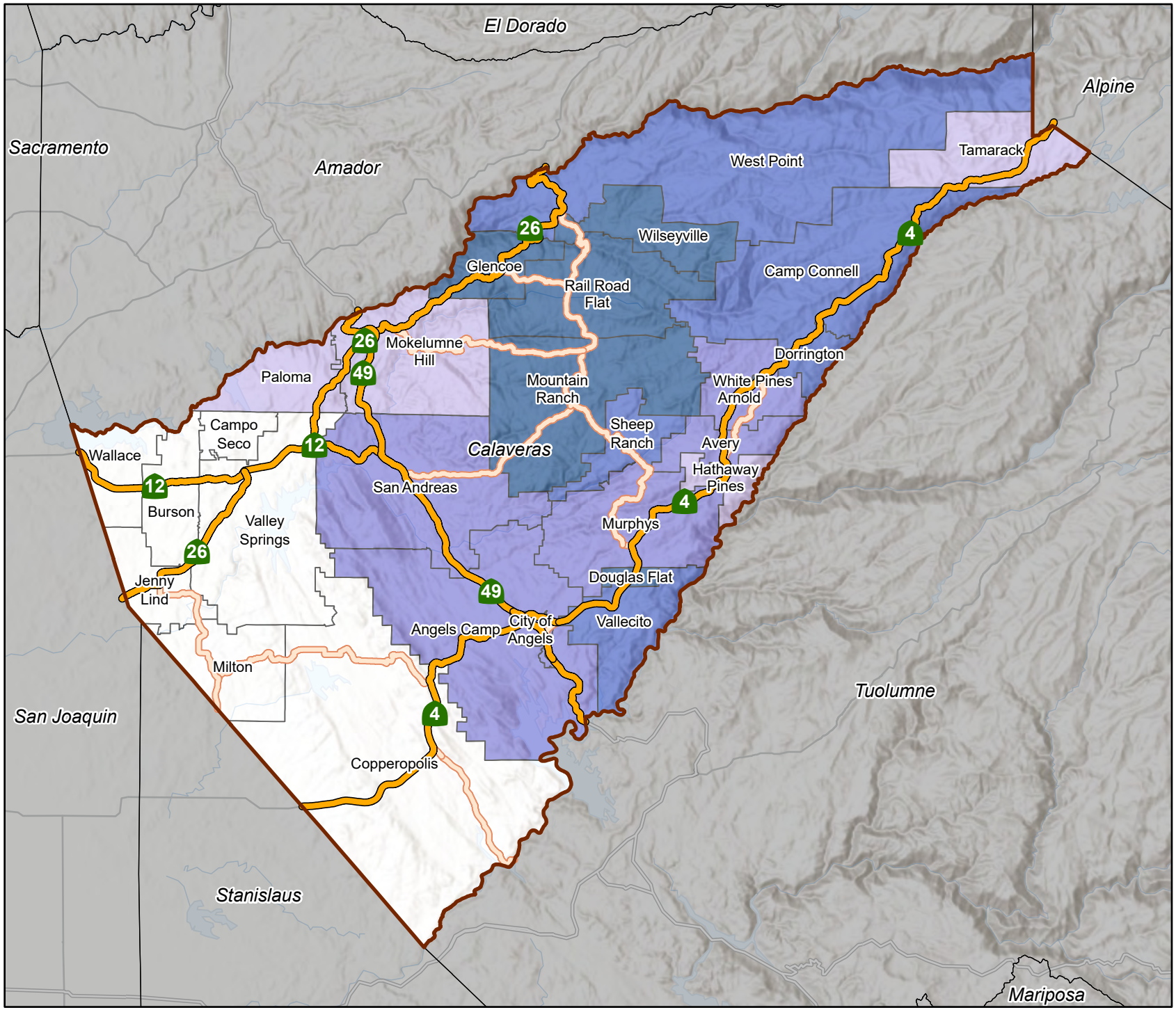
Map 2: Address Community Sensitivity



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County
- Highway
- Major Road

Sensitivity Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

Dewberry

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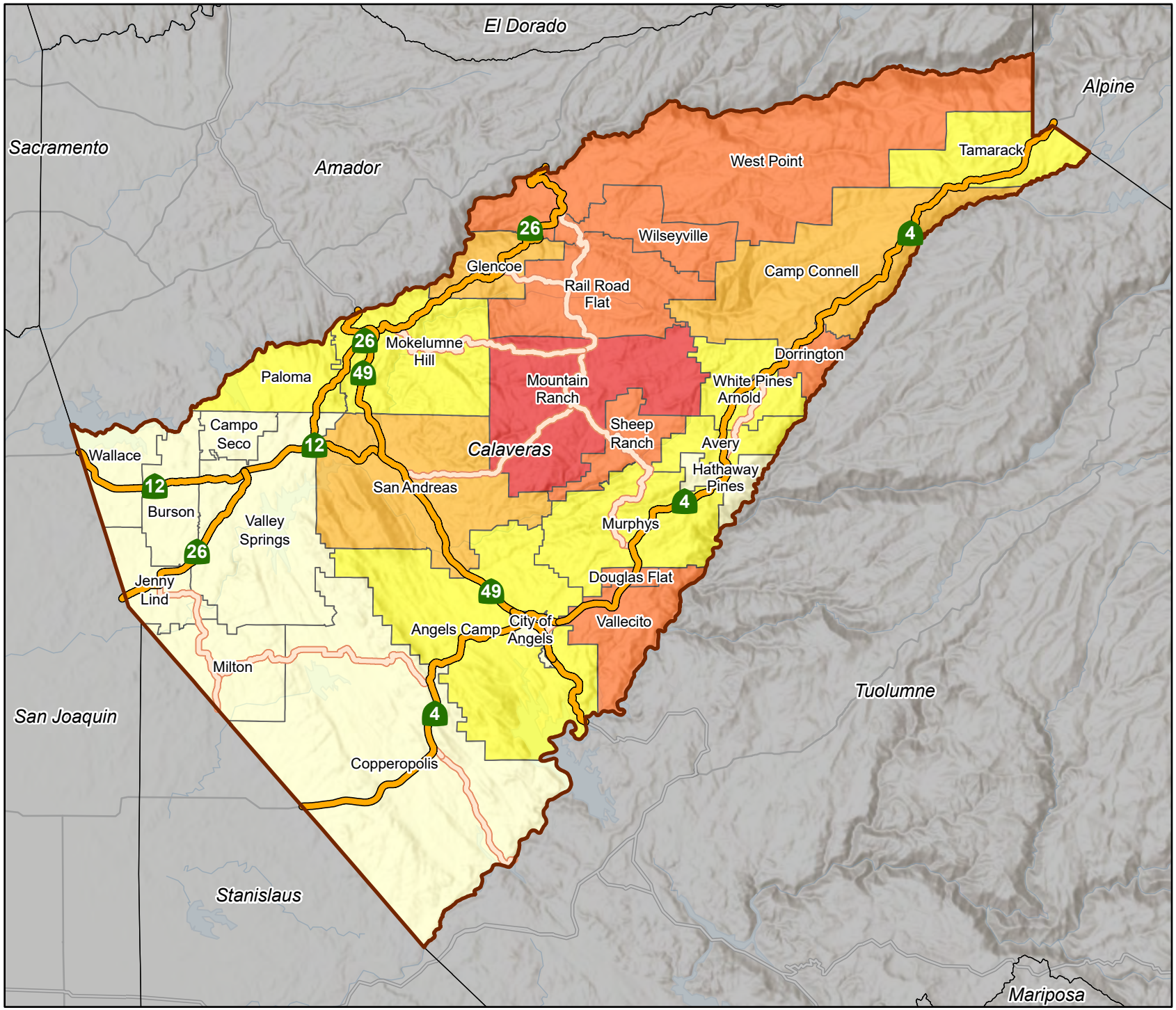
Map 3: Address Community Vulnerability



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County
- Highway
- Major Road

Vulnerability Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 10, 2022

Dewberry

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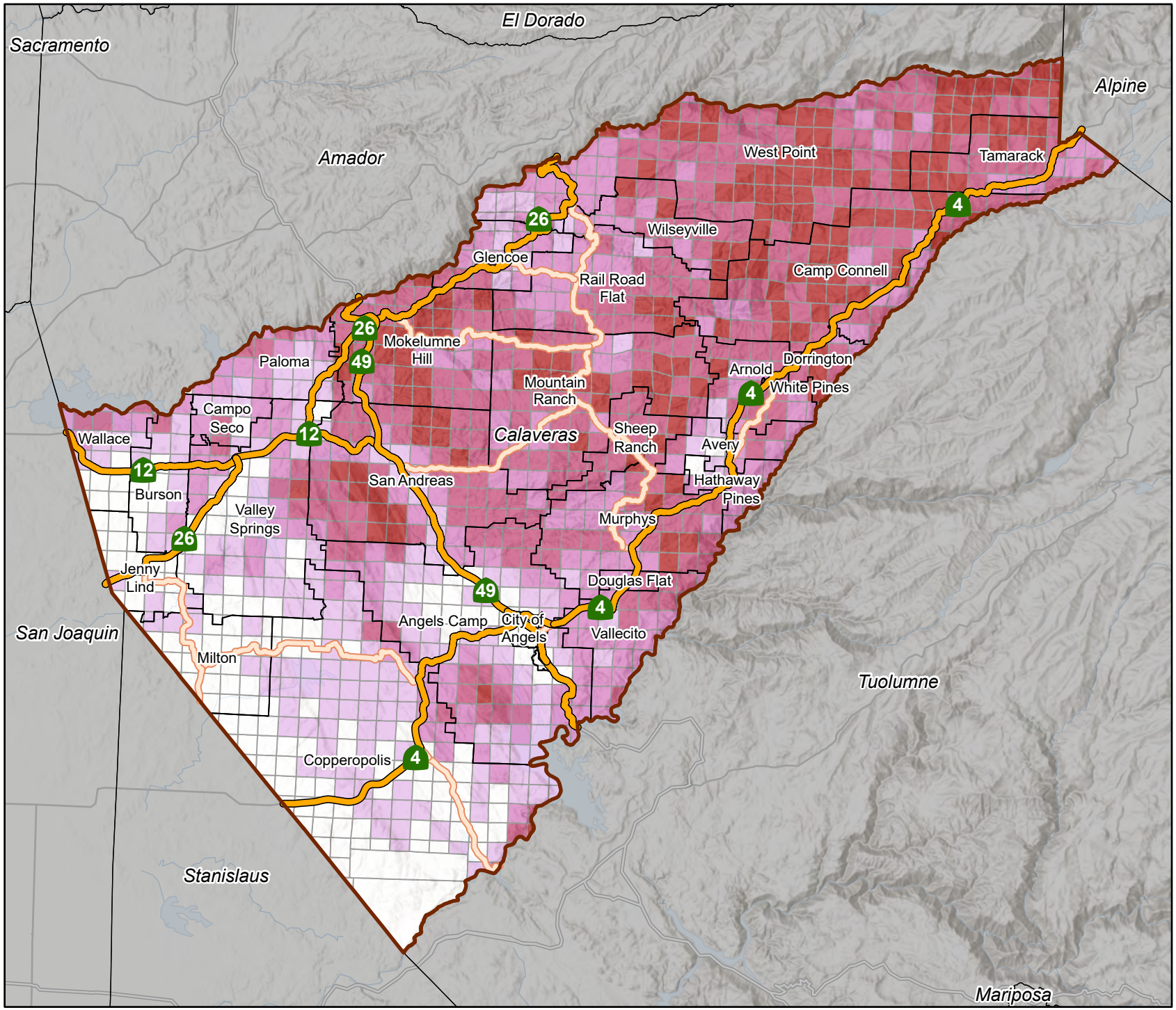
Map 4: PLSS Section Exposure



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County
- Highway
- Major Road

Exposure Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

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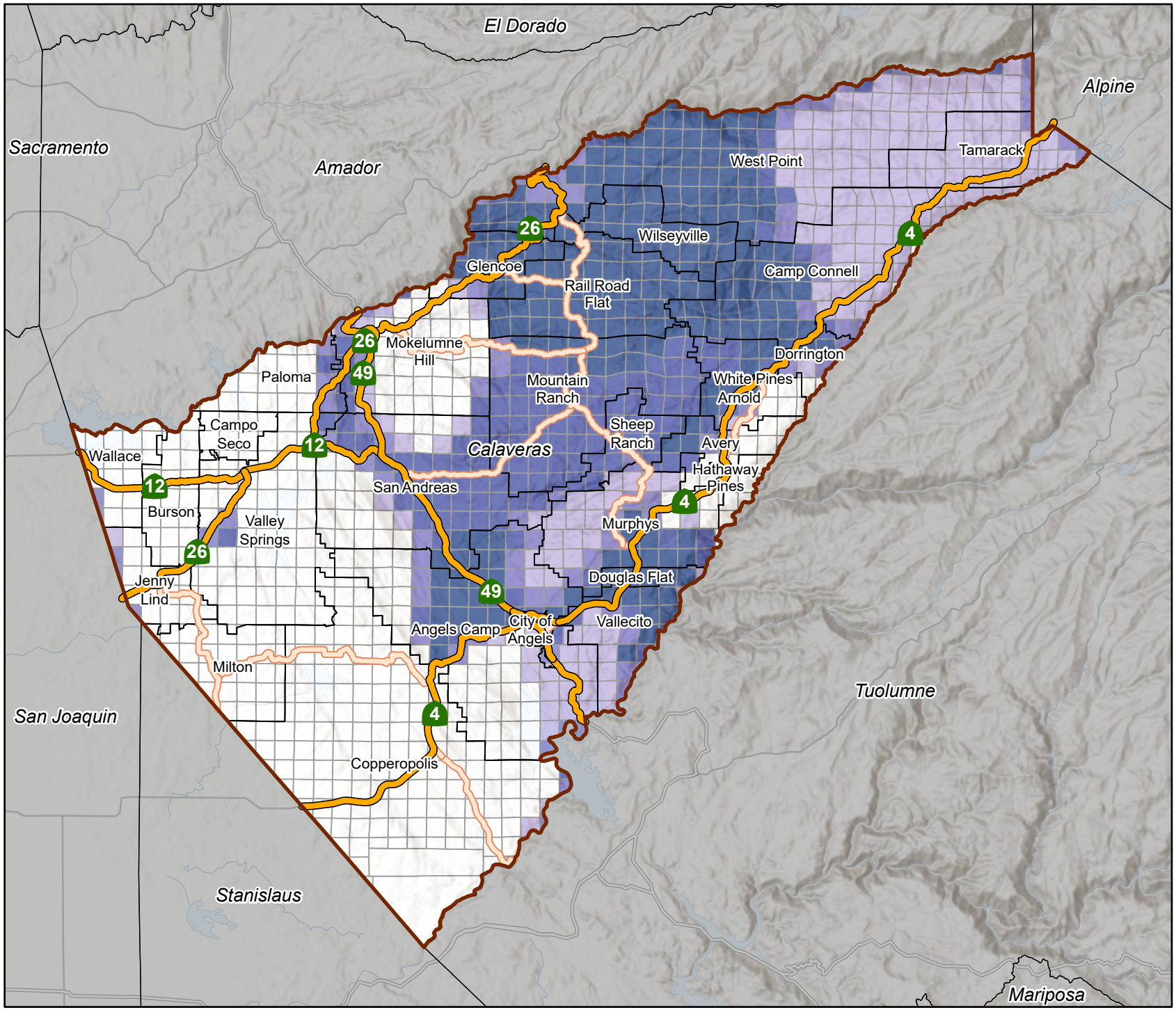
Map 5: PLSS Section Sensitivity



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County
- Highway
- Major Road

Sensitivity Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

N

0 8 Miles

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

Dewberry

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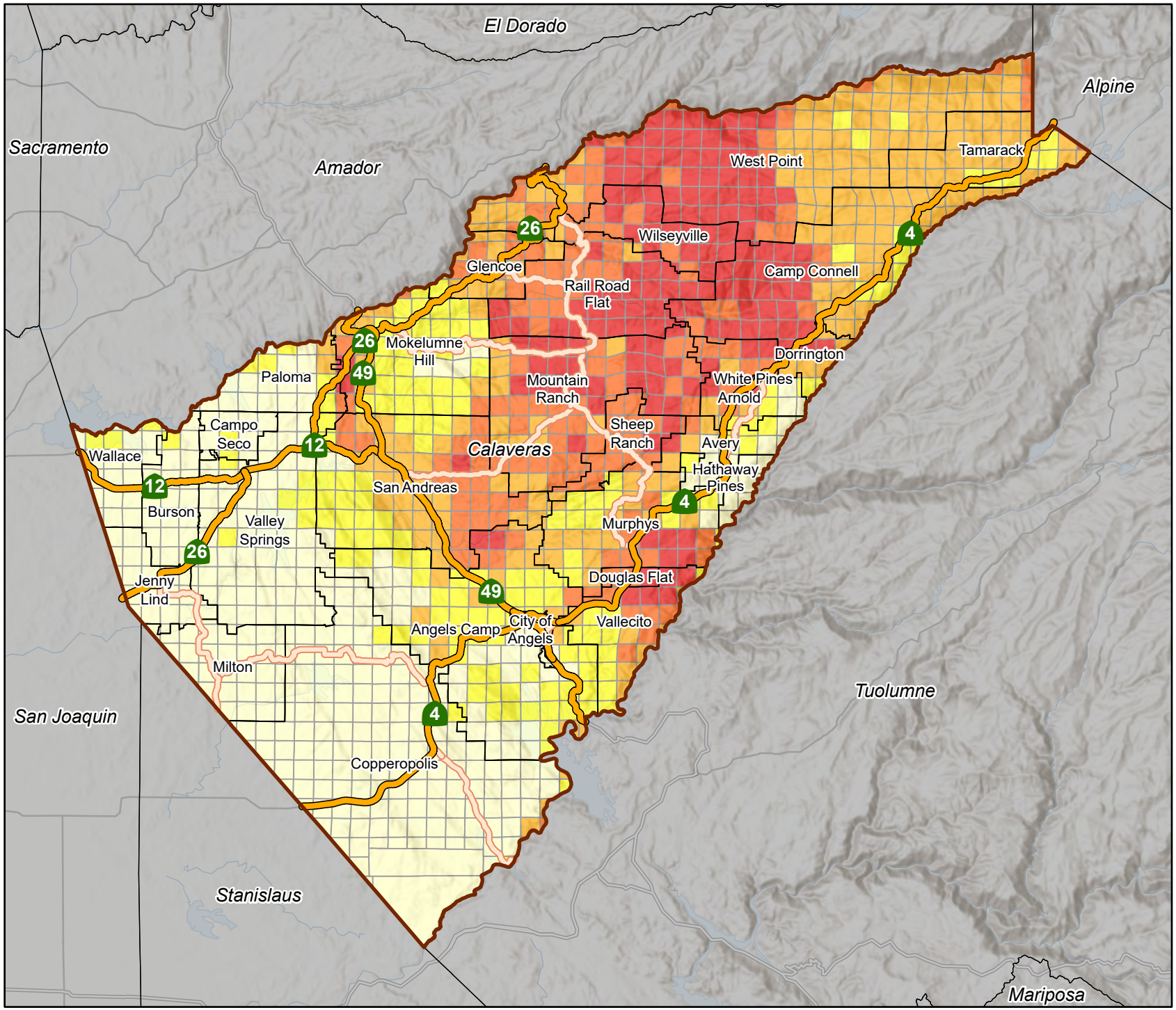
Map 6: PLSS Section Vulnerability



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County
- Highway
- Major Road

Vulnerability Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 10, 2022

Dewberry

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4 Transportation Asset Assessment

The Transportation Asset Assessment examines the susceptibility of the County's transportation assets to potential hazard impacts by characterizing **risk**. Risk refers to the potential for adverse consequences where something of value is at stake, and the occurrence and degree of an outcome are uncertain. An asset's risk to hazard impacts is a function of two components: vulnerability and criticality, defined as the following:

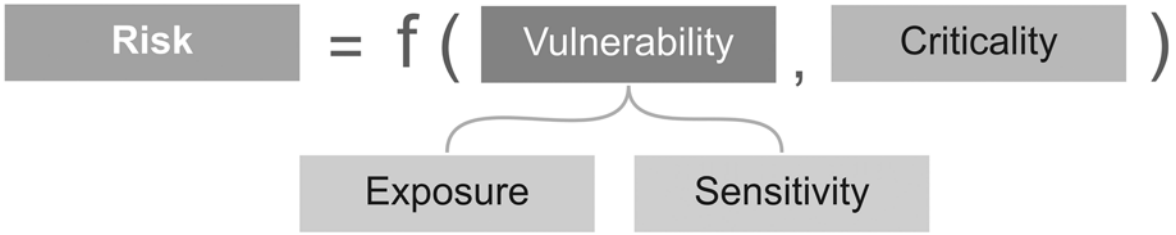
- **Vulnerability** refers to the overall degree to which an asset is expected to experience adverse impacts due to hazards. Vulnerability is a function of an asset's exposure and sensitivity to hazards, defined as the following:
  - Exposure refers to the likelihood and degree to which physical contact between a hazard and an asset will occur. Exposure indicators incorporate event characteristics, such as frequency, intensity, geographic scale, and exposure to hazard stressors.
  - Sensitivity refers to the degree to which an asset is expected to cope with hazard impacts. Sensitivity indicators approximate an asset's structural composition, such as road surface and the surrounding community that the asset serves.
- **Criticality** refers to an asset's importance to the surrounding community. This component incorporates indicators related to an asset's significance to the larger transportation network, such as its frequency of use.

This assessment focuses on evaluating the risk to roads and bridges. This analysis did not include culverts due to a lack of readily available data. To fill this data gap, impacts to culverts may be identified through qualitative means, like community outreach and interviews, to include in considerations for priority locations.

Each component is quantified by multiple indicators that are quantified through metrics. Metrics use readily available datasets that provide information about road and bridge characteristics. Each road or bridge is assigned a metric score relative to all roads or bridges within Calaveras County, from one (lowest) to five (highest). Metrics are weighted equally and averaged to produce a single component score (Figure 10).

An asset's risk is a function of its vulnerability and criticality. Risk scores are assigned using a lookup matrix (refer to Section 4.3.1 for more details and the matrix figure). The matrix assigns higher weights to more critical assets, reflecting their relative importance to Calaveras County and its transportation network. For example, a bridge with a high criticality score receives a higher Risk Score than a less critical bridge, even if both brides receive the same Vulnerability Score.

Figure 10. Transportation Asset Assessment Components



The Transportation Asset Assessment considers two types of transportation assets: roads and bridges.

- Roads: The roads dataset was obtained from the Calaveras County Open Data Portal.[15] The dataset was clipped to the Calaveras County boundary to remove a few roads that extended into neighboring counties. The final road dataset contains a total of 9,275 road sections, which represent 2,470 miles of roadway including local roads and highway. The distribution of roadway length by road type is provided in Table 6.

Table 6. Distribution of roadway length by road type.

ROAD TYPE	MILES OF ROAD
Forest	790
Rural	710
County	605
Highway	150
Main	95
Other (including private drive, trailer park, parking, airstrip)	120

- Bridges: The bridge assets were downloaded from the California bridges in the 2021 National Bridge Inventory.[16] There are a total of 105 bridges across the county. A review of the bridge locations suggests that some bridges might be missing from the inventory (e.g., in the Arnold address community). Future work might try to identify a more complete bridge dataset.

The process for evaluating the sensitivity and criticality of each asset type varies based on the asset characteristics and functions. The process for evaluating exposure is consistent for each asset type. Additionally, this assessment methodology differs from efforts by others to evaluate Calaveras County's transportation assets, specifically the methodology used to assess bridges in the Caltrans District Adaptation Priorities Report (2020). This assessment adopted different methods and metrics to incorporate social vulnerability components and structural and condition metrics to help support decision-making related to evacuations at the County level. A comparison of results between this assessment and the Caltrans report is discussed in Section 4.3.3.3.

The following section outlines the Transportation Asset Assessment process by component, summarizing indicators and metrics and concluding with results.

4.1 Vulnerability

4.1.1 Exposure

Asset exposure refers to the likelihood and degree to which physical contact between a hazard and asset will occur. Exposure indicators incorporate indicators related to event characteristics, such as frequency, intensity, geographic scale, and event stressors.

The assessment focuses on the exposure to three hazards: flooding, wildfires, and debris flow (see explanation in Section 3.1.1). In addition to hazard exposure, the assessment examines assets' exposure to stressors. Two indicators represent stressors: precipitation trends and air temperature trends (see

[15] The shapefile Calaveras_County_Open_Data_Roads.shp was downloaded from https://opendata-calaveras-gis.opendata.arcgis.com/ on January 6, 2022.
[16] Downloaded from https://www.fhwa.dot.gov/bridge/nbi/ascii2021.cfm on May 2, 2022.

explanation in Section 3.1.2). The transportation asset exposure metrics for roads and bridges are described in Table 7.

Table 7. Transportation Asset Exposure Metrics

	INDICATOR	SOURCE(S)	DATASET(S)	METRIC
EVENT TYPE	Flood Exposure	• Roads: FEMA • Bridges: FHWA	• Roads: Special Flood Hazard Areas (see Appendix A Map 1) • Bridges: National Bridge Inventory (NBI)	• Roads: Binary score based on intersection with floodplain • Bridges: Waterway adequacy score derived from NBI
	Wildfire Severity	California Department of Forestry and Fire Protection	Fire Hazard Severity Zones (see Appendix A Map 2)	• Roads: Length-weighted average of Fire Severity Zone score • Bridges: Score based on intersection with Fire Severity Zone
	Debris Flow Susceptibility	US Geological Survey	Landslide Susceptibility (see Appendix A Map 3)	• Roads: Length-weighted average of Landslide Susceptibility • Bridges: Score based on intersection with Landslide Susceptibility class
EVENT STRESSOR	Temperature Change	Cal-Adapt Local Climate Change Snapshot Tool	Annual Maximum Daily Temperature Projection (see Appendix A Map 4 and 5)	• Roads: Length-weighted average of the projected increase in air temperature under RCP8.5 by the end of the century (2070-2099) • Bridges: Score based on the projected increase in air temperature under RCP8.5 by the end of the century (2070-2099) for encompassing census tract
	Precipitation Change	Cal-Adapt Local Climate Change Snapshot Tool	Annual Precipitation Projection	• Roads: Length-weighted average of the projected increase in rainfall under RCP8.5 by the end of the century (2070-2099) • Bridges: Score based on the projected increase in rainfall under RCP8.5 by the end of the century (2070-2099)

4.1.1.1 Metrics

Refer to Section 3.1.3: Metrics.

4.1.1.1.1 Methods

The following section provides abbreviated descriptions of each indicator and the methods adopted to quantify its associated metric's value. For additional information, refer to Section 3.1.3.1: Methods.

Flood Exposure

A roadway's flood exposure is determined by intersection with the 1% annual chance floodplain, delineated by Special Flood Hazard Areas (SFHAs). Roads that fall within the floodplain are more likely to be exposed to flooding than those outside the floodplain. Roads are assigned scores based on the asset's intersection with the floodplain in a binary fashion. Assets that do not fall within the floodplain receive a one (asset faces no flood exposure), and those that do receive a five (asset is exposed to flooding).

A bridge's flood exposure is determined by its waterway adequacy, referring to the ability of water to pass or flow through its structure. A bridge with insufficient waterway adequacy can experience overtopping water that can cause traffic delays. The National Bridge Inventory assigns bridges a Waterway Adequacy Score based on potential overtopping frequency and level of service (traffic capacity). A bridge with a high chance of experience overtopping and that has a higher level of service (such as an interstate or freeway) receives a higher Waterway Adequacy Score. In Calaveras County, bridges received Waterway Adequacy Scores ranging from two (occasional or frequent overtopping and potentially severe traffic delays) to nine (remote chance of overtopping). Closed bridges receive a score of zero, and bridges that do not cross waterways are not ranked. For the Transportation Asset Assessment, Waterway Adequacy Scores are reclassified from one (lowest chance of overtopping and traffic delays) to five (highest chance of overtopping).

Wildfire Severity

Asset exposure is determined by its intersection with Fire Severity Zones, including Moderate Hazard, High Hazard, and Very High Hazard.Roads are assigned scores based on a length-weighted average based on the proportion of their length within each Fire Severity Zone. Roads receive scores from one (no data) to five (highest length-weighted average Fire Severity Zone). Bridges are assigned scores based on the zone with which it intersects.

Debris Flow Susceptibility

An asset's debris flow susceptibility is determined by its intersection with areas of high landslide incidence and susceptibility, indicated by the Landslide Susceptibility dataset. Each road segment is scored using the length-weighted average landslide susceptibility class. Roads receive scores from one (lowest length-weighted average susceptibility class) to five (highest length-weighted average susceptible class). Bridges are assigned scores based on the susceptibility class at its point location.

Temperature Change

Cal-Adapt provides temperature change projections in an approximately four-mile-by-four-mile gridded raster. Roads are assigned scores based on an area-weighted average based on the proportion of their mileage that overlaps with different tracts and their respective projections. Roads receive scores from one (lowest increase) to five (highest increase). Bridges are assigned scores based on the projection for the census tract with which it intersects.

Precipitation Change

Cal-Adapt provides precipitation change projections in an approximately four-mile-by-four-mile gridded raster. Roads are assigned scores based on an area-weighted average based on the proportion of their mileage that overlaps with different tracts and their respective projections. Roads receive scores from one (limited change) to five (high change). Bridges are assigned scores based on the projection for the census tract with which it intersects.

4.1.2 Sensitivity

Sensitivity refers to the degree to which an asset is expected to cope with hazard impacts. Sensitivity indicators incorporate indicators related to an asset's structural composition, such as road surface and the surrounding community that the asset serves.

4.1.2.1 Sensitivity Approach

An asset's sensitivity is determined by physical characteristics critical to its function and the social characteristics of the surrounding community. Asset sensitivity varies based on its type. The Transportation Assessment characterizes sensitivity by two types of indicators:

- **Structural conditions** refer to the physical attributes of a road or bridge that indicate potential deficiencies. Specific attributes, like road pavement materials or scour potential, indicate that an asset is more likely to endure damage or disruption during a hazard.
- **Community vulnerability** refers to the vulnerability of the PLSS Section community surrounding the asset. This indicator is derived from the process described in Section 3.0: Community Assessment.

4.1.2.2 Metrics

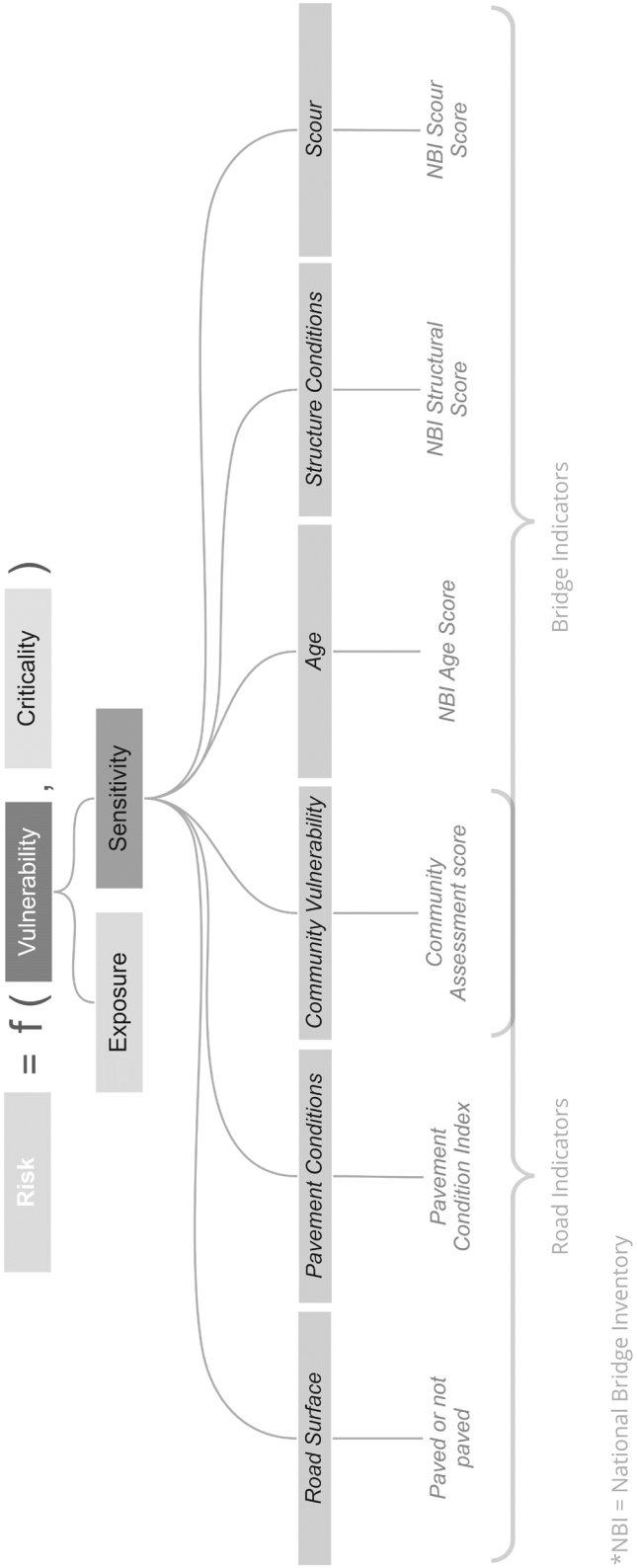
The Transportation Asset Assessment characterizes sensitivity through distinct metrics for each asset type (Figure 11.). The following section defines and describes the process of quantifying each indicator through metrics.

Metrics leverage different datasets and raw values to indicate asset sensitivity, as outlined in Table 8. All metrics are assigned scores from one (indicating low sensitivity) to five (high sensitivity).

Table 8. Transportation Asset Sensitivity Metrics

	INDICATOR	SOURCE	DATASET	METRIC
ROADS	Road Surface	Calaveras County Open Data	County Roads (see Appendix A Map 9)	• Binary score based on whether a road is paved or not
	Pavement Condition Index	CalaCOG Website	Calaveras County Pavement Management Update (see Appendix A Map 10)	• Pavement Condition Index from the Calaveras County Pavement Management Update
BRIDGES	Age	Federal Highway Administration	National Bridge Inventory (see Appendix A Map 13)	• Age score derived from NBI
	Structural Conditions	Federal Highway Administration	National Bridge Inventory (see Appendix A Map 14)	• Structural score derived from NBI
	Scour	Federal Highway Administration	National Bridge Inventory (see Appendix A Map 15)	• Scour rating score derived from NBI
ALL ASSETS	Community Vulnerability	Community Assessment	PLSS Section Vulnerability Score	• Score based on encompassing PLSS section

Figure 11. Transportation Asset Sensitivity



4.1.2.2.1 Methods

This section briefly describes each indicator and the methods adopted to quantify its associated metric's value.

Road Surface

Unpaved or dirt roads are more likely to experience flood and debris flow damage than paved roads. Calaveras County road data indicates whether a road is paved or unpaved, or its surface materials are unknown. Roads are assigned a score in a binary fashion, receiving one (low sensitivity) if they are paved or a five if they are dirt or unpaved (high sensitivity).

Pavement Condition Index

A road's ability to withstand damage depends on physical conditions, such as the presence of cracks or potholes on its surface. A newly constructed or maintained road is less likely to endure adverse impacts than one older or has not recently been maintained. The Calaveras County 2019 Pavement Management Program Update produces a Pavement Condition Index that measures a roadway's pavement condition from zero (poor condition) to 100 (pristine condition). The index considers several factors that affect pavement conditions, including the surrounding environment, traffic volumes and loads, surface materials, and age.

For this assessment, the Pavement Condition Index scores were spatially joined to the Calaveras County road dataset used for this effort. These scores are reclassified from one (worst conditions) to five (best conditions). Roadways lacking data are assigned the median value of all index scores in Calaveras County.

Bridge Age

Older bridges may exhibit more deficiencies or have been built under design requirements that have since been improved. The National Bridge Inventory includes what year a bridge was built or reconstructed. Bridges are assigned a score indicating their age, ranging from one (low sensitivity due to young bridge age) to five (high sensitivity due to old bridge age). Bridges lacking data are assigned the median score for all bridges in Calaveras County.

Bridge Structural Conditions

Structural conditions indicate the overall robustness of a bridge. The National Bridge Inventory includes data on inspections that characterize a bridge's structural conditions. Bridges are assigned a score indicating structural conditions, ranging from one (most structurally sound) to five (least structurally sound). Bridges lacking data are assigned the median structural score of all bridges in Calaveras County.

Bridge Scour

Bridge scour refers to sediment removal around a bridge's foundation, such as its abutments or piers. The presence of scour and scour-related conditions is associated with bridge failure during flood events. The National Bridge Inventory assigns bridges a Scour Critical Ranking based on observed scour or the potential for scour to occur based on previous studies. The Scour Critical Ranking assigns bridges a score from zero (bridge failure and closed to traffic) to nine (bridge foundation on dry land well above flood evaluations). A bridge does not receive a ranking if it does not cross a waterway; has not been evaluated for scour; or crosses tidal waters and is considered low risk.

For this assessment, Scour Critical Ranking scores are reclassified from one (low chance of scouring or no scour present) to five (scour observed or possible). Bridges lacking data are assigned the median value of all scour scores in Calaveras County.

Community Vulnerability

Assets are assigned a Community Vulnerability Score based on the encompassing PLSS section. For more details on the methods to produce these scores, refer to Section 3.0: Community Assessment.

4.2 Criticality

Criticality refers to an asset's importance to the surrounding community. This component incorporates indicators related to an asset's significance to the continuous operation of the larger transportation network. The Transportation Assessment characterizes criticality by examining two types of indicators:

- An asset's **frequency of use** indicates how much a community depends on it to travel. The frequency of use is indicated by the average annual daily traffic recorded for bridges and roads.
- An asset's **redundancy** indicates how easily an asset can be substituted with another in the same transportation network. More redundant assets are less critical to the network, whereas those that cannot be replaced are essential to facilitate travel throughout Calaveras County.

4.2.1 Criticality Approach

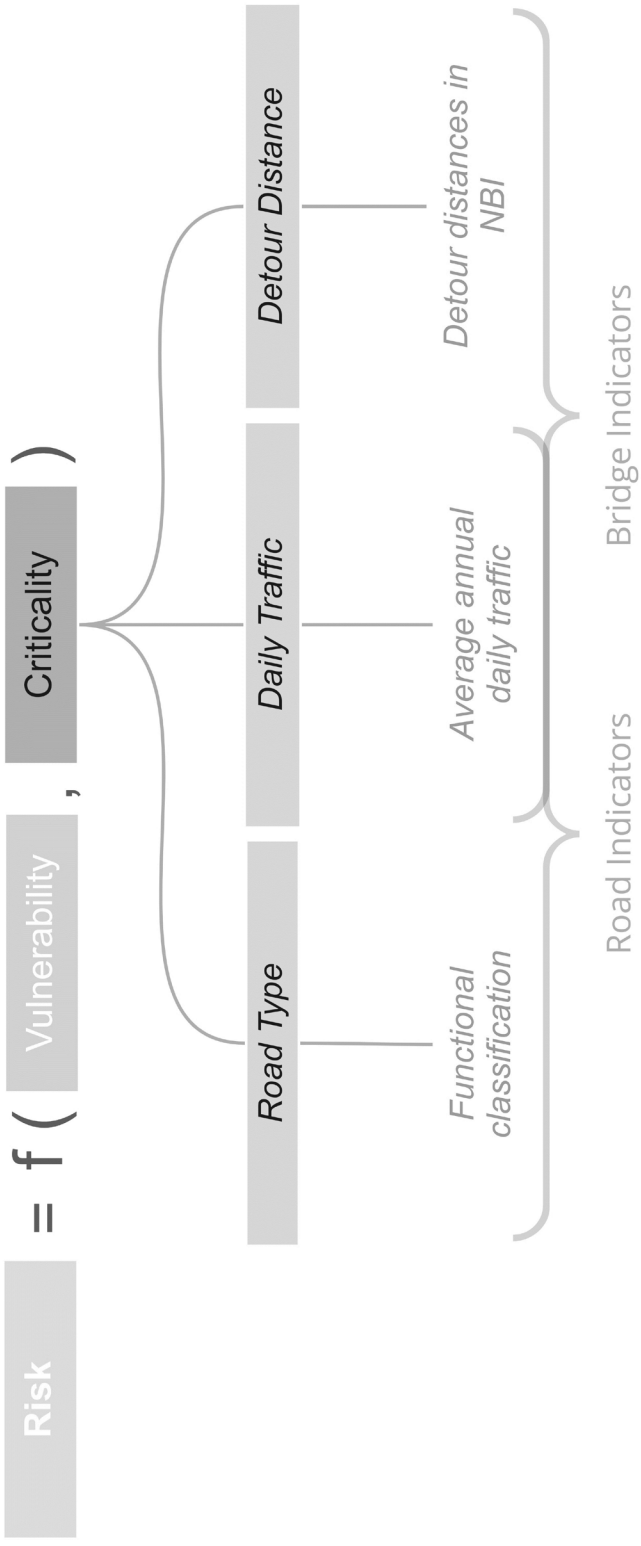
Criticality is characterized by distinct metrics for each asset type (Figure 12.). The following section defines and describes the process of quantifying each indicator through specific metrics.

Metrics leverage different datasets and raw values to indicate asset criticality, as outlined in Table 9. All metrics are assigned scores from one (indicating low criticality) to five (high criticality).

Table 9. Transportation Asset Criticality Metrics

	INDICATOR	SOURCE	DATASET	METRIC
ROADS	Road Type	• Calaveras County Open Data	• County Roads (see Appendix A Map 12)	• Scores assigned based on expert judgment of road type
BRIDGES	Detour Distance	• FHWA	• National Bridge Inventory (see Appendix A Map 16)	• Scores assigned based on estimated travel distance required to detour the bridge
ALL ASSETS	Average Annual Daily Traffic (AADT)	• *Roads:* CalTrans • Bridges: FHWA	• *Roads:* CalTrans State Highway Traffic Volume Dataset (see Appendix A Map 11) • *Bridges:* National Bridge Inventory	• Scores assigned based on road or bridge AADT derived from source data

Figure 12. Transportation Asset Criticality


Risk
=
f (
Vulnerability
,
Criticality
)
Road Type
Daily Traffic
Detour Distance
Functional classification
Average annual daily traffic
Detour distances in NBI
Road Indicators
Bridge Indicators
*NBI = National Bridge Inventory

4.2.2 Metrics

This section briefly describes each indicator and the methods adopted to quantify its associated metric's value.

Road Type

A road type refers to the level of service it aims to provide. Calaveras County road data assigned each roadway a qualitative type, such as highway, main roads, or private driveways. Road types that can serve higher traffic levels are considered more critical to the road network because if these roads become impassable, it will affect a larger number of travelers than a small or private roadway. Roads were assigned the scores outlined in Table 10.

Table 10. Road Types Scores

	SCORE				
	5 (MOST CRITICAL)	4	3	2	1 (LEAST CRITICAL)
ROAD TYPE	Highway	• Main • County • City of Angels	• Rural	• Forest • Trailer Park • Forest • Private Drive • Airstrip • Non-public	• Parking • Other

Bridge Detour Distance

Some bridges are important connectors for isolated communities, and their closures can cut off travelers from other neighborhoods or parts of the region. Detour distances indicate the miles a traveler must go to circumvent a bridge in the event of its closure. Higher distances indicate that a bridge is vital to the surrounding area's connectivity to the rest of the region, whereas lower distances indicate that travelers have other route options. Bridges were assigned a score from one (lowest detour travel distances) to five (highest detour travel distances).

Average Annual Daily Traffic

Average annual daily traffic indicates the frequency with which a road or bridge is used. An asset with higher traffic volumes is more critical to the surrounding region, as more people and businesses depend on it. These roadways' safe and clear passage is also essential to facilitate evacuations and provide emergency services. Assets are assigned scores from one (lowest traffic counts) to five (highest traffic counts).

4.3 Risk

4.3.1 Risk Approach

Risk refers to the potential for adverse consequences where something of value is at stake, and the occurrence and degree of an outcome are uncertain. An asset's risk is a function of its vulnerability to adverse hazard impacts and criticality to the larger region.

Metrics are averaged across vulnerability and criticality indicators to produce a single composite score for each component. Based on these component scores, a Risk Score is assigned using a lookup matrix (Table 11). The matrix assigns higher weights to more critical assets, reflecting their relative importance to Calaveras County and its transportation network. For example, a bridge with a high criticality score receives a higher Risk Score than a less critical bridge, even if both brides receive the same Vulnerability Score.

Table 11. Risk Lookup Matrix

Risk Score

Increasing criticality →

Vulnerability Score						
5	3	4	4	5	5	
4	3	3	4	4	5	
3	2	3	3	4	5	
2	2	2	3	4	4	
1	1	2	3	3	4	
	1	2	3	4	5	

Criticality Score

↑ *Increasing vulnerability*

4.3.2 Roads Results

The following section summarizes the Transportation Asset Assessment results for roads, organized by component. These sections identify high vulnerability routes, some of which that cross into neighboring jurisdictions. Recognizing the shared reliance on these critical roadways, CalaCOG plans to coordinate evacuation planning needs and potential project development with these jurisdictions.

4.3.2.1 Vulnerability

Roads exhibiting the highest vulnerability are clustered in West Point along State Route 26 on the County's northern border and Camp Connell along Highway 4 on the southern border (Map 7). These results correlate with previously identified at-risk routes, determined through the Climate Debrief Interviews conducted to develop the Preparedness Plan. Specifically, Calaveras officials identified Highway 4 as a road critical for ingress and egress during emergencies and historically has had access issues during winter storms due to fallen trees, limbs, and power lines blocking the route. Overall, in these areas, high vulnerability is driven primarily by high wildfire exposure and the presence of predominately unpaved roadways. The communities surrounding these roadways also exhibited the highest Community Vulnerability Scores in the County.

4.3.2.2 Criticality

Calaveras County's most critical roadways include segments of Main Street, West St. Charles, and Highways 4, 12, 26, and 49 (Map 8). These roads have higher traffic capacities and are essential to the County's overall transportation network. During the Climate Debrief Interviews, Calaveras officials identified Highway 4 as a critical road for ingress and egress during evacuations. Many roads in rural areas exhibit low criticality scores. These roads may be necessary to nearby communities, but they likely have limited capacity and connections to other vital roads in the County's transportation network.

4.3.2.3 Risk

Roads exhibiting the highest risk include segments of Highways 4 and 49 (Map 9). These roads exhibit moderate vulnerability but high criticality to the County's overall transportation network, driving their higher Risk Scores. Roads exhibiting the second-highest Risk Scores include additional segments of Highways 4 and 49, major thoroughfares (such as Highways 12 and 26, Main Street, and East and West St. Charles Streets), and several rural roads in Rail Road Flat, West Point, Mountain Ranch, Murphys, and Wilseyville. The high risk of these rural roads is driven by high exposure and high Community Vulnerability scores, despite lower criticality scores.

These results correlate with previously identified at-risk routes, determined through the Climate Debrief Interviews conducted to develop the Preparedness Plan. Highway 4 has been previously identified as a critical route for ingress and egress during evacuations and access issues during winter storms. Additionally, Calaveras officials identified Highway 49 as a concern for evacuations and noted that the route was shut down for three to four hours due to the 2020 O'Reilly Fire.

4.3.3 Bridges Results

The following section summarizes the Transportation Asset Assessment results for bridges, organized by component.

4.3.3.1 Vulnerability

The majority of the County's most vulnerable bridges are located north of Highway 49 (Map 10). Bridges exhibiting the highest vulnerability are located primarily in the central and northern portions of the County. High vulnerability in these areas is driven primarily by high wildfire exposure and high Community Vulnerability scores.

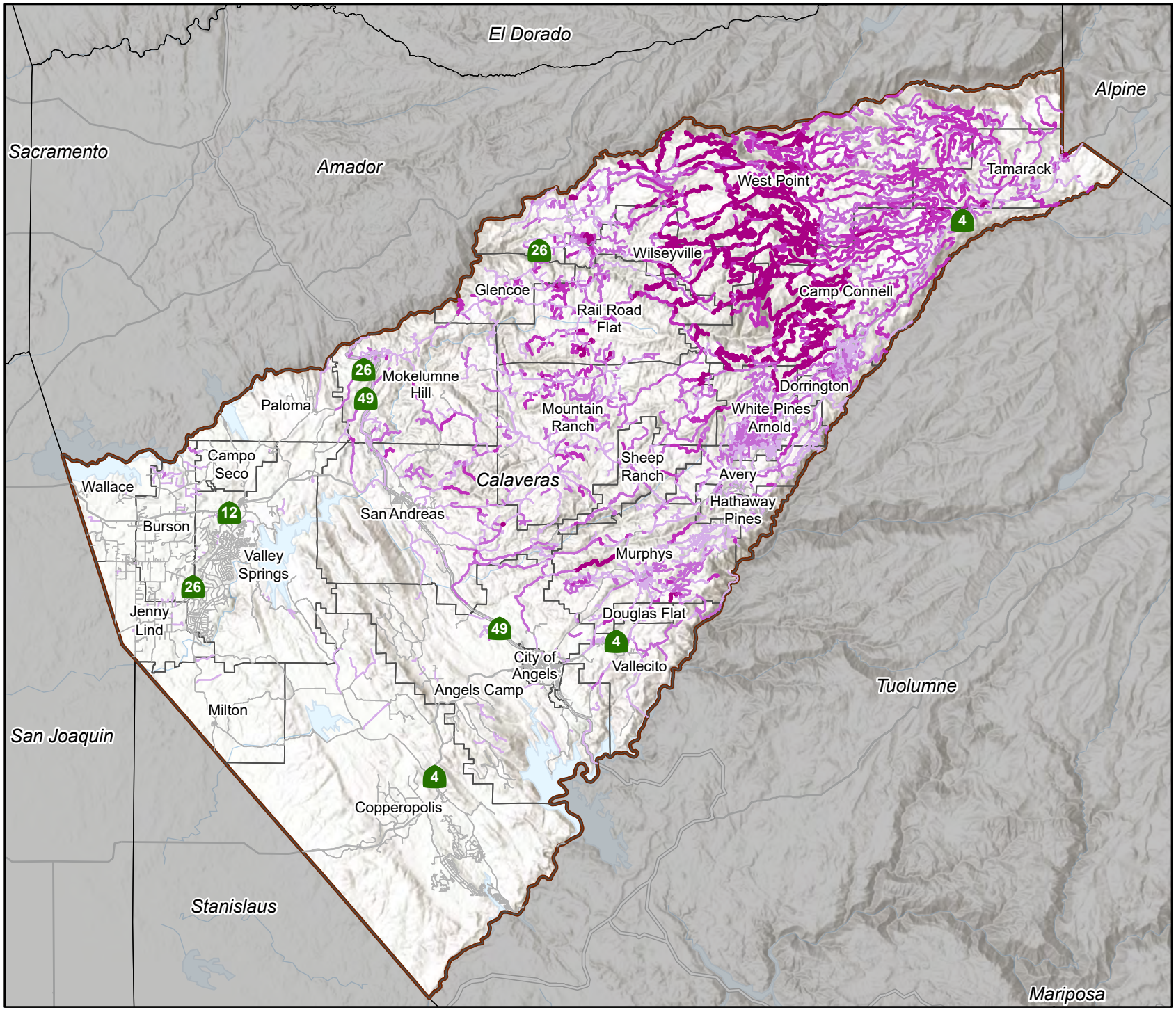
4.3.3.2 Criticality

Out of the 32 bridges with the highest criticality score, most are clustered around the City of Angels, Vallecito, and Angels Camp (Map 11). These bridges tend to have higher average annual daily traffic counts than other bridges within the County. However, at least two of the County's most critical bridges are in northern rural areas (West Point and Wilseyville). The criticality of these bridges is driven primarily by the high scores for detour distance.

4.3.3.3 Risk

Bridges exhibiting the highest risk in Calaveras County are typically centrally located in Mountain Range and Sheep Ranch (Map 12). Only one of these bridges serves high traffic values. The remaining bridges tend to exhibit low average annual daily traffic counts, possibly due to their rural locations. However, these bridges typically exhibit the highest hazard exposure and detour distance scores, indicating their importance to the transportation network.

Map 7: Road Vulnerability



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Vulnerability Score

- 1
- 2
- 3
- 4
- 5

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

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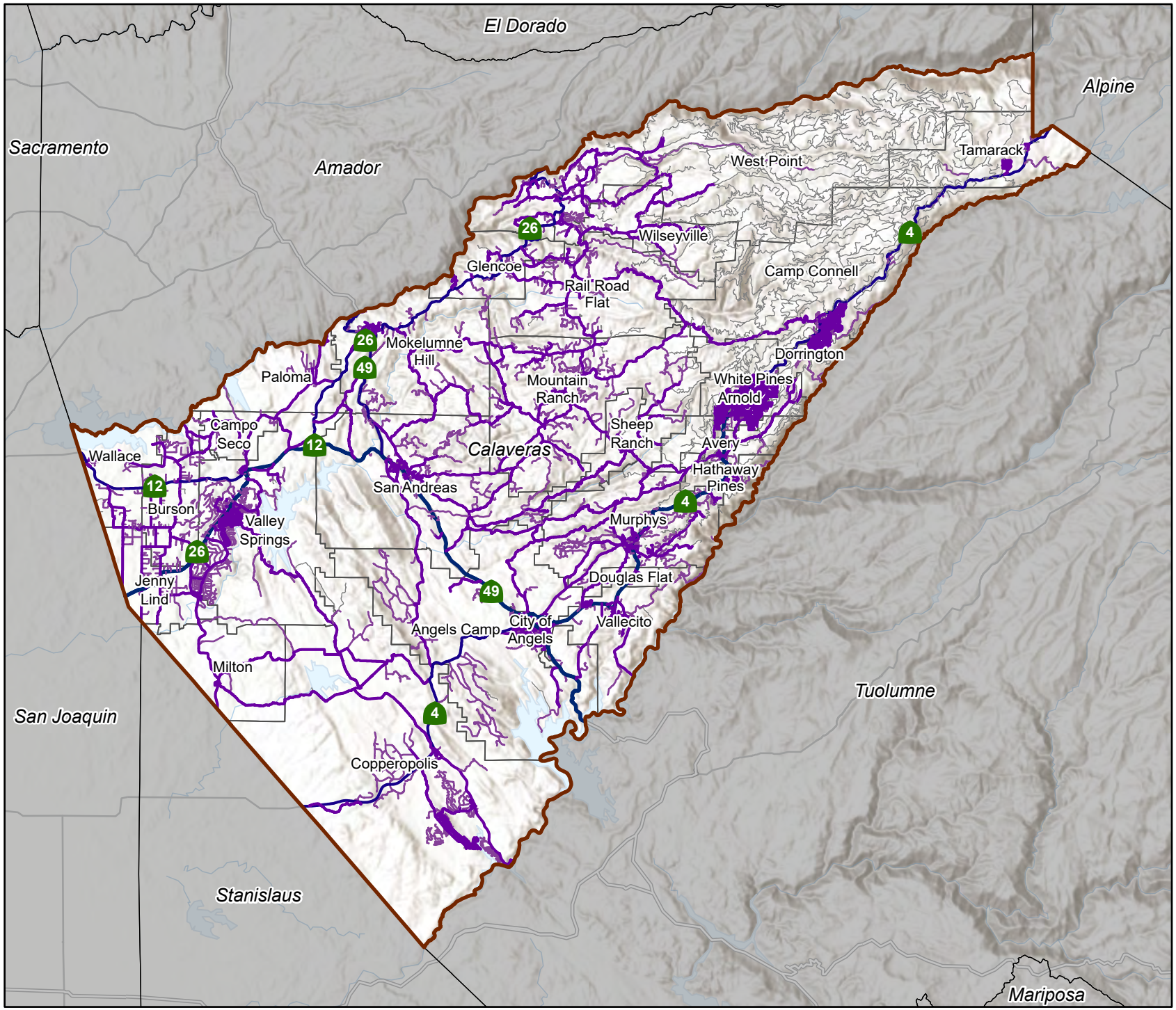
Map 8: Road Criticality



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Criticality Score

- 1 (Low)
- 2
- 3
- 4
- 5 (High)

0 8 Miles

N

Author: A. Piazzoni
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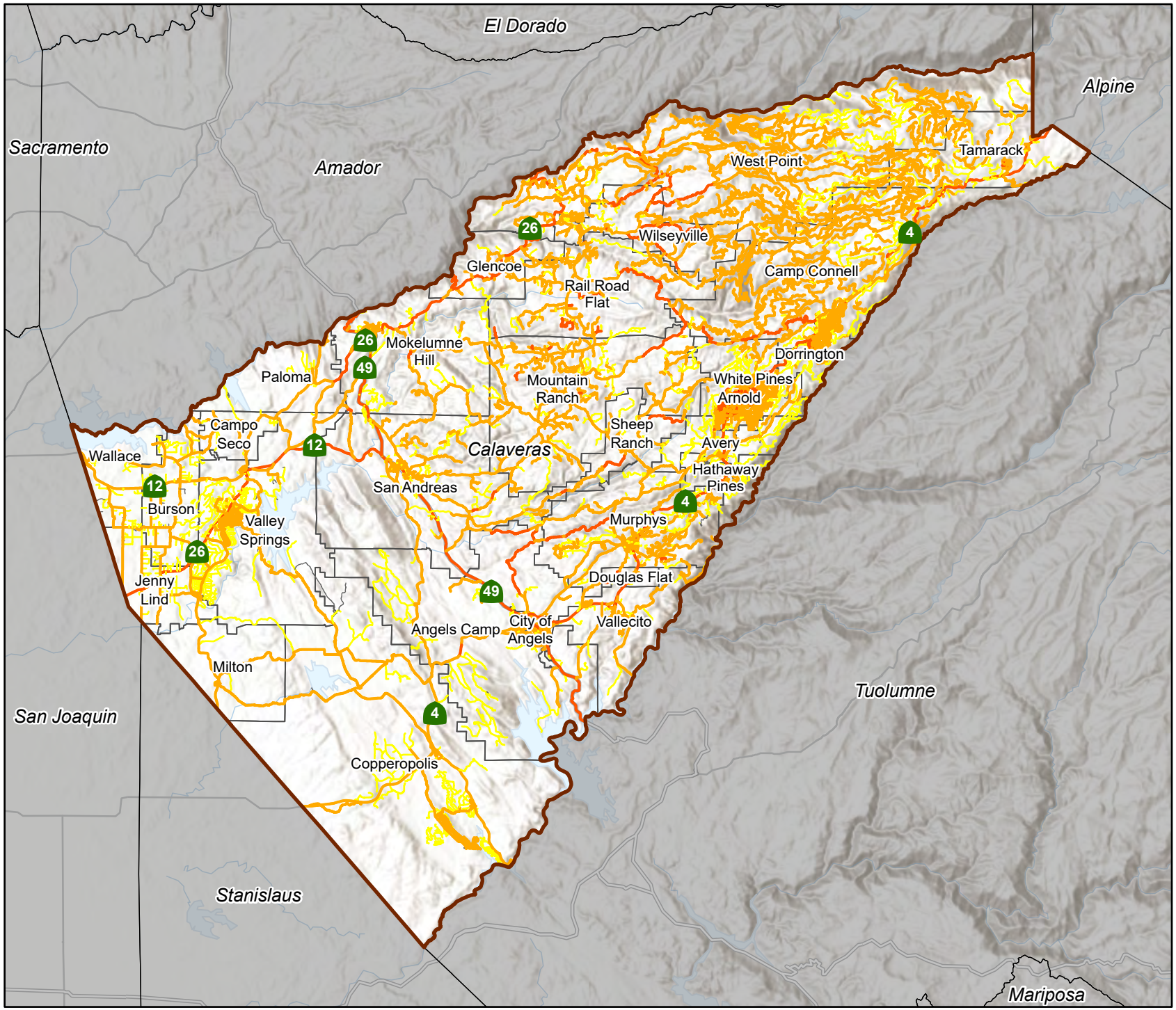
Map 9: Road Risk



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Risk Score

- 1
- 2
- 3
- 4
- 5

N

0 8 Miles

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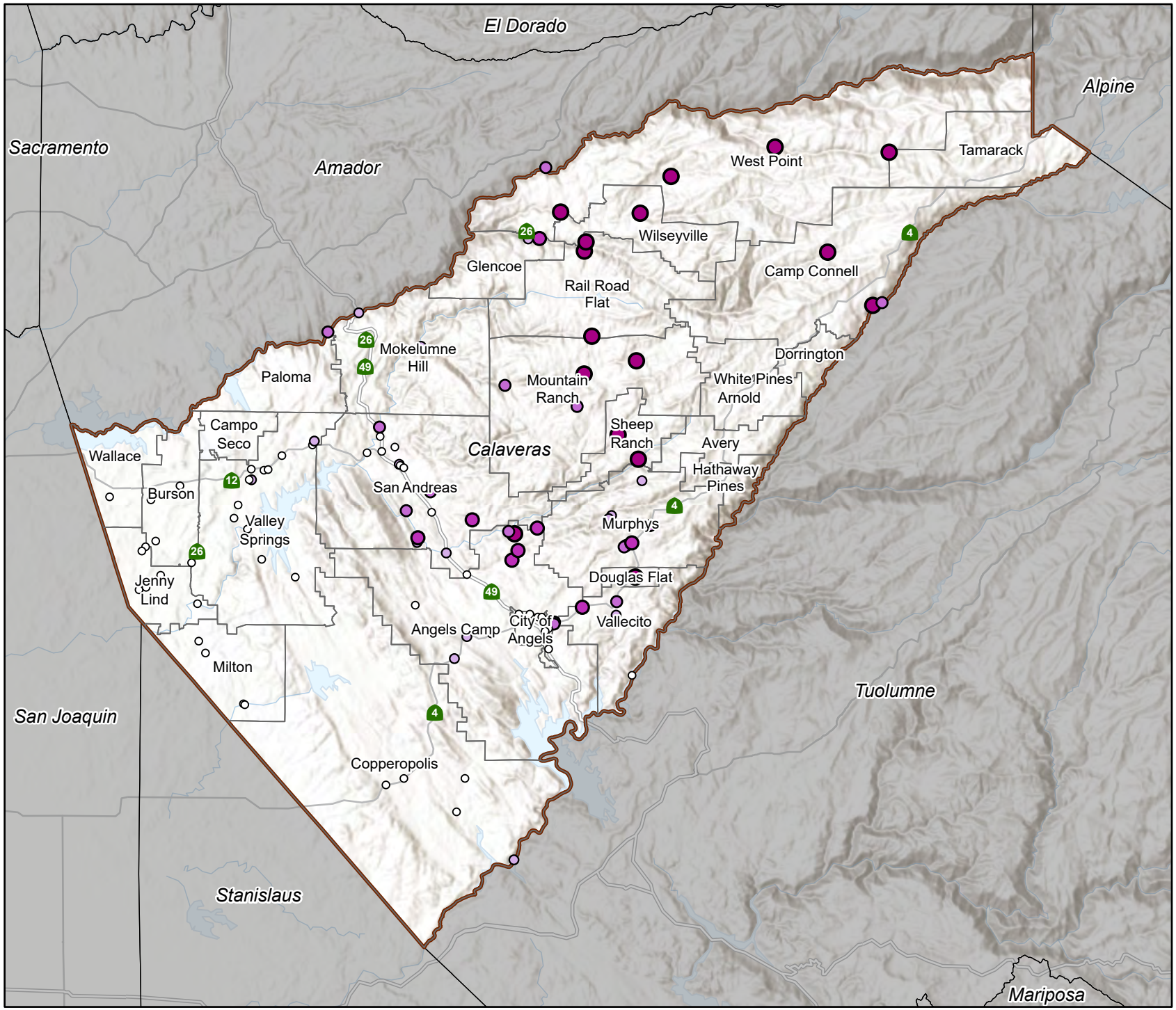
Map 10: Bridge Vulnerability



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Vulnerability Score

- 1
- 2
- 3
- 4
- 5

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

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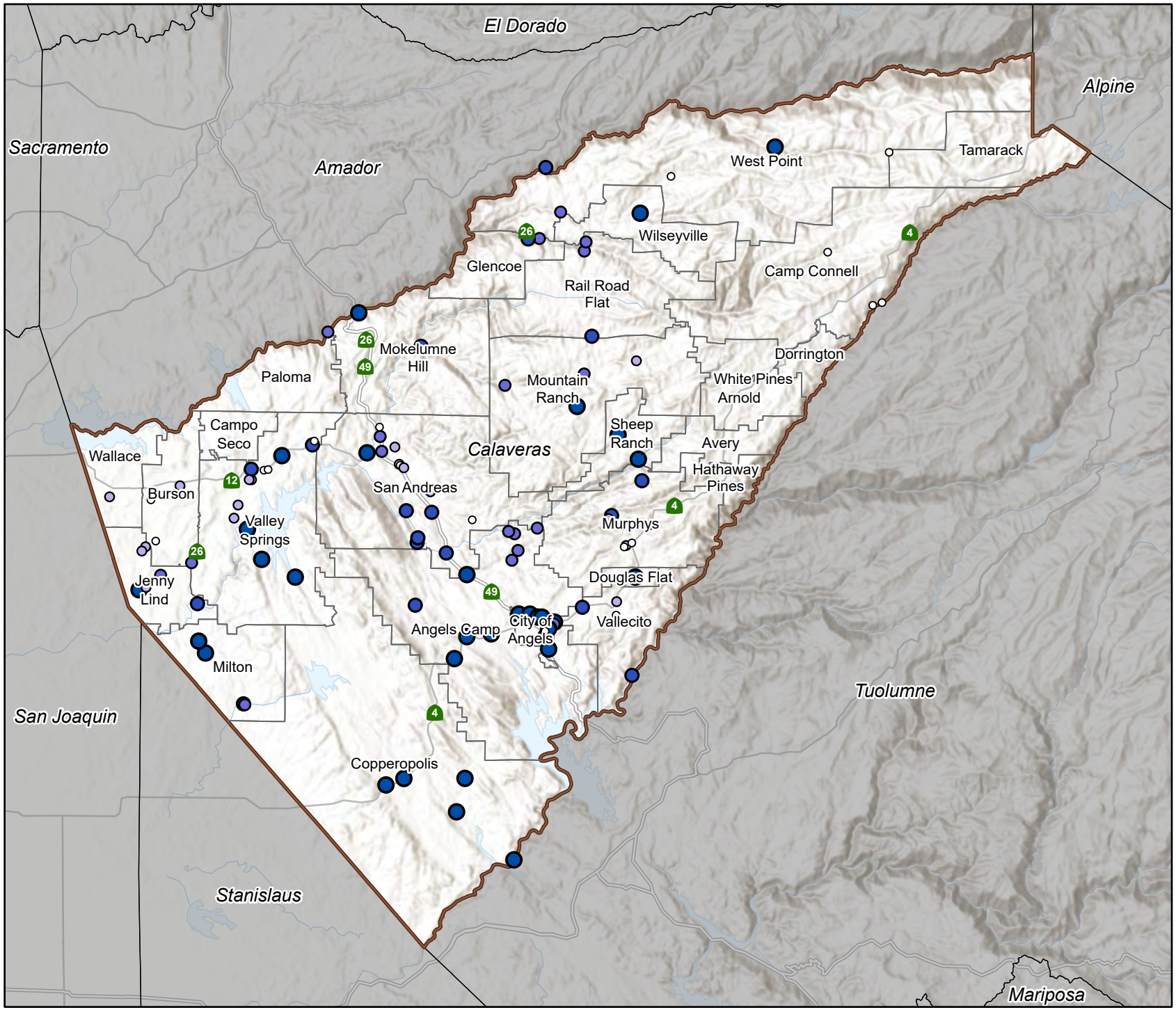
Map 11: Bridge Criticality



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Criticality Score

- 1
- 2
- 3
- 4
- 5

0 8 Miles

N

Author: A. Piazzoni
Last updated on Friday, June 3, 2022

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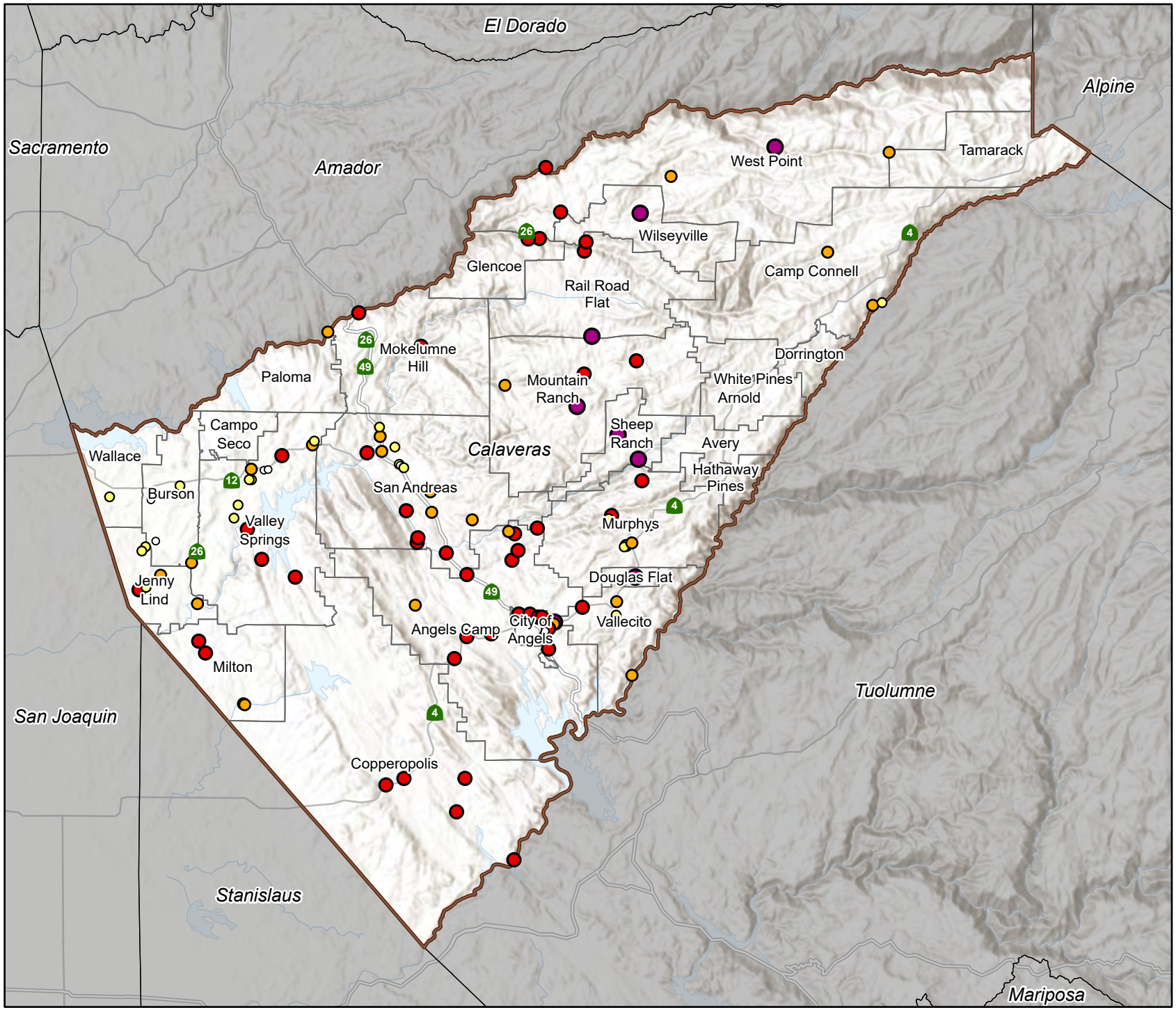
Map 12: Bridge Risk



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Risk Score

- 1
- 2
- 3
- 4
- 5

0 8 Miles

N

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Last updated on Friday, June 3, 2022

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4.3.3.3.1 Results Comparison

The following section summarizes key differences between this assessment and the Caltrans Adaptation Priorities Report for District 10, including Calaveras County. The Caltrans Report assessed the vulnerability of Caltrans-owned roads and bridges to climate-influenced hazards. The CalaverasCOG assessment builds off this previous effort but adopts different metrics and methods tailored to Calaveras County's unique hazard exposure, asset inventory, and specific evacuation-related needs. For example, the Caltrans report studies 248 Caltrans-owned bridges, of which 19 are in Calaveras County. This assessment examined a broader set of assets by using the National Bridge Inventory to select the 105 bridges located in Calaveras County.

Additionally, each assessment focused on different hazards to determine asset exposure. As discussed in previous sections, this assessment focuses on hazard exposure to flooding, wildfires, and debris flow. The Caltrans report focuses on riverine flooding, sea level rise, and storm surge flooding. Sea level rise and storm surge flooding were not included in this process since Calaveras County is not exposed to these hazards. As a result, these methodologies emphasize different types of hazard exposure for bridges. In addition to considering hazard exposure and structural condition, the CalaverasCOG assessment incorporates a social vulnerability component not included in the Caltrans evaluation.

Further, both the Caltrans report and this assessment apply a relative framework to produce final scores or results compared to all assets examined. For example, this assessment assigns risk and Vulnerability Scores relative to the 105 assets contained in the National Bridge Inventory. The Caltrans report assigns bridges a priority score compared to the 248 Caltrans-owned bridges, and the results for Calaveras County represent just a subset of the District 10 assessment. Due to all the factors discussed above, this assessment produced different results from the Caltrans Report (Table 12)

Table 12. Results Comparison of CalaverasCOG Assessment and Caltrans Report

BRIDGE NUMBER	BRIDGE NAME	Caltrans District 10 Adaptation Priorities Report		CalaCOG Hazard Risk and Vulnerability Assessment	
		PRIORITY	CLASS	RISK SCORE	CLASS
30 0007	N. FORK CALAVERAS RIVER	1	• Highest	• 4	• High
30 0020	SIX MILE CREEK	1	• Highest	• 4	• High
30 0036	W BRANCH CHEROKEE CREEK	1	• Highest	• 4	• High
30 0049	N. FORK MOKELUMNE RIVER	2	• High	• 4	• High
30 0002	COSGROVE CREEK	2	• High	• 3	• Moderate
30 0009	SIX MILE CREEK	3	• Moderate	• 4	• High
30 0017	SAN ANTONIO CREEK	3	• Moderate	• 4	• High
30 0006	HAUPT CREEK	3	• Moderate	• 3	• Moderate
30 0031	NORTH FORK CALAVERAS RIV	3	• Moderate	• 3	• Moderate
30 0056	ANGELS CREEK	4	• Low	• 5	• Highest
30 0018	SAN DOMINGO CREEK	4	• Low	• 4	• High
30 0019	ANGELS CREEK	4	• Low	• 4	• High
30 0052	M. FORK MOKELUMNE RIVER	4	• Low	• 4	• High
30 0016	CALAVERITAS CREEK	4	• Low	• 3	• Moderate
30 0023	INDIAN CREEK	5	• Lowest	• 4	• High
30 0034	LITTLEJOHNS CREEK	5	• Lowest	• 4	• High
30 0055	CREEK & PENSTOCK PIPE	5	• Lowest	• 4	• High
30 0024	INDIAN CREEK	5	• Lowest	• 3	• Moderate
30 0030	MURRAY CREEK	5	• Lowest	• 3	• Moderate

5 Climate Debrief Interview Comparison

As part of the Preparedness Plan's development, four climate debrief interviews were conducted with seven subject matter experts between February 16 and February 22, 2022. The interviewees represented various organizations and roles in natural hazard management and response across the county, including City of Angels Camp, Calaveras County, and Caltrans. The interviews are summarized in more detail in a separate project report titled “Climate Debrief Interview Summary Report”.

The interviewees identified several areas and assets across the county that may be at especially vulnerable to natural hazards and/or especially critical to the operation of the transportation network. While very valuable, these observations were too qualitative to be incorporated into the system-wide hazard risk and vulnerability assessment scores. Instead, the observations are summarized below and compared as closely as possible with the assessment results.

- Airola Fire: In August 2021, the Airola Fire resulted in evacuations and temporary road closures near River Canyon in the Vallecito address community. Based on this assessment, this community has a high wildfire severity score (4 out of 5).
- Salt Fire: In August 2020, the Salt Fire caused temporary road closures near Salt Springs Reservoir in the Copperopolis address community. Based on this assessment, this community has a moderate wildfire severity score (3 out of 5).
- O’Reilly Fire: In July 2020, the O’Reilly Fire temporary closed Highway 49 in the City of Angle Camp address community. Based on this assessment, this community has a low wildfire severity score (1 out of 5).
- Butte Fire: In September 2015, the Butte Fire caused closures and evacuations in the Mokelumne Hill, Rail Road Flat, Mountain Road, and San Andreas address communities. Based on this assessment, all of these communities have the highest wildfire severity score (5 out of 5).
- Winter Storms: In 2017 and 2018 winter storms closed Highway 26 and prompted a federal disaster declaration in the county. Based on this assessment, the average risk score for the segments of Highway 26 is high (4 out of 5).
- Evacuation Routes: Interviewees identified Highway 49 and Highway 4 from the City of Angles to Ebbetts Pass as critical for evacuations. Based on this assessment, the segments of both highways have the highest criticality (5 out of 5).
- Angels Camp Vulnerable Roads: Interviewees identified the following roads in City of Angels Camp as vulnerable to natural hazards: Birds Way, Finnegan Lane, Bush Street, Echo Street, and Crystal Street. Based on this assessment, these roads have a moderate criticality (3 out of 3) and risk score (3 out of 3).
- Angels Camp Subdivisions: Interviewees identified the following neighborhoods and subdivisions as vulnerable to hazards due to access limitations: Big Horn Mobile Park, Greenhorn Creek, Stelte Park near Angels Camp, Kiva recreational area, Diamond XX , Circle XX, and Bar XX. Based on this assessment, the Angels Camp and City of Angles Camp communities, which contains these subdivisions, have has the lowest (1 out of 5) and low (2 out of 5) community vulnerability, respectively.
- City of Angel Camp Bridge: Interviewees identified an old two-lane bridge at the southern end of City of Angels Camp as critical to local transit and evacuation. Based on this assessment, assuming this is structure number 30-0019 built in 1909, this bridge has the highest criticality score (5 out of 5) and a high risk score (4 out of 5).
- O’Byrnes Ferry Bridge: Interviewees noted that trucks have hit the road abutments at this bridge, which cause major traffic delays. Based on this assessment, the bridge has the highest criticality (5 out of 5) and high risk (4 out of 5)

In summary, the feedback from the interviews was generally consistent with the results of the assessments. For example, most of the wildfires occurred in areas with moderate or higher wildfire risk,

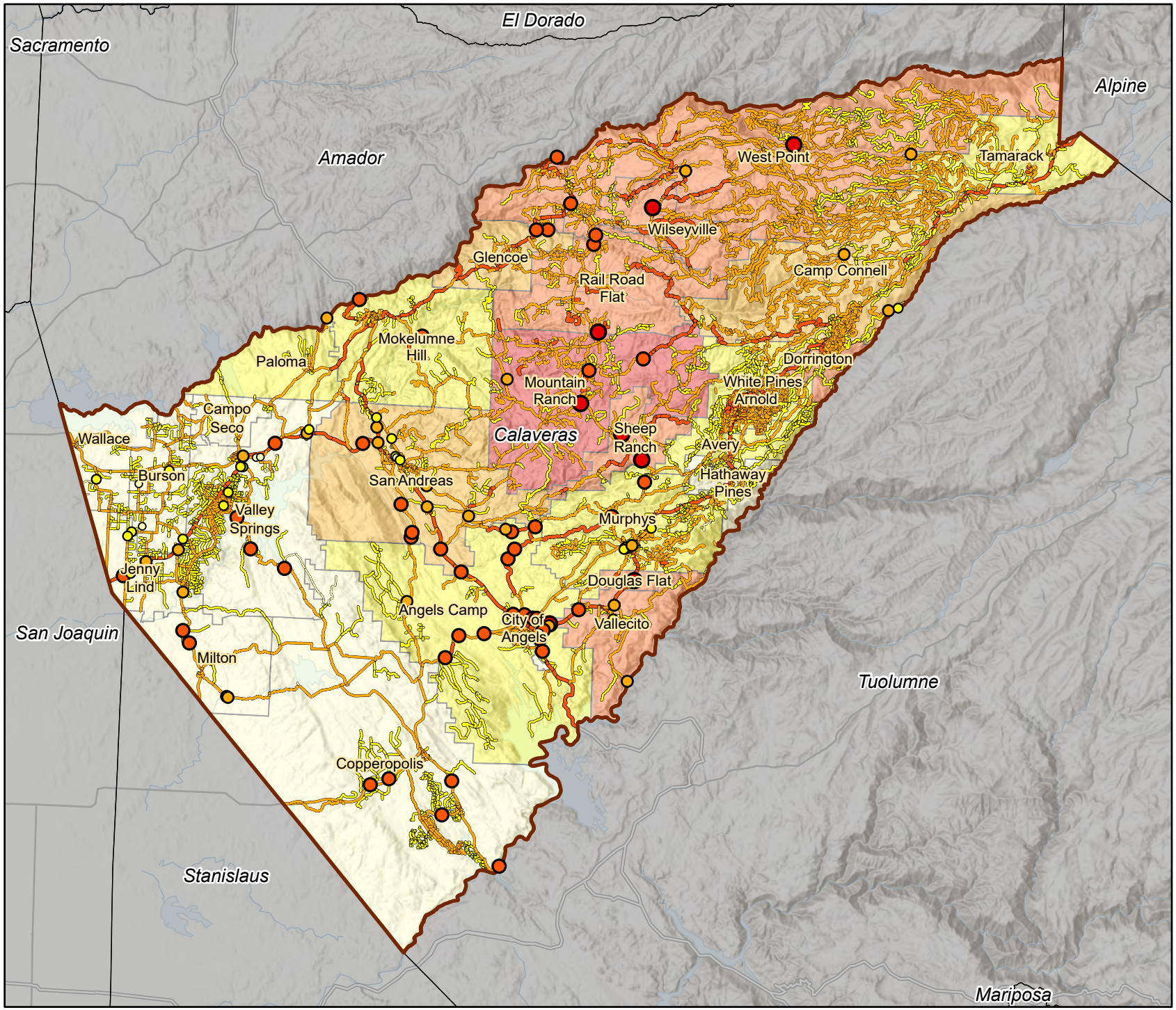
and most of the roads and bridges identified as important for evacuation had the highest criticality. There were, however, important differences, especially at the local level. For example, the small (5 acre) O'Reilly fire occurred in an area with the lowest wildfire severity score. Furthermore, the assessment seemed to underestimate the vulnerability of some local roads and neighborhoods in the Angels Camp region. The assessment might be improved by more explicitly considering neighborhood access (including gated entrances) as well as snow and wind hazards that cause fallen branches and other obstacles.

6 Assessment Summary

The following section summarizes the combined results from the Community and Transportation Asset Assessments. Mountain Ranch received the highest Vulnerability Score of all address communities due to a combination of high exposure to wildfires and landslides and high social vulnerability (Map 13). In Mountain Ranch, there are several high-risk bridges, including structures crossing Rail Road Flat Road, South Jesus Maria Road, and Mountain Ranch Road. Overall, the northern portion of Calaveras County contains a significant cluster of high vulnerability communities and high-risk bridges and roadways.

Specifically, Rail Road Flat, Wilseyville, and West Point received high Vulnerability Scores. These three communities also exhibit high Sensitivity Scores, particularly West Point, which received the highest possible score for social vulnerability. Within these communities, high-risk roads include Baily Ridge Road, Blue Mountain Road, Cooks Camp Road, Dorothy Way, Fay Street, Grinding Rock Court, and Patricia Way. These communities contain several of the County's highest risk bridges, including structures crossing Ridge Road and Jesus Maria Road in Rail Road Flat, Schaad Road in Wilseyville, and Forest Route 07N28 in West Point.

Map 13: Community, Road, and Bridge Risk in Calaveras County



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Community Vulnerability Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

Road Risk Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

Bridge Risk Score

- 1 (Lowest)
- 2
- 3
- 4
- 5 (Highest)

0 8 Miles

N

Author: A. Piazzoni

Last updated on Tuesday, November 15, 2022

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7 Supplemental Files

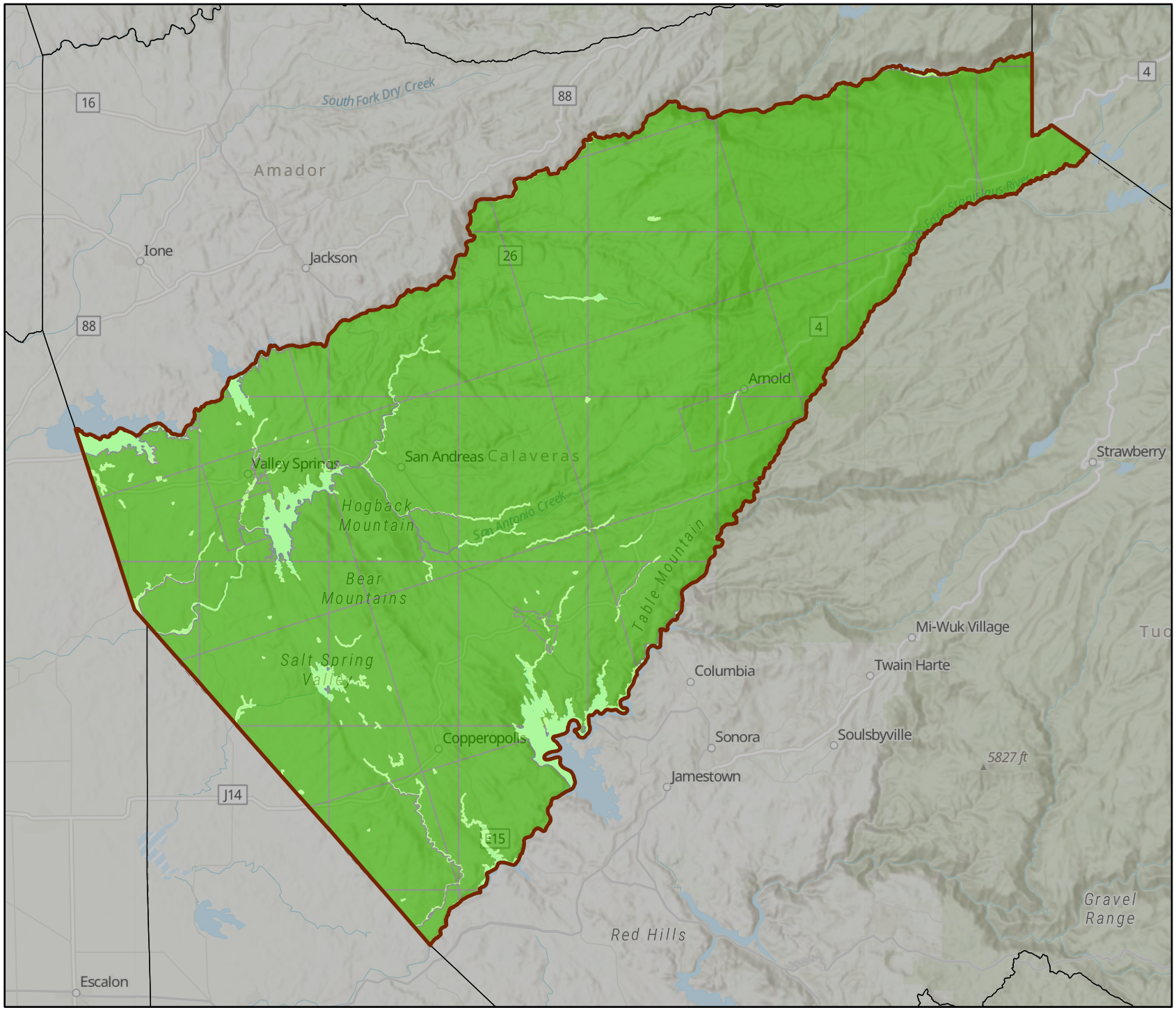
The Community Assessment and Transportation Asset Assessment results can be accessed through supplemental zipped files containing shapefiles for Address Communities, PLSS Sections, and Roads/Bridges.

Appendix A – Maps of Exposure Metrics

This appendix contains maps of the source data for metrics used to score the indictors for exposure, sensitivity, and criticality. Table 4, 5, 7, 8, and 9 contain details on how the data in each map was used in the assessment.

1) Special Hazard Flood Areas
2) Fire Hazard Severity Zones
3) Landslide Susceptibility
4) Mean Temperature from Climate Models (current conditions)
5) Mean Temperature from Climate Models (2070-2099)
6) National Risk Index All Hazards Economic Loss
7) Social Vulnerability Index
8) Disadvantaged Status
9) Road Surface
10) Road Pavement Condition Index
11) Road AADT
12) Road Type
13) Bridge Age
14) Bridge Structural Condition
15) Bridge Scour Rating NBI Score
16) Bridge Detour Distance NBI Score

Map 1: Special Hazard Flood Areas



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

FEMA Flood Zones

- A
- X

N

0 6 Miles

1:565,000

Author: A. Piazzoni
Last updated on Tuesday, November 1, 2022

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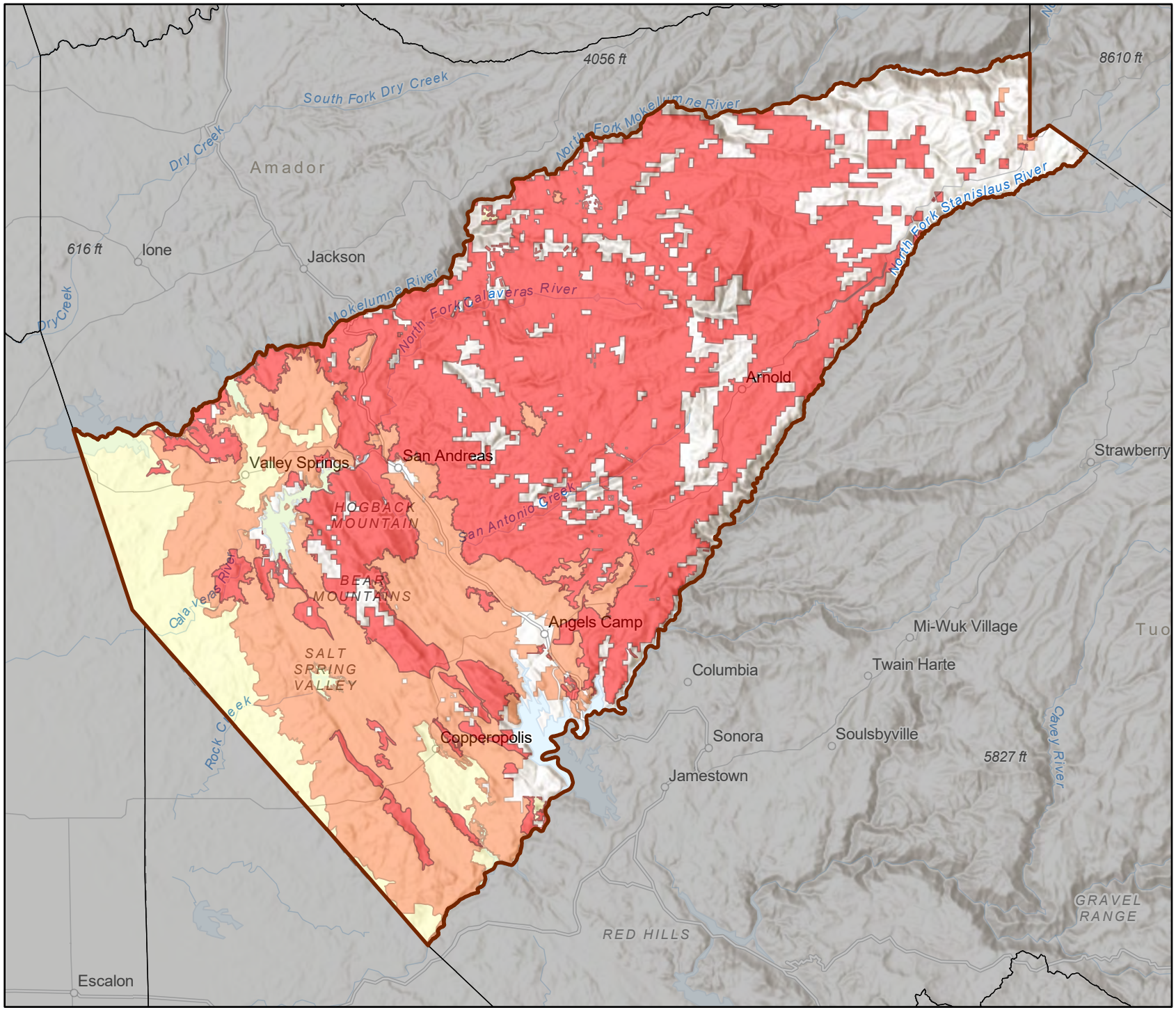
Map 2: Fire Hazard Severity Zones



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Fire Hazard Severity Zones

- Moderate
- High
- Very High

N

0 6 Miles

1:565,000

Author: A. Piazzoni
Last updated on Wednesday, November 2, 2022

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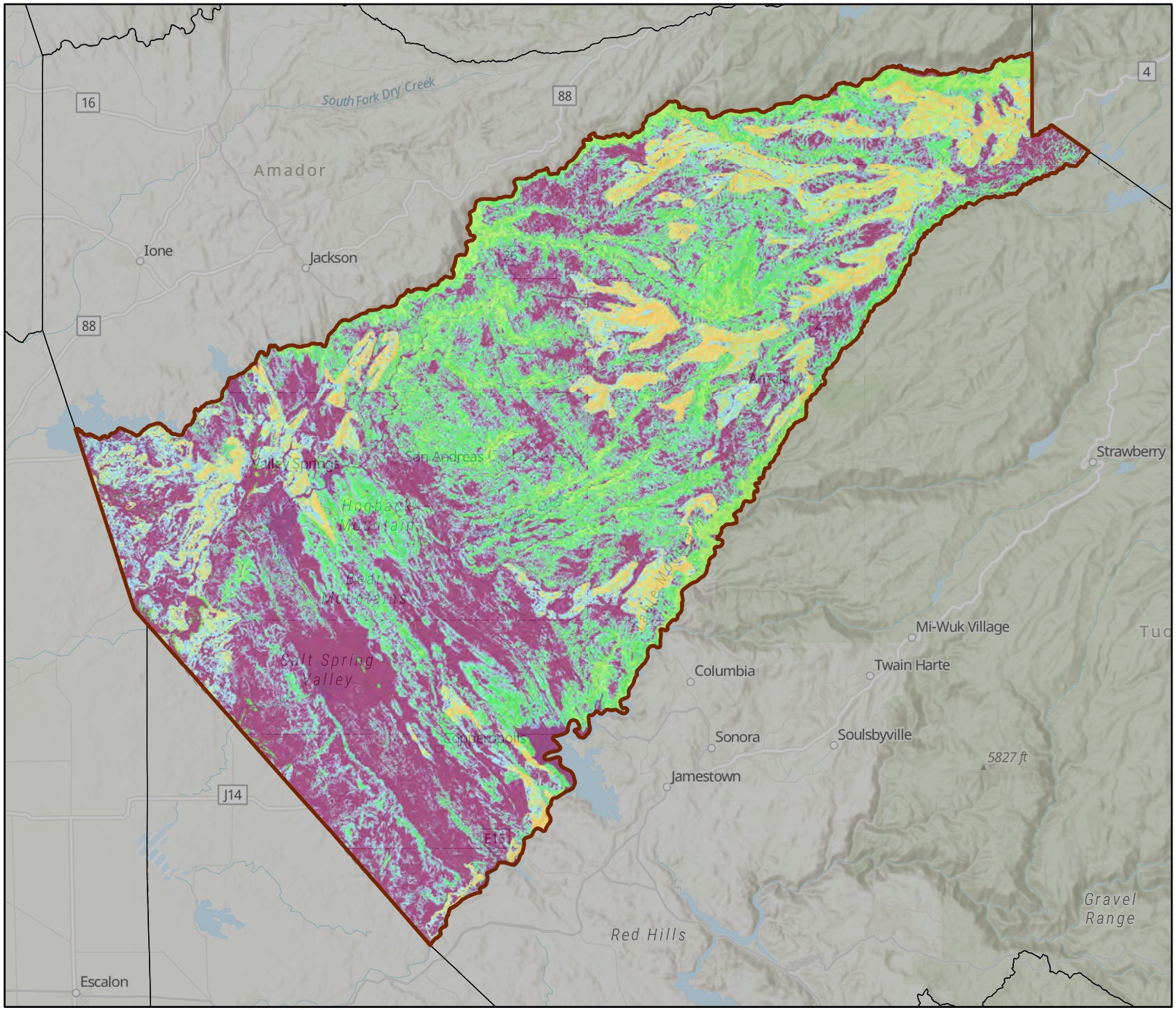
Map 3: Landslide Susceptibility



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

USGS Landslide Susceptibility

- 0 (Low)
- 3
- 5
- 6
- 7
- 8
- 9
- 10 (High)

N

0 6 Miles

1:565,000

Author: A. Piazzoni

Last updated on Monday, November 7, 2022

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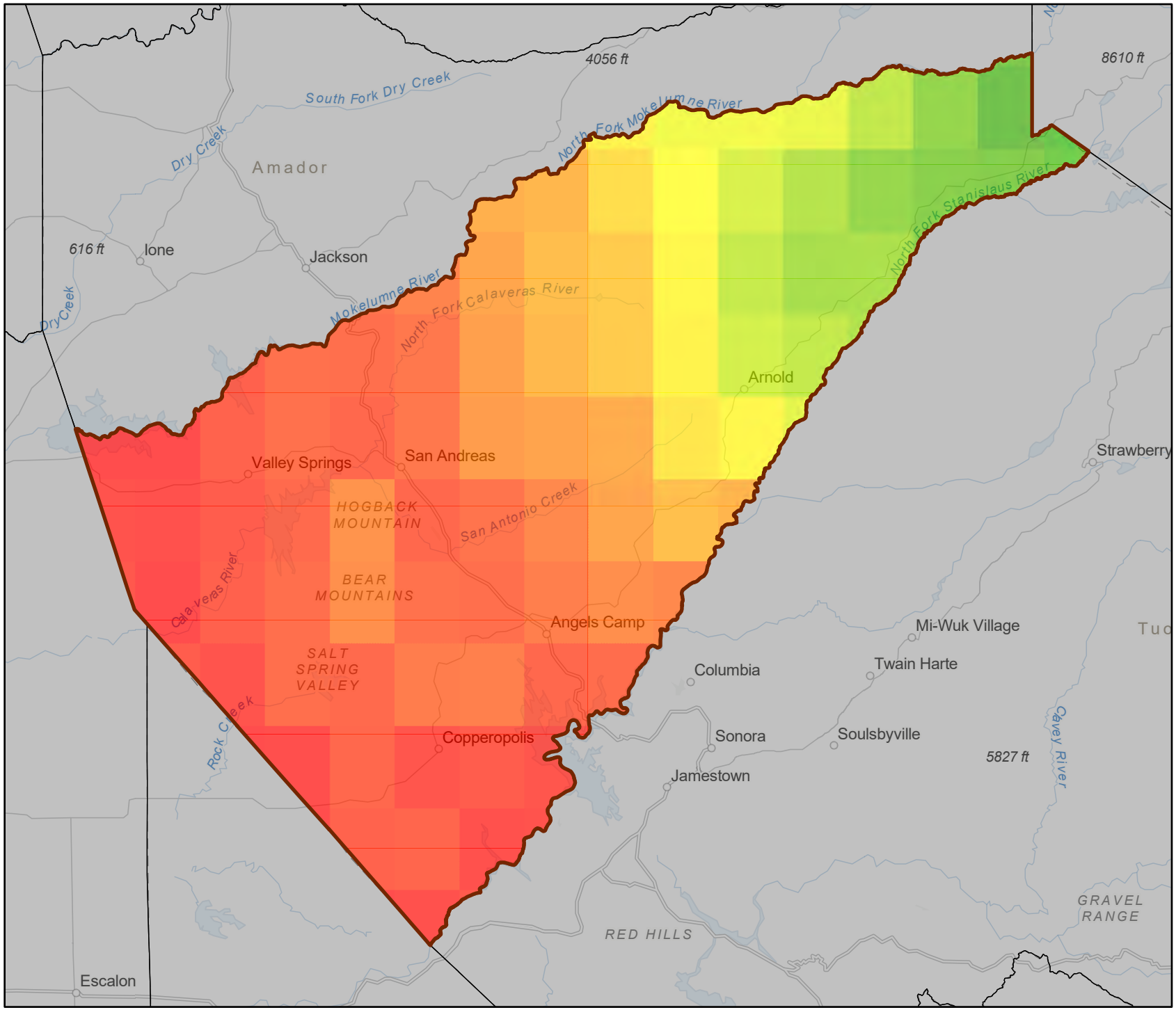
Map 4: Temperature Change Baseline



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

Calaveras County

Mean Temp (°C)

23.9768

12.3153

N

0 6 Miles

1:565,000

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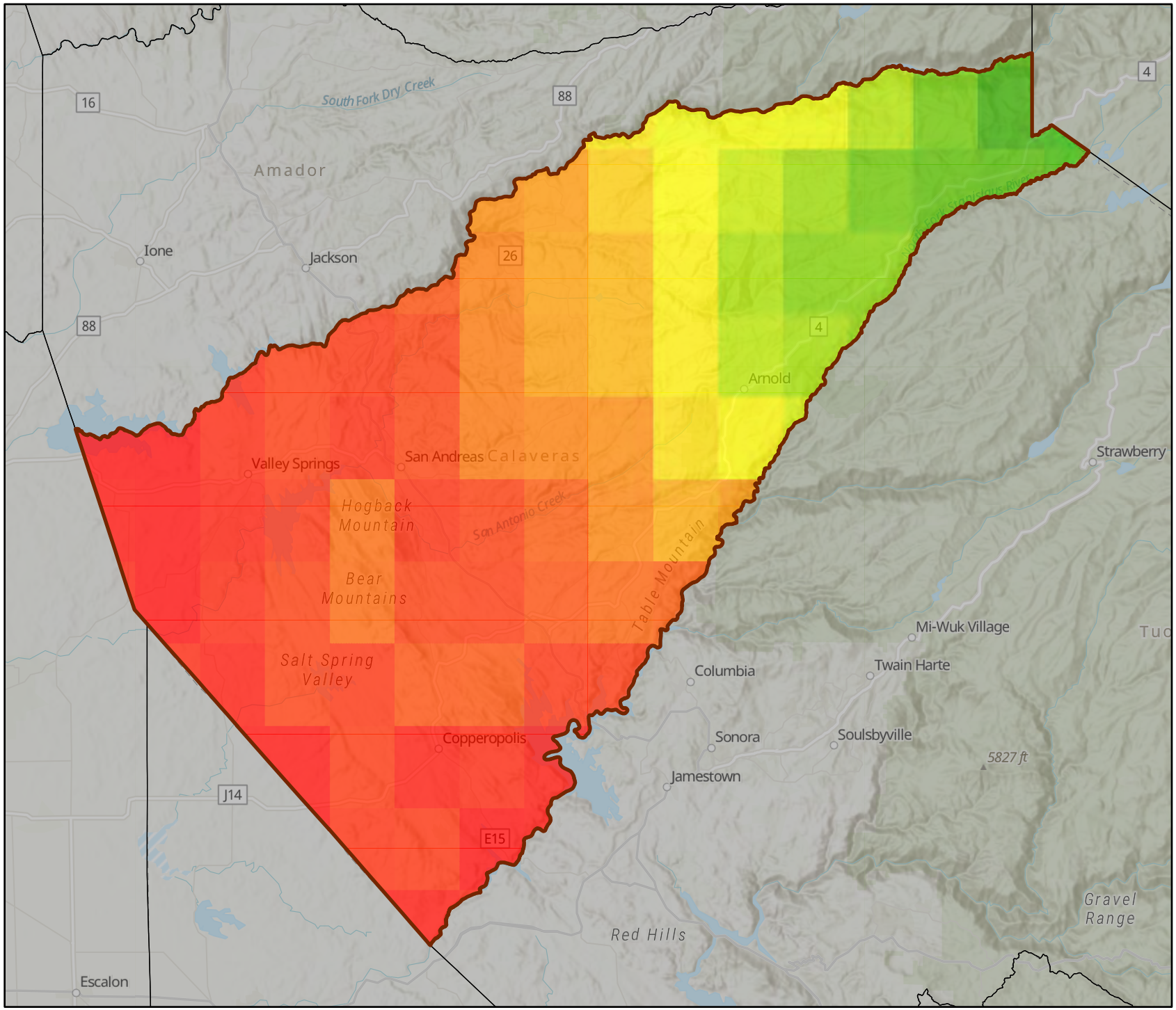
Map 5: Temperature Change (2070-2099)



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

Calaveras County

Projected Mean Temp 2070-2099 (°C)

28.9133

17.6891

N

0 6 Miles

1:565,000

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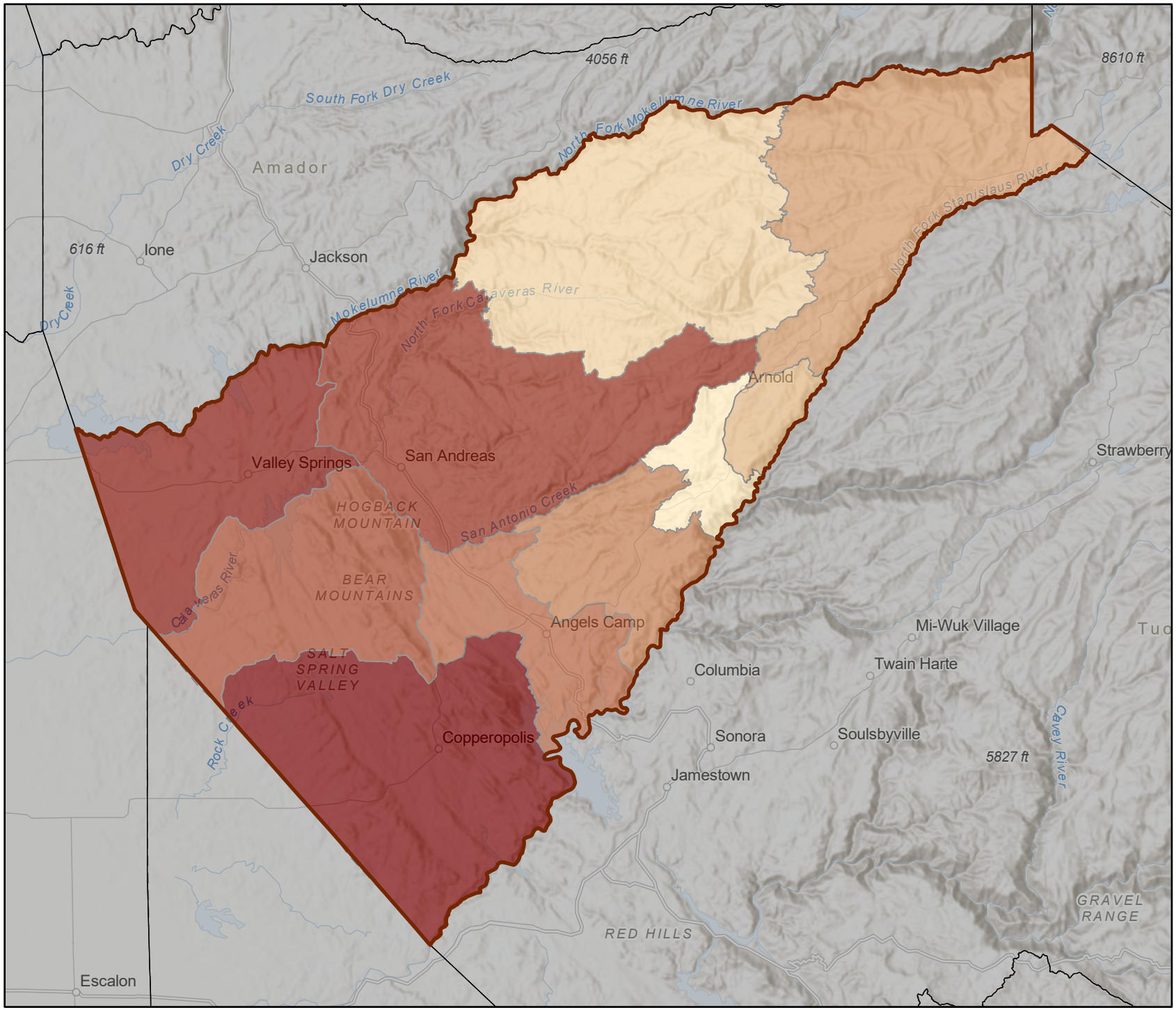
Map 6: National Risk Index All Hazards Economic Loss



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Expected Annual Loss Score

- 22.629491 (Relatively Moderate)
- 24.947746
- 26.601183
- 27.269899
- 27.397890
- 29.57454
- 38.728631
- 39.517782
- 42.562778
- 46.555140 (Very High)

N

0 6 Miles

1:565,000

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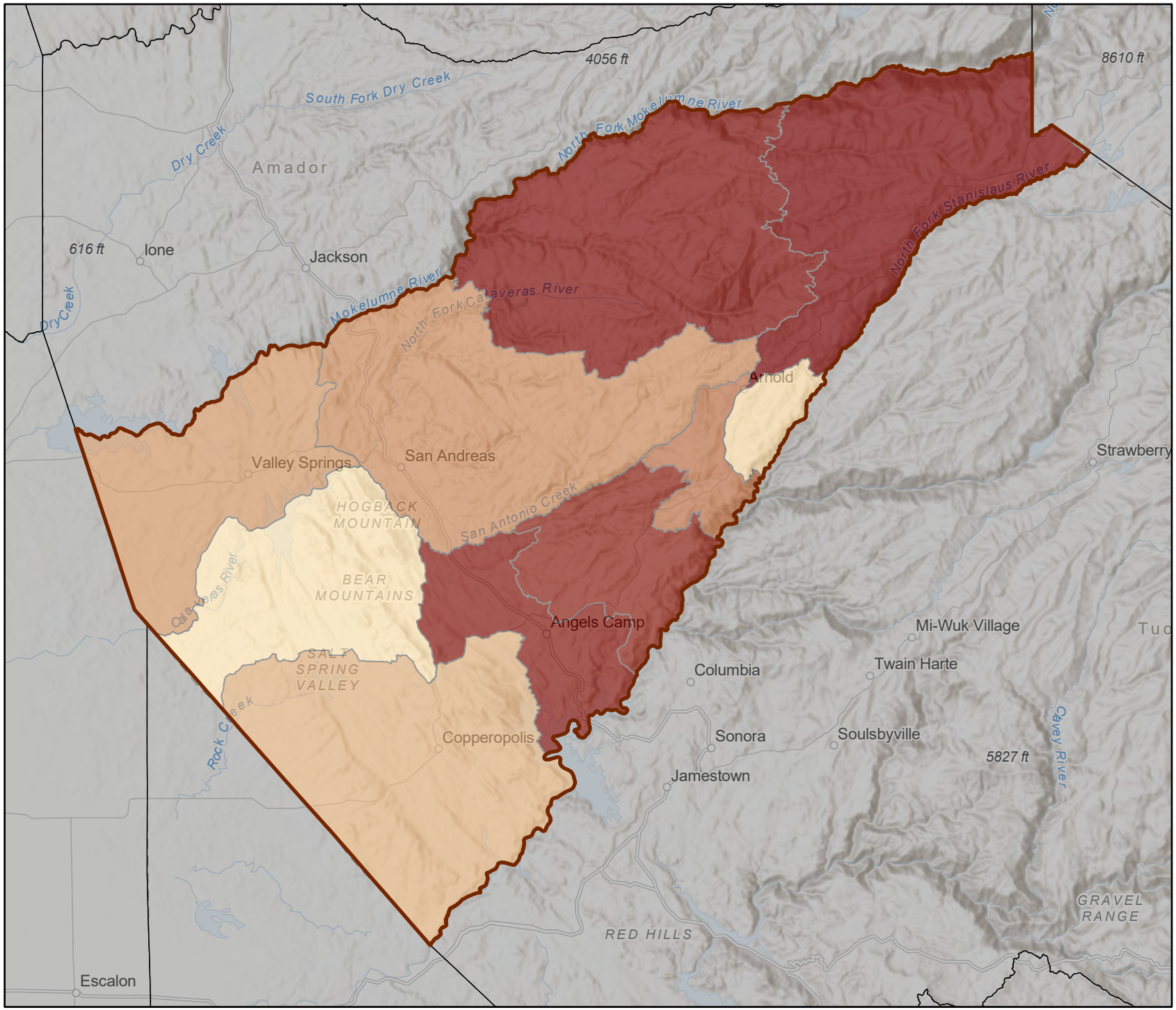
Map 7: Social Vulnerability Index



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Social Vulnerability Risk Score

- 29.945788 (Relatively Low)
- 30.214446
- 30.764556
- 31.565733
- 31.744838
- 33.700606
- 35.849871
- 36.270449
- 36.283242
- 38.039115 (Relatively High)

N

0 6 Miles

1:565,000

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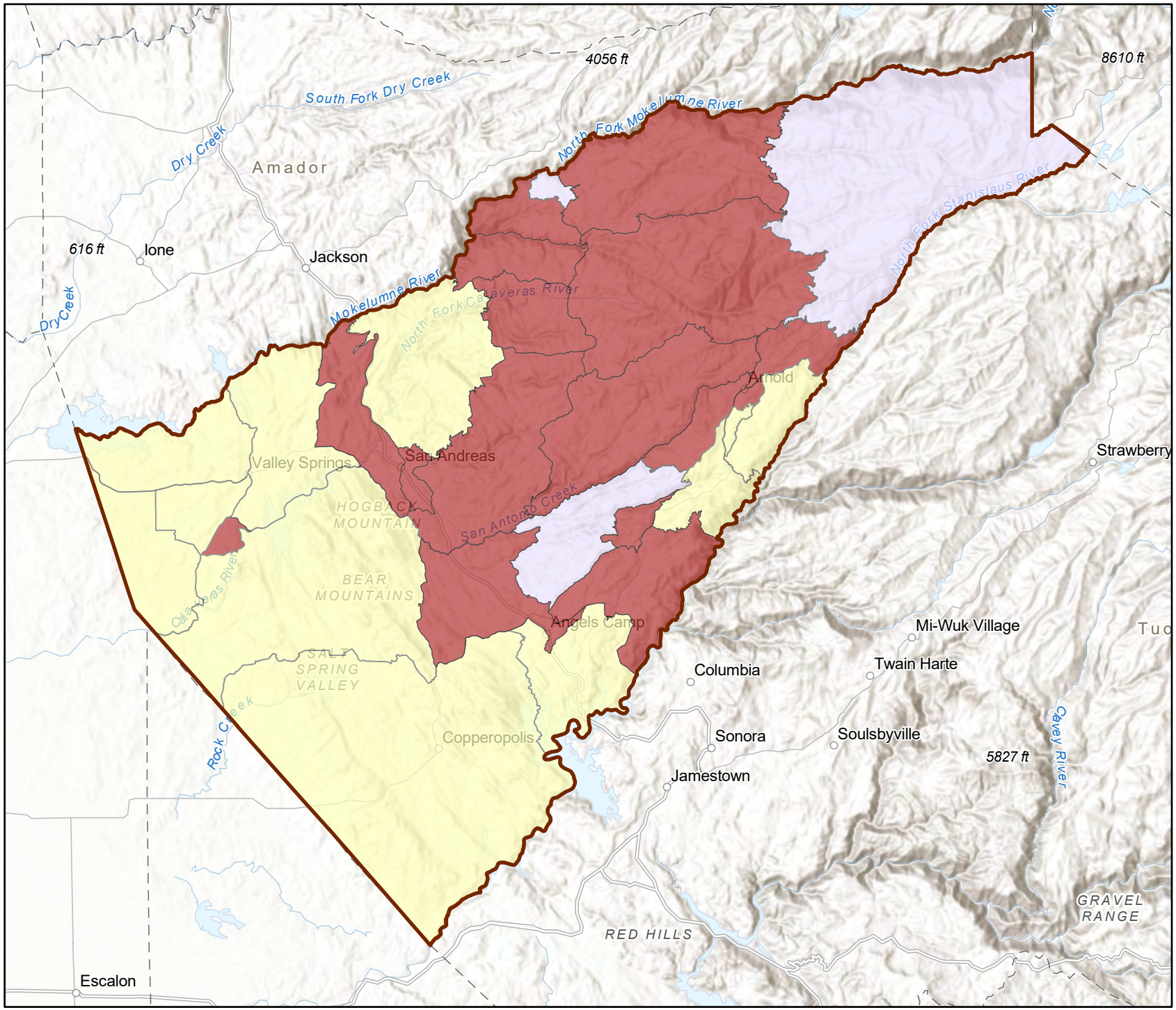
Path: U:\50149324 - Calaveras Co Evac & Access Pln - CCOG\400 Project Design Files\460 Environmental\Figures\GIS\MXD\CalCOG_AppendixA\CalCOG_AppendixA.aprx

Map 8: Disadvantaged Community Areas



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Disadvantaged Communities

- Data Not Available
- No
- Yes

N

0 6 Miles

1:565,000

Author: A. Piazzoni
Last updated on Wednesday, November 2, 2022

Dewberry

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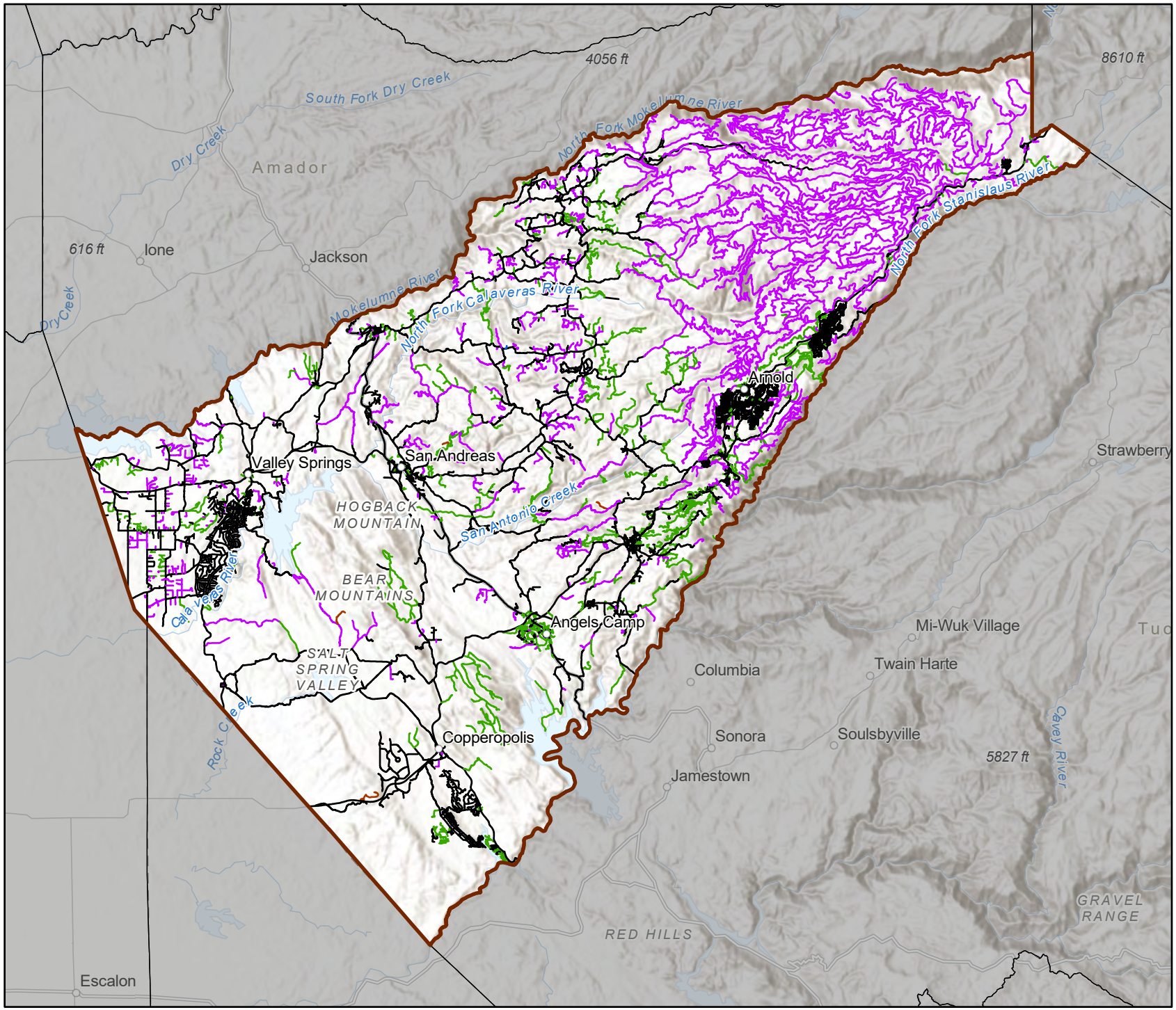
Map 9: Road Surface



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Road Surface Type

- Dirt
- Nonpaved
- Paved
- Unpaved
- Unknown

N

0 6 Miles

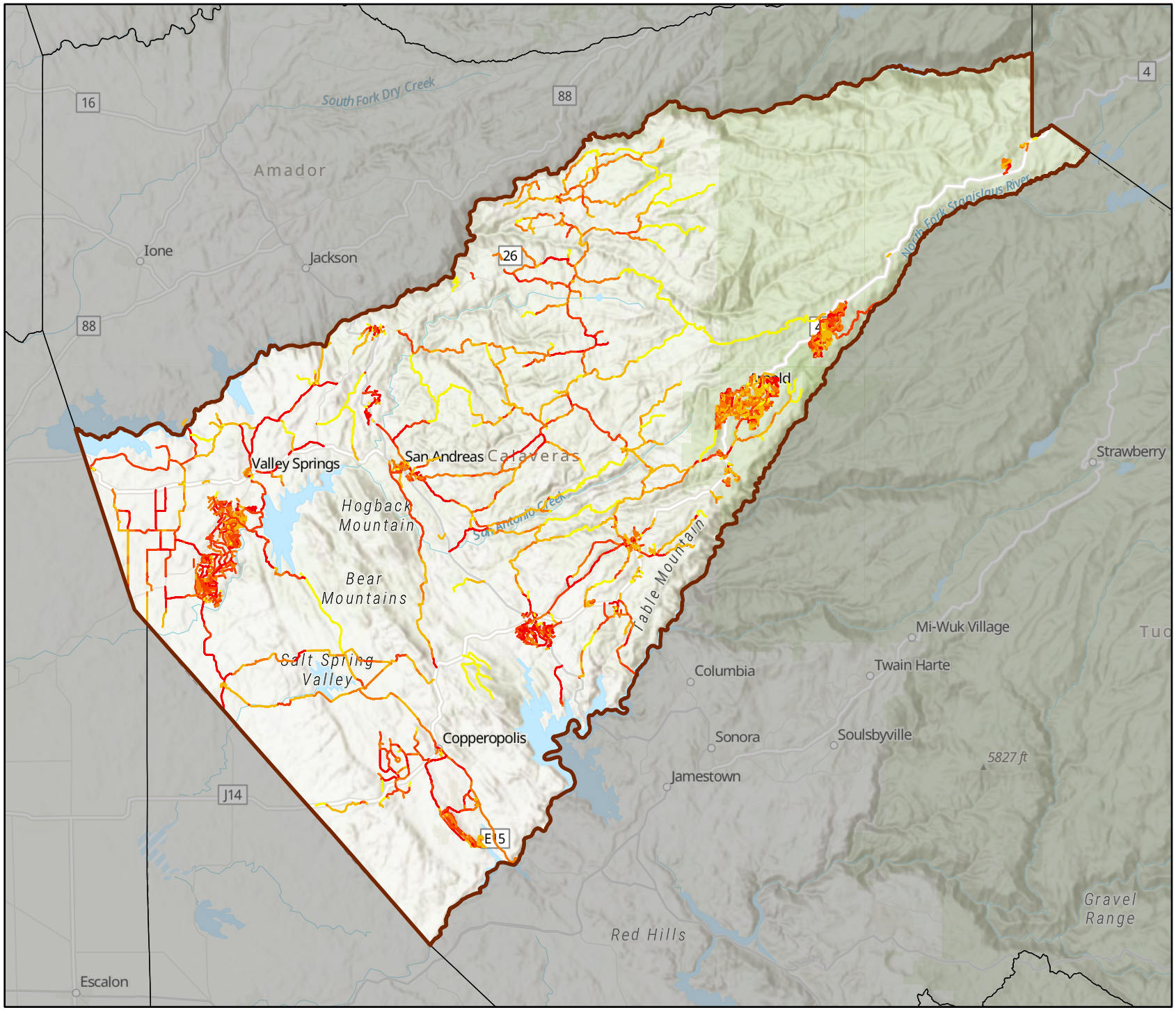
1:565,000

Author: A. Piazzoni
Last updated on Wednesday, November 2, 2022

Dewberry

Path: U:\50149324 - Calaveras Co Evac & Access Pln - CCOG\400 Project Design Files\460 Environmental\Figures\GIS\MXD\CalCOG_AppendixA\CalCOG_AppendixA.aprx

Map 10: Pavement Condition Index



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Pavement Condition Index

- 0 - 15
- 16 - 36
- 37 - 54
- 55 - 73
- 74 - 100

N

0 6 Miles

1:565,000

Author: A. Piazzoni
Last updated on Wednesday, November 2, 2022

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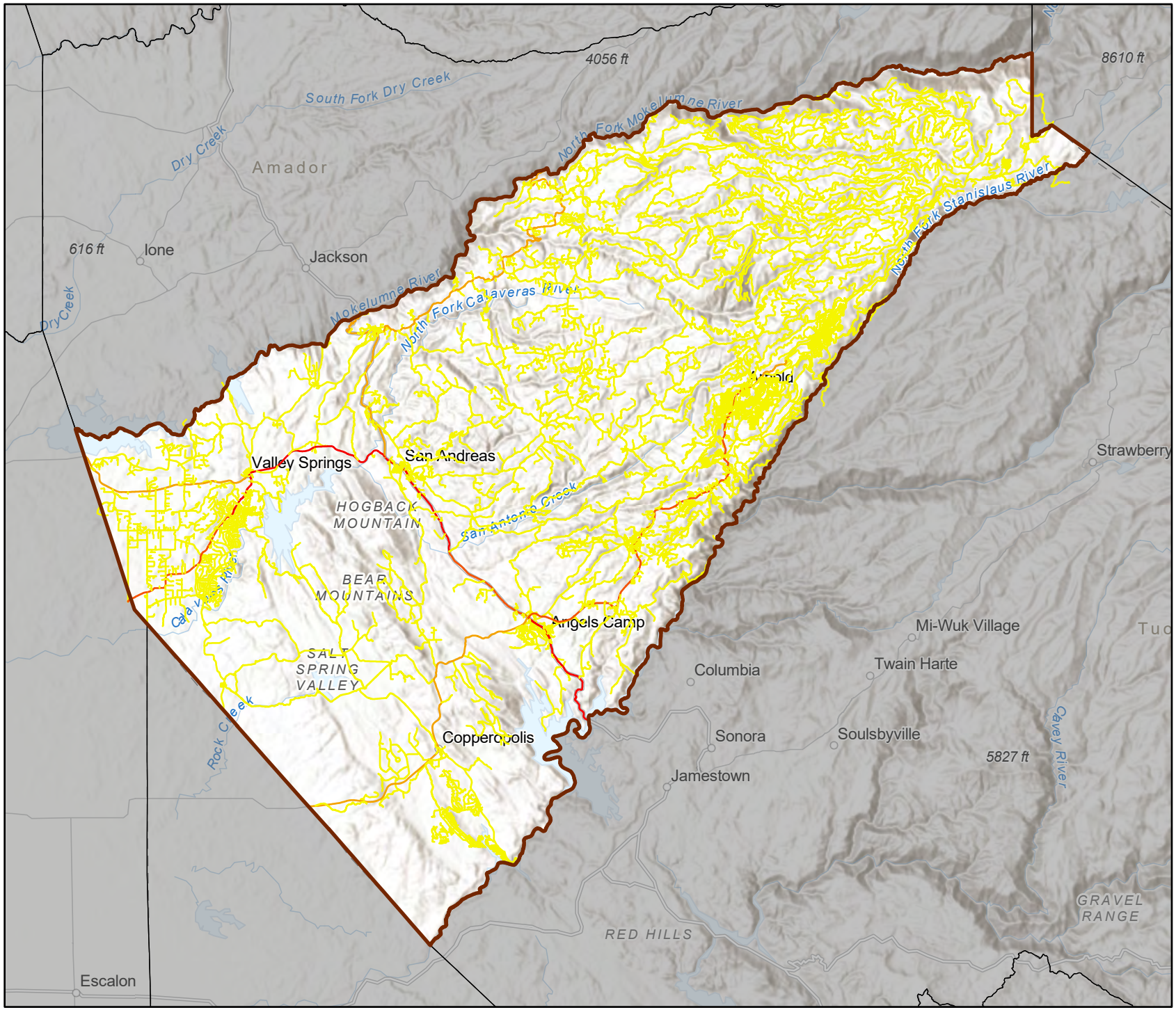
Map 11: Road Average Annual Daily Traffic



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Road AADT

- <11,500
- <8,500
- <6,700
- Unknown

0 6 Miles

N

1:565,000

Author: A. Piazzoni
Last updated on Thursday, November 3, 2022

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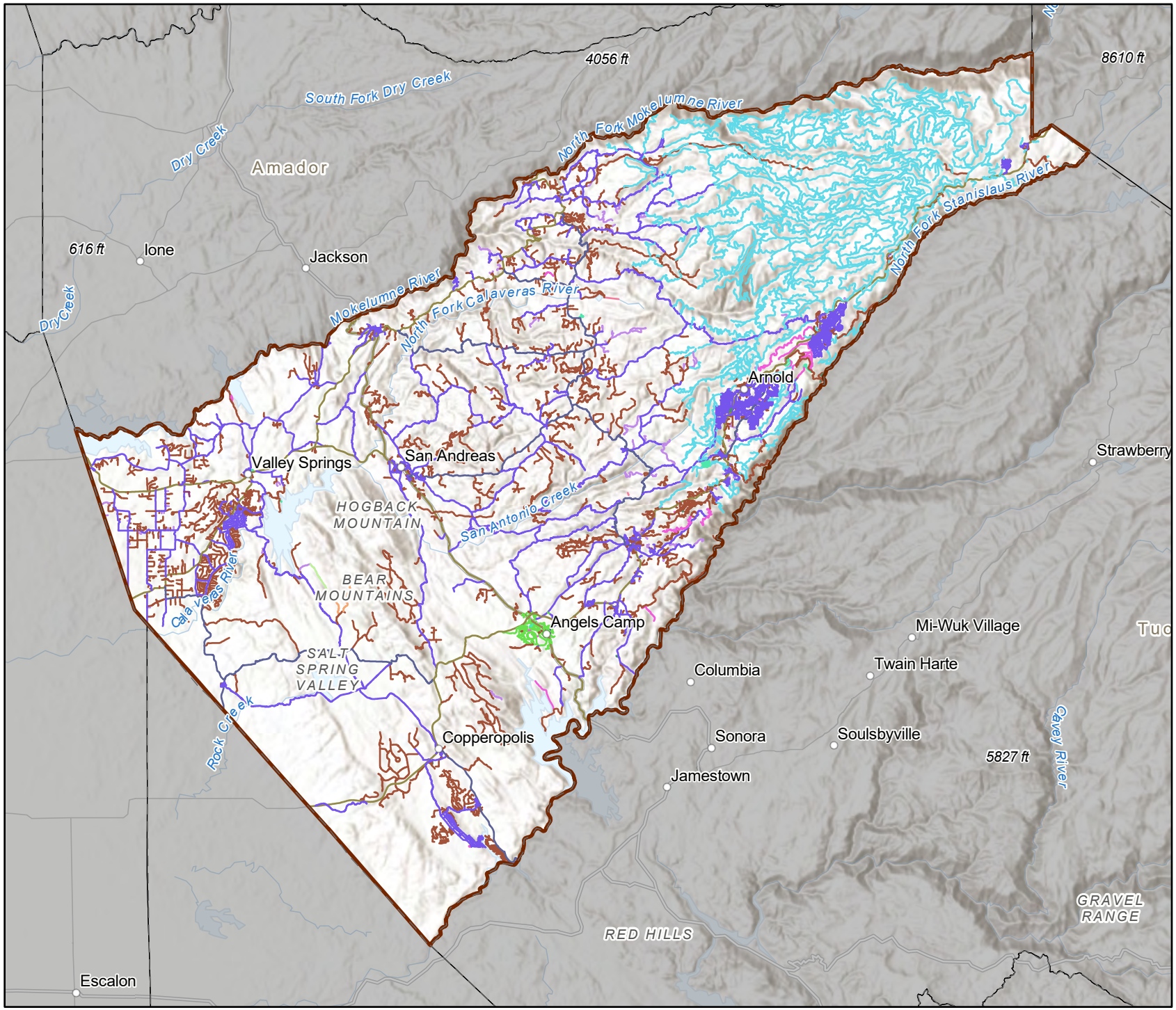
Map 12: Road Type



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Road Type

- Airstrip
- City of Angels
- County
- Forest
- Highway
- Main
- Nonpublic
- NP
- Other
- Parking
- PD
- Private Drive
- Rural
- Trailer Park

N

0 6 Miles

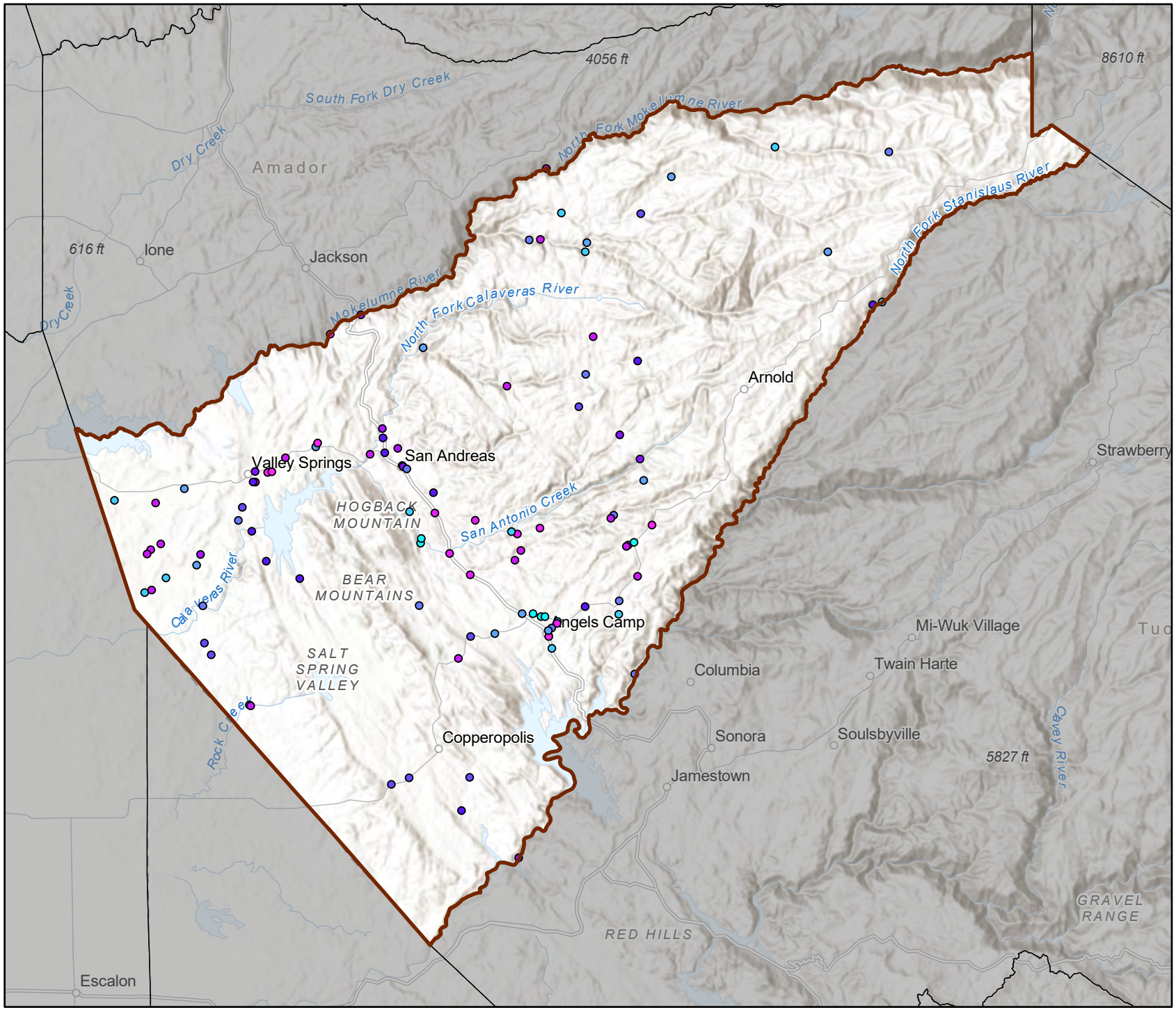
1:565,000

Author: A. Piazzoni
Last updated on Wednesday, November 2, 2022

Dewberry

Path: U:\50149324 - Calaveras Co Evac & Access Pln - CCOG\400 Project Design Files\460 Environmental\Figures\GIS\MXD\CalCOG_AppendixA\CalCOG_AppendixA.aprx

Map 13: Bridge Age NBI



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Bridge Age (Years)

- 13-17
- 18-25
- 19-36
- 37-47
- 48-55
- 56-63
- 64-69
- 70-74
- 75-87
- 88-94
- 95-113

N

0 6 Miles

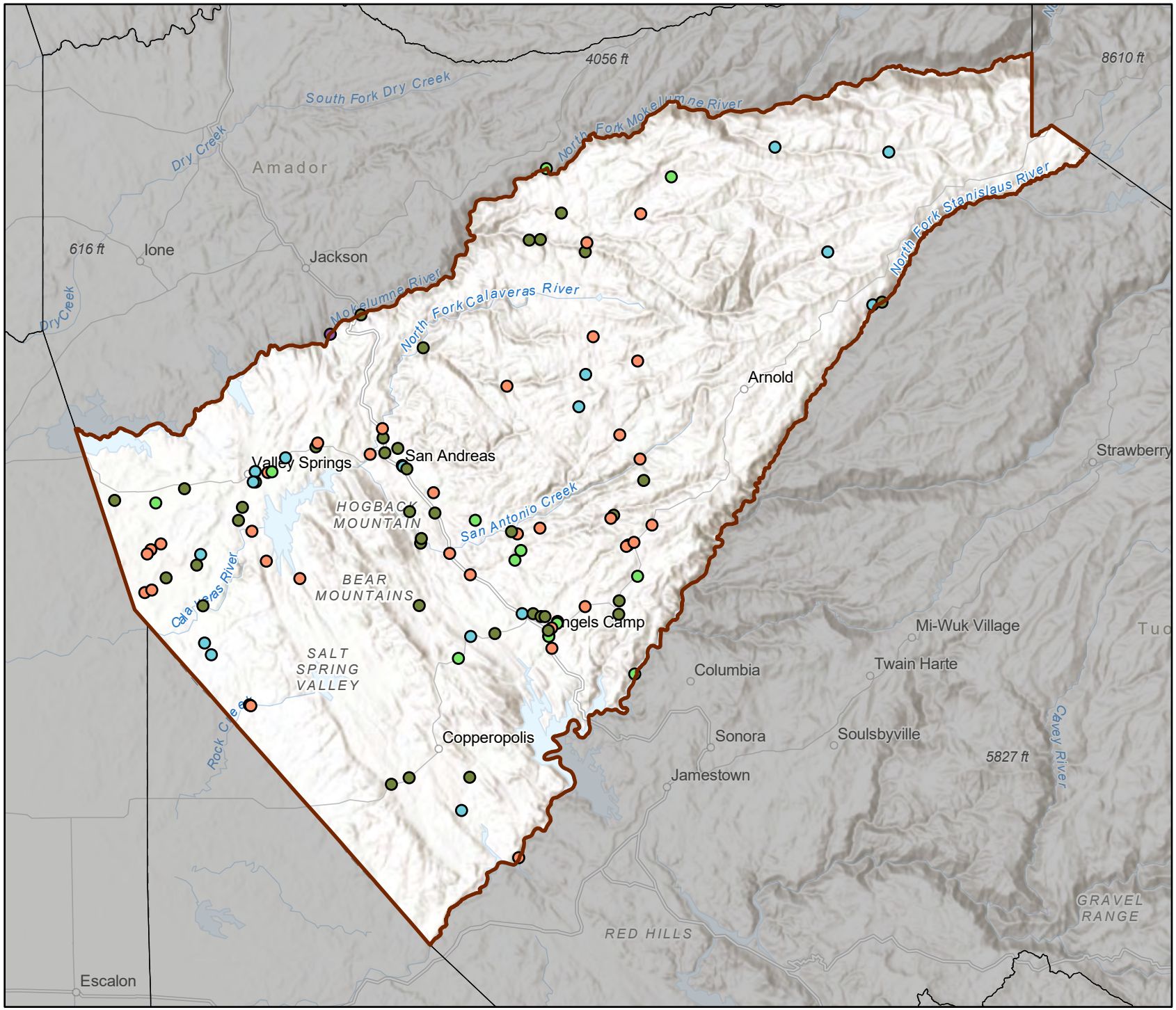
1:565,000

Author: A. Piazzoni
Last updated on Wednesday, November 2, 2022

Dewberry

Path: U:\50149324 - Calaveras Co Evac & Access Pln - CCOG\400 Project Design Files\460 Environmental\Figures\GIS\MXD\CalCOG_AppendixA\CalCOG_AppendixA.aprx

Map 14: Bridge Structural Condition



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Bridge Structure Score

- 3 (Poor)
- 4
- 5 (Fair)
- 6
- 7 (Good)

N

0 6 Miles

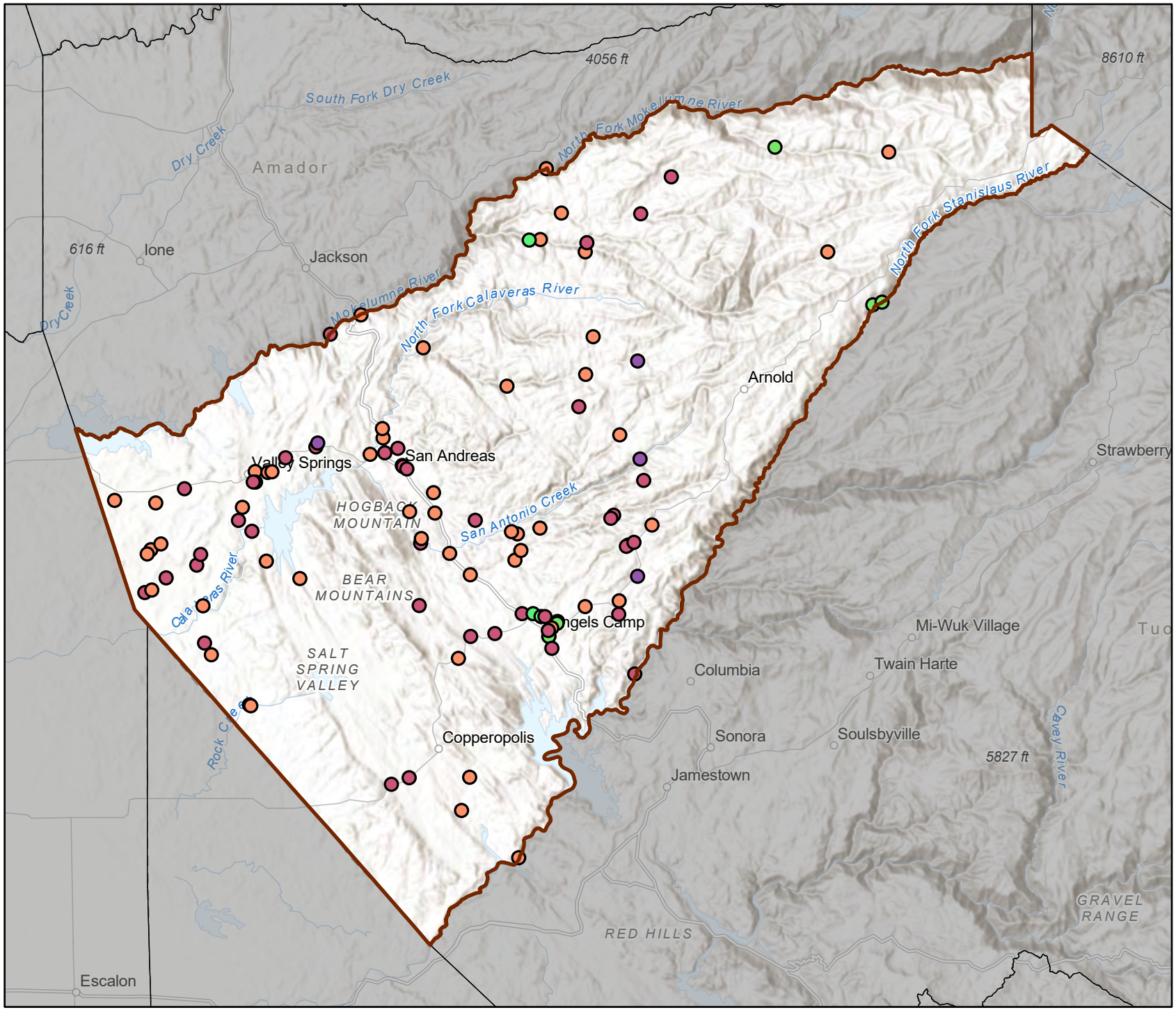
1:565,000

Author: A. Piazzoni
Last updated on Thursday, November 3, 2022

Dewberry

Path: U:\50149324 - Calaveras Co Evac & Access Pln - CCOG\400 Project Design Files\460 Environmental\Figures\GIS\MXD\CalCOG_AppendixA\CalCOG_AppendixA.aprx

Map 15: Bridge Scour Rating NBI Score



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Bridge Scour Rating

- 3 (Critical)
- 4
- 5 (Fair)
- 8
- 9 (Good)

N

0 6 Miles

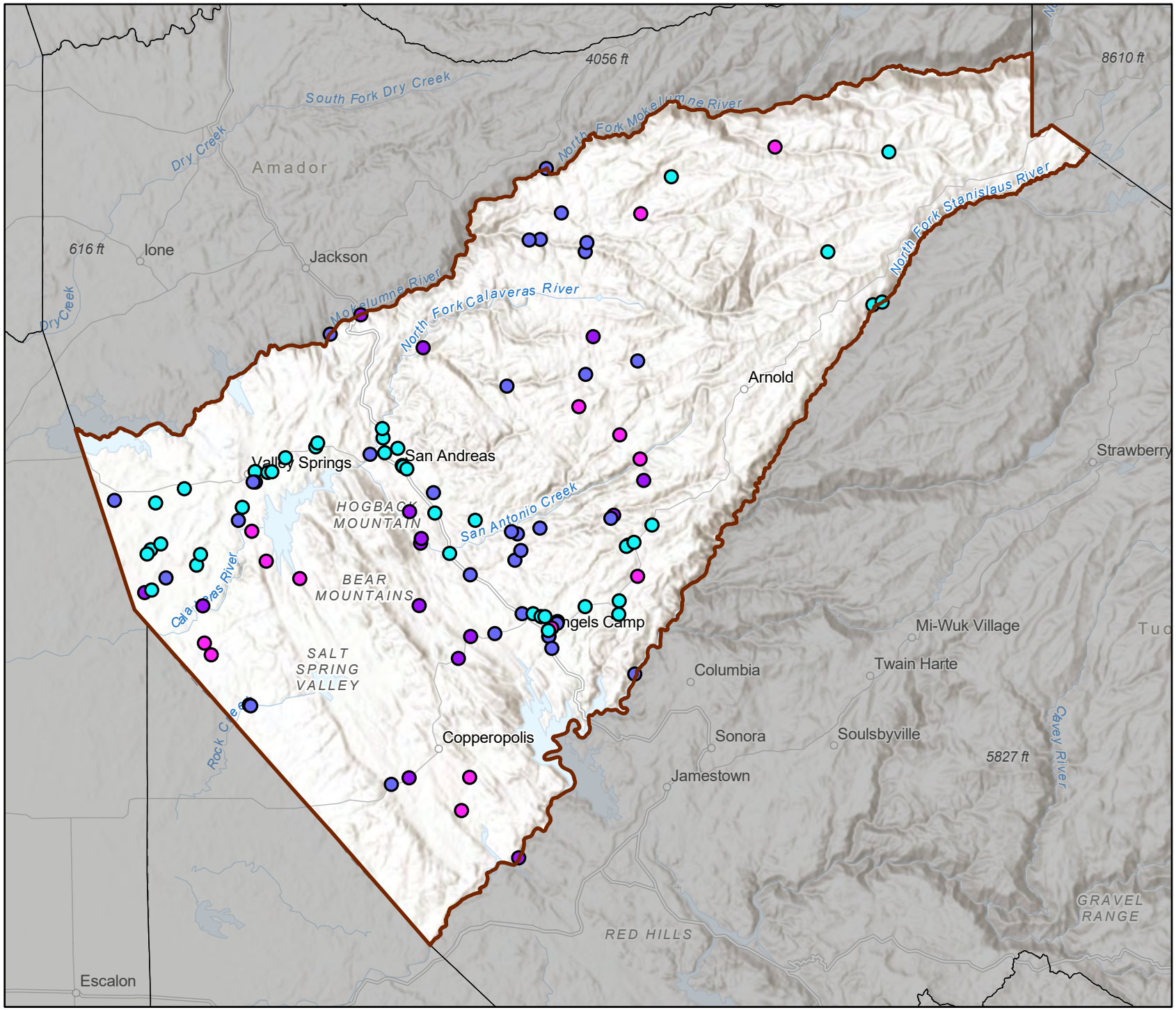
1:565,000

Author: A. Piazzoni
Last updated on Thursday, November 3, 2022

Dewberry

Path: U:\50149324 - Calaveras Co Evac & Access Pln - CCOG\400 Project Design Files\460 Environmental\Figures\GIS\MXD\CalCOG_AppendixA\CalCOG_AppendixA.aprx

Map 16: Bridge Detour Distance NBI



Calaveras COG Hazard Risk and Vulnerability Assessment

Legend

- Calaveras County

Detour Distance (km)

- 0-11
- 12-30
- 31-66
- 67-99

N

0 6 Miles

1:565,000

Author: A. Piazzoni
Last updated on Thursday, November 3, 2022

Dewberry

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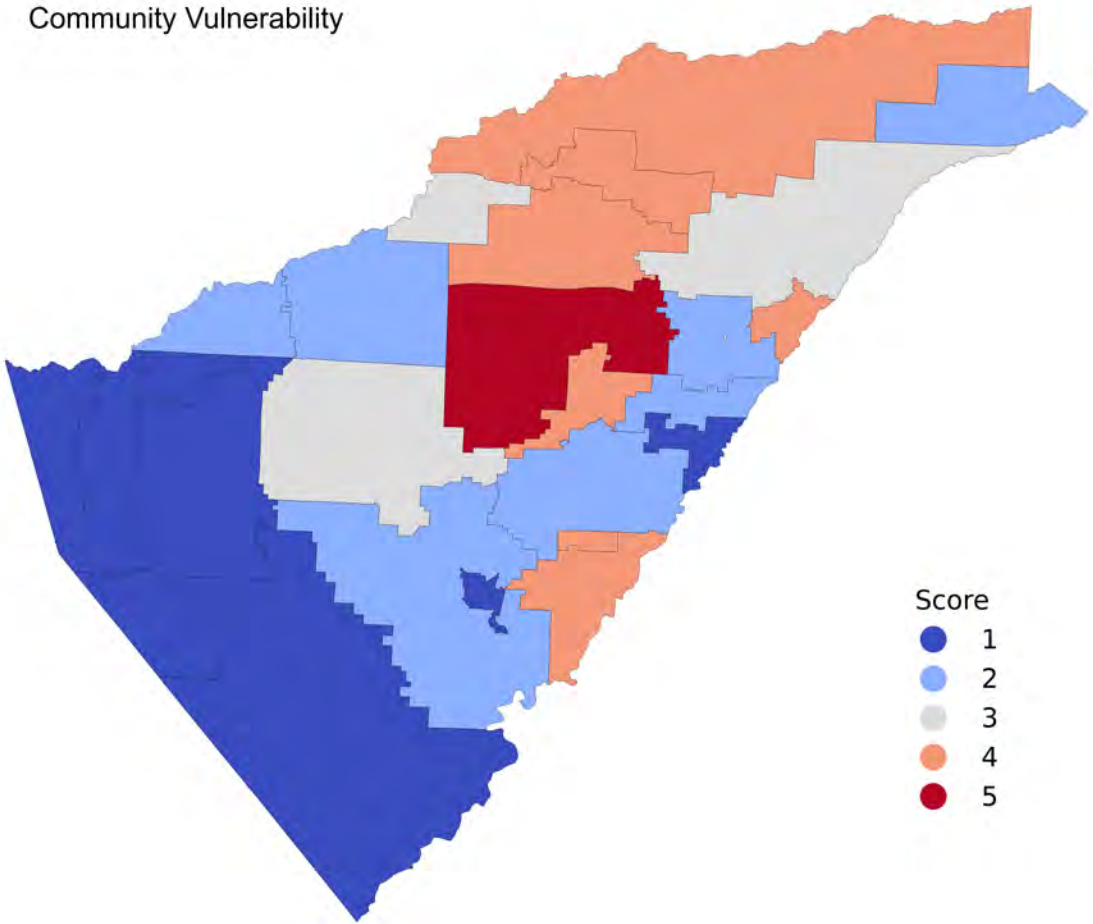
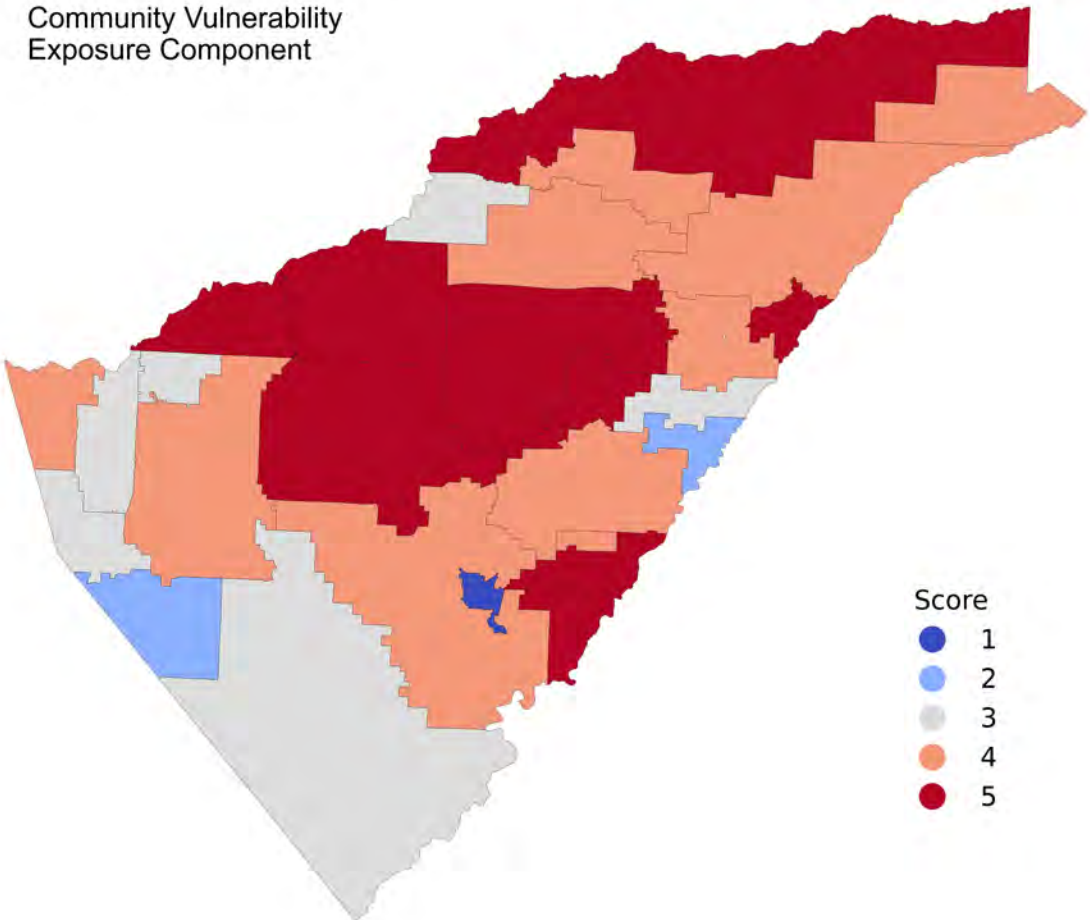
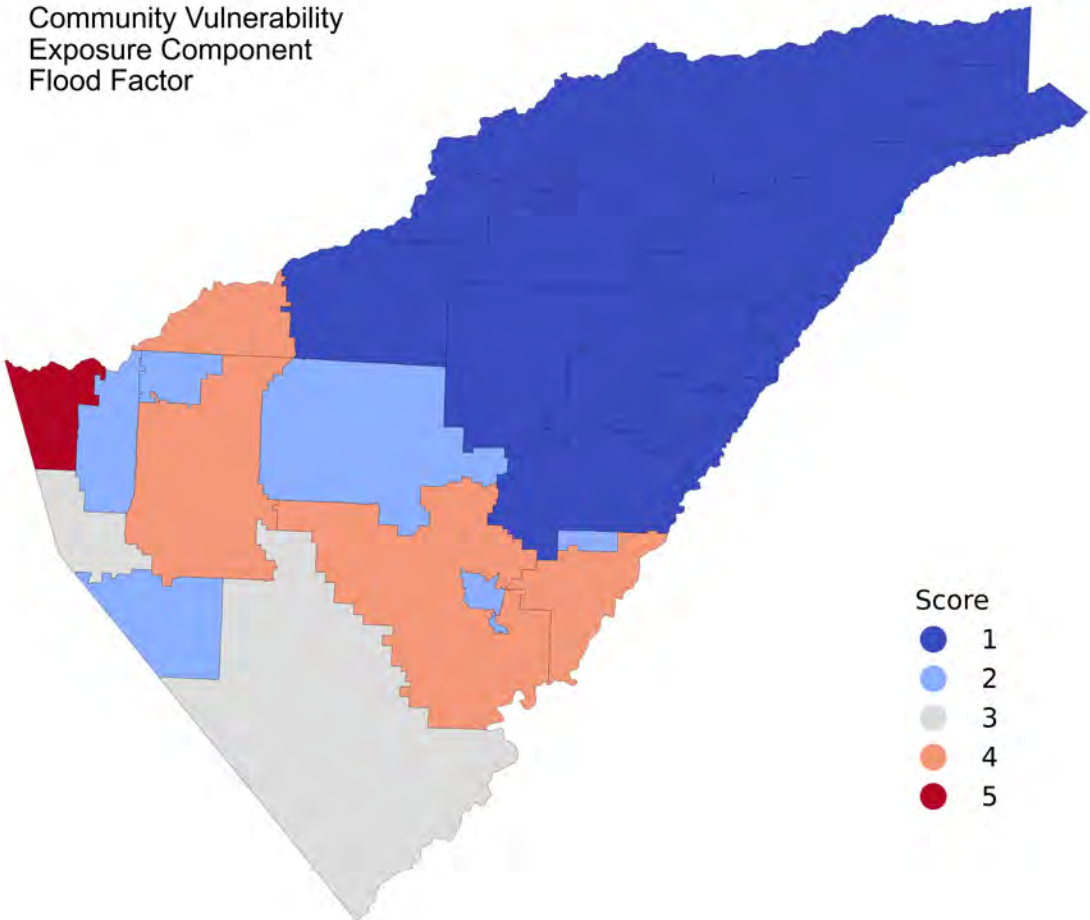
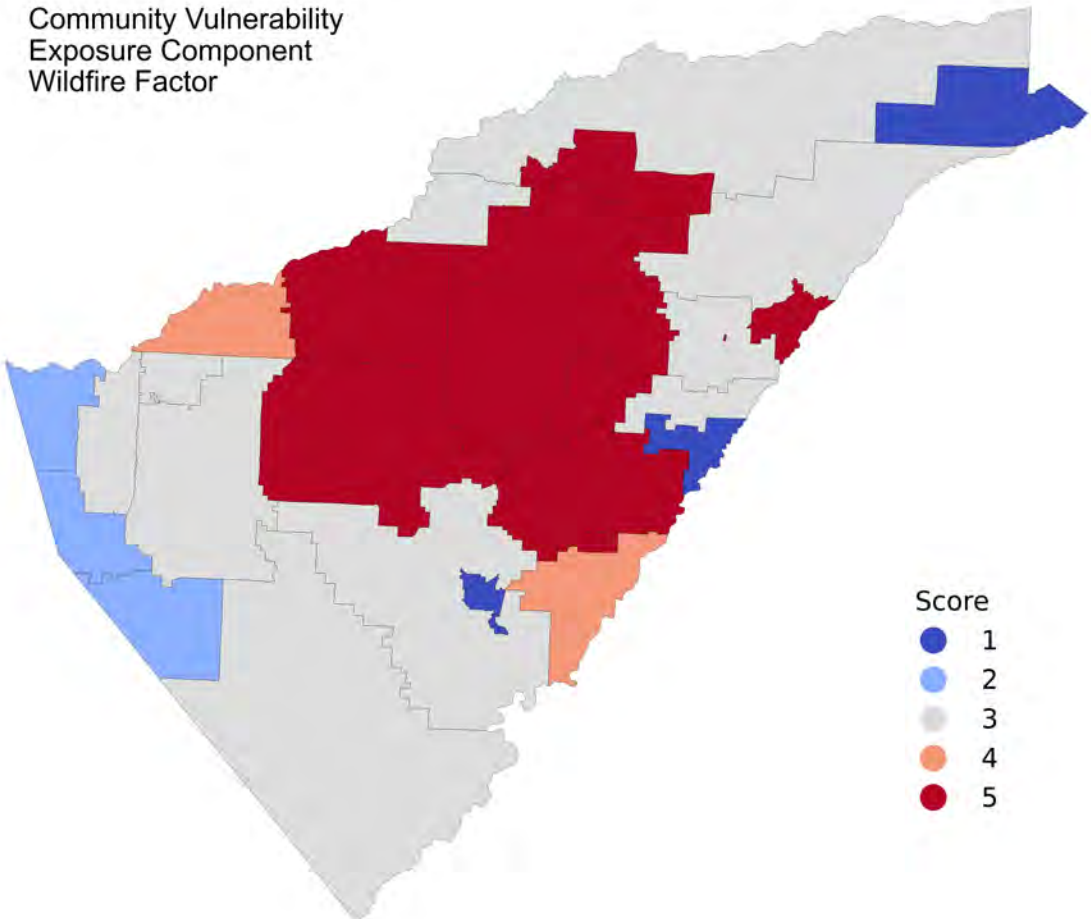
Appendix B – Maps of Assessment Scores

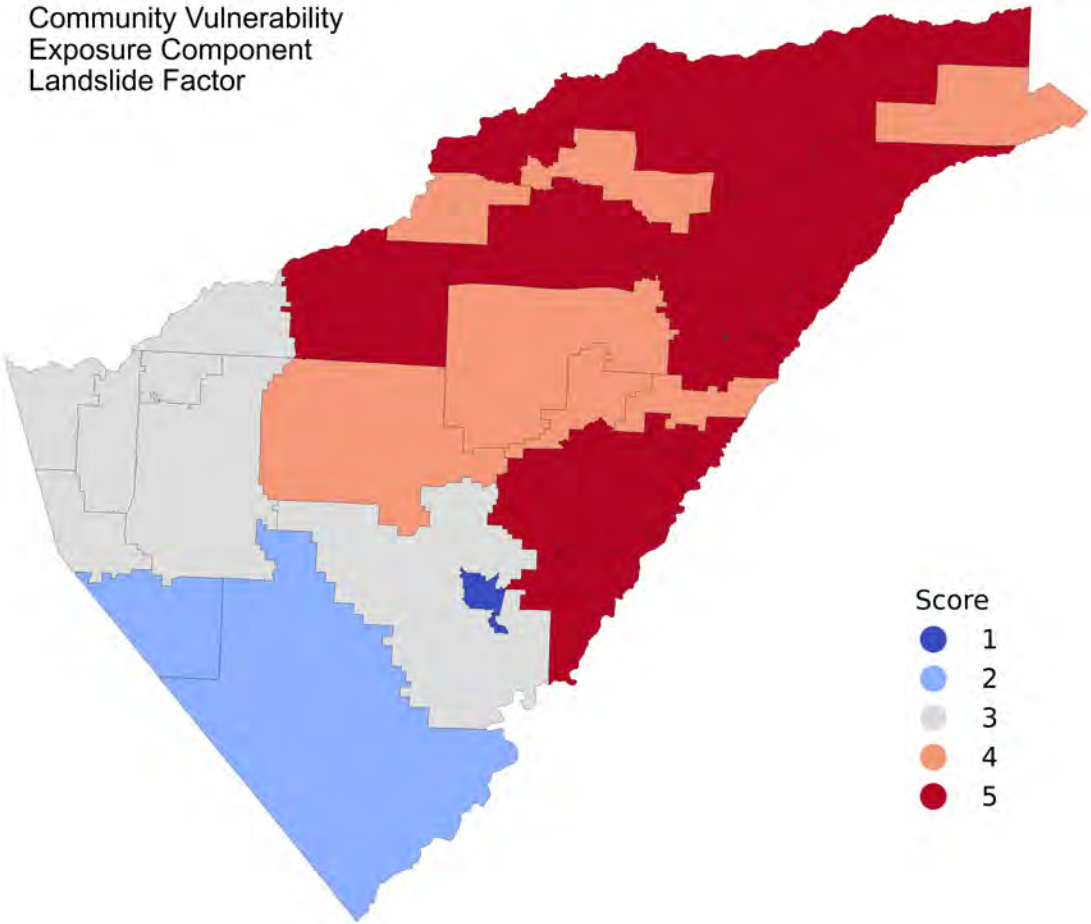
This appendix contains maps of the assessment scores on a scale of 1 (lowest) to 5 (highest) for communities, roads, and bridges. A map is shown for each indicator and (as applicable) exposure, sensitivity, vulnerability, criticality, and overall risk.

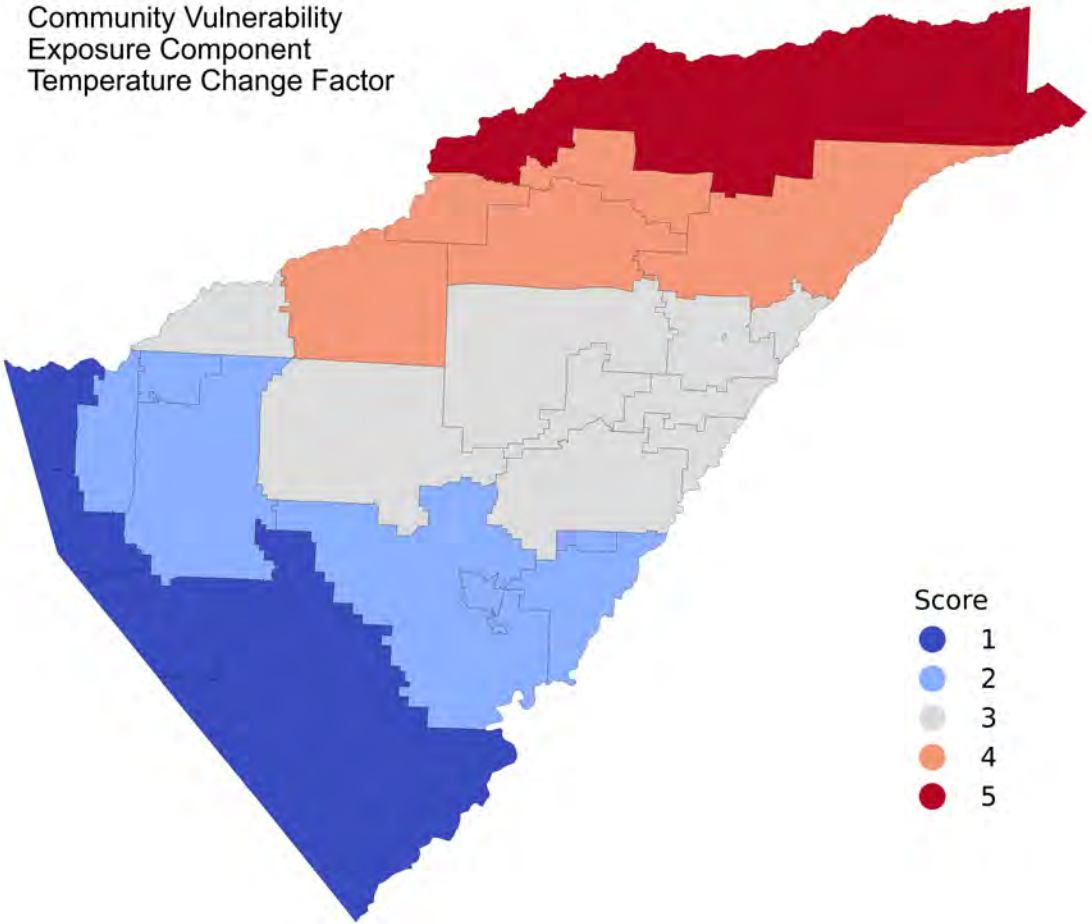

Community Vulnerability
Score
1
2
3
4
5

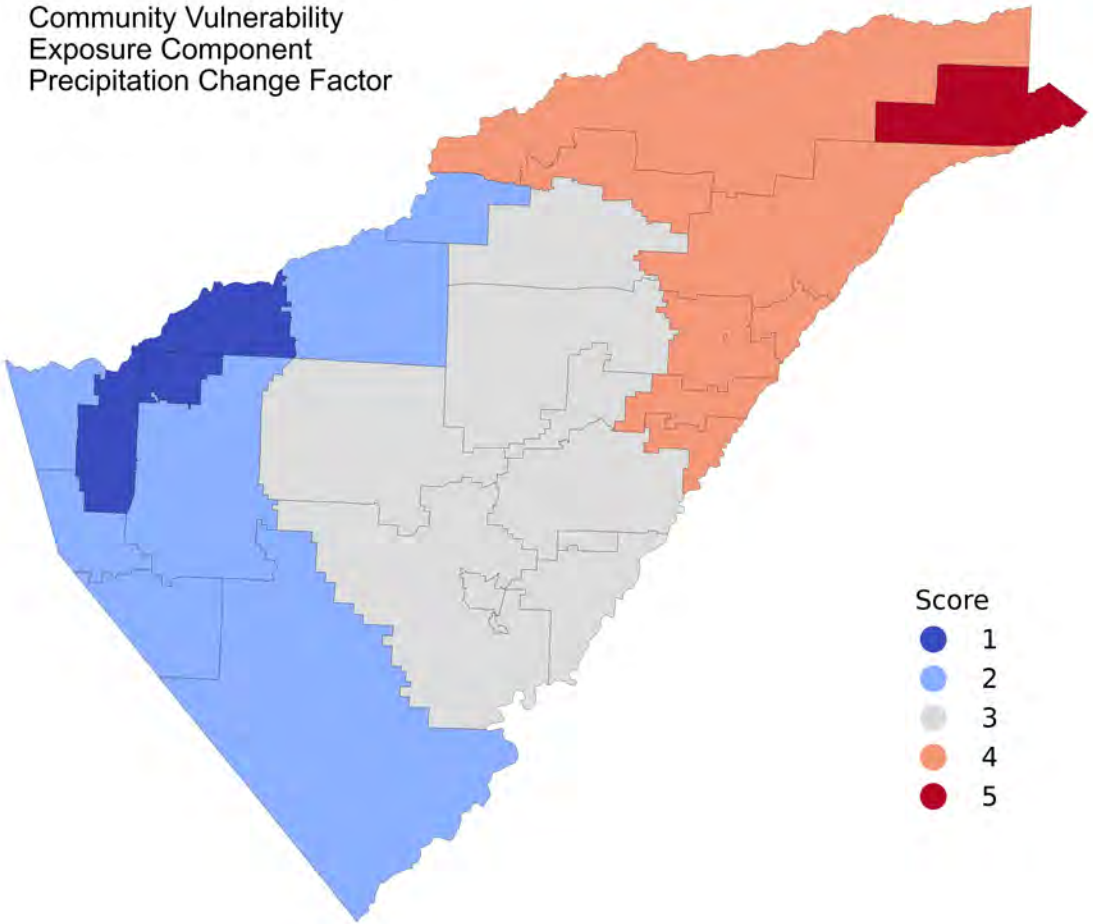

Community Vulnerability
Exposure Component
Score
1
2
3
4
5

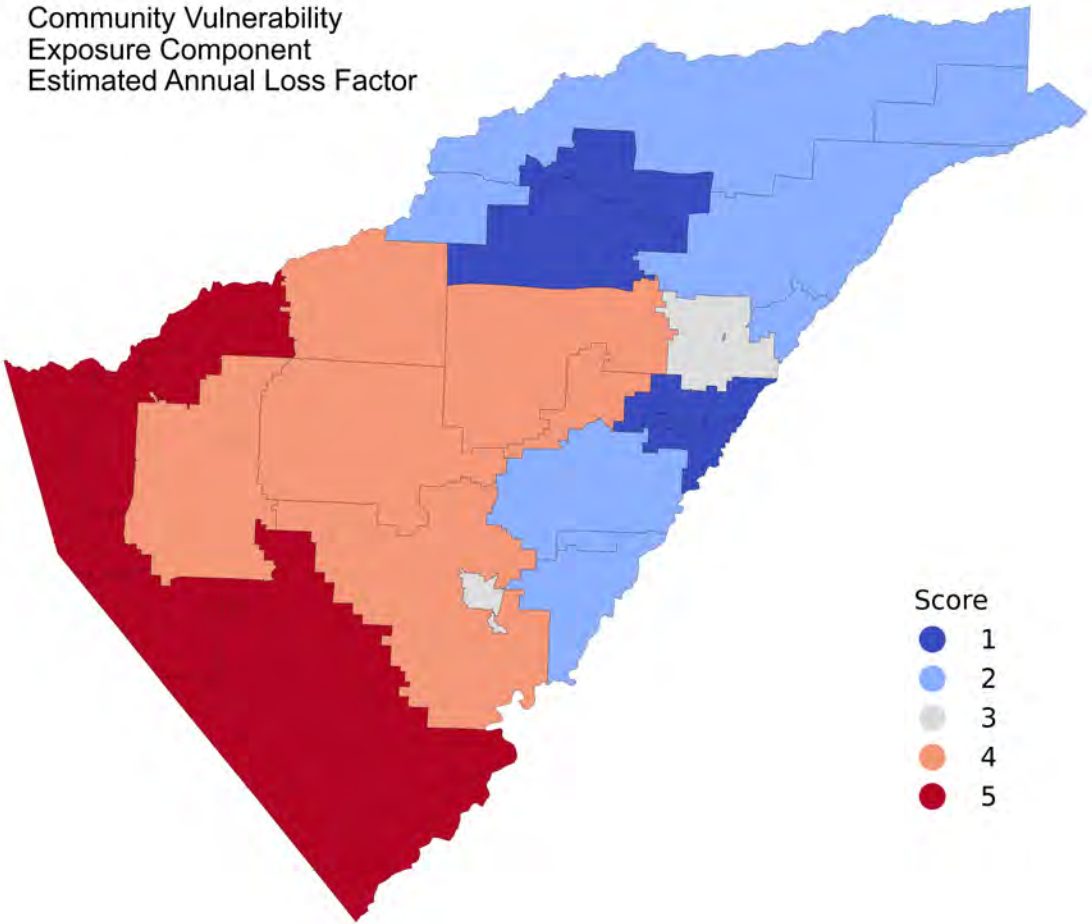

Community Vulnerability
Exposure Component
Flood Factor
Score
1
2
3
4
5

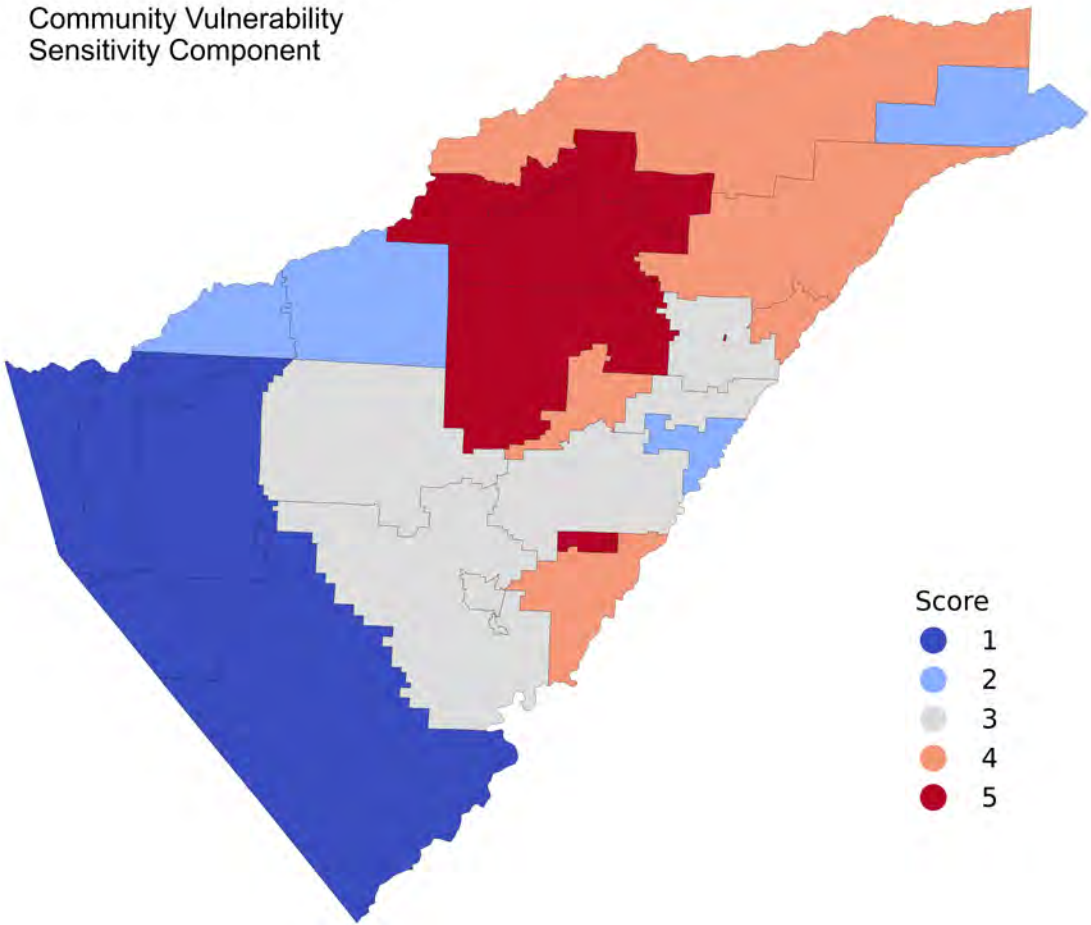

Community Vulnerability
Exposure Component
Wildfire Factor
Score
1
2
3
4
5

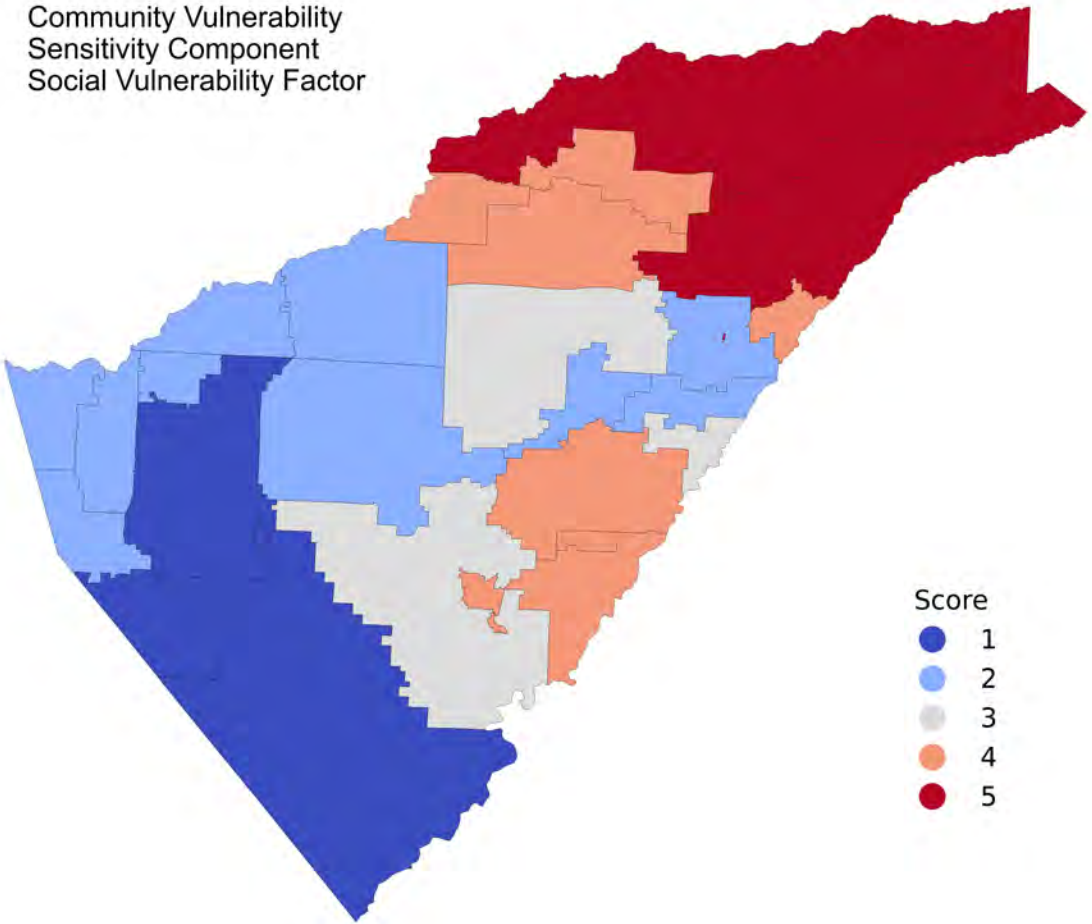

Community Vulnerability
Exposure Component
Landslide Factor
Score
1
2
3
4
5

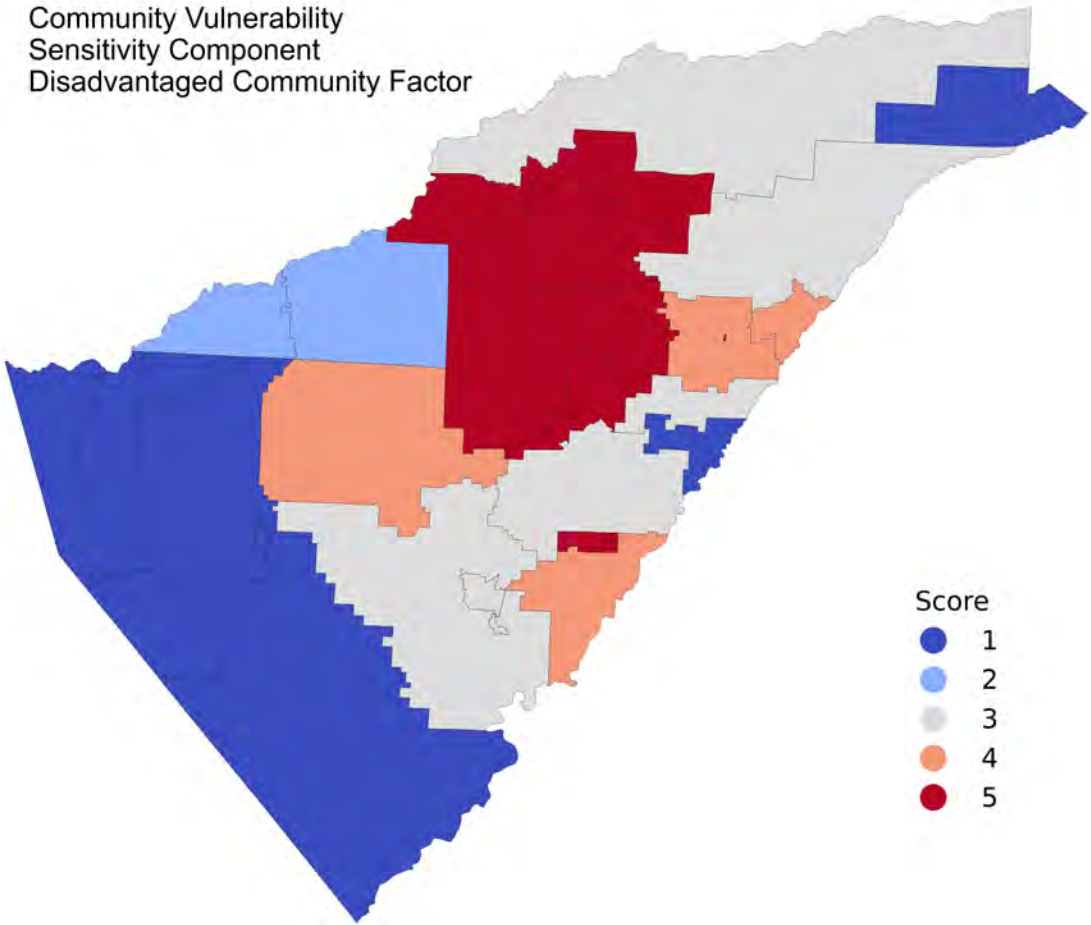

Community Vulnerability
Exposure Component
Temperature Change Factor
Score
1
2
3
4
5

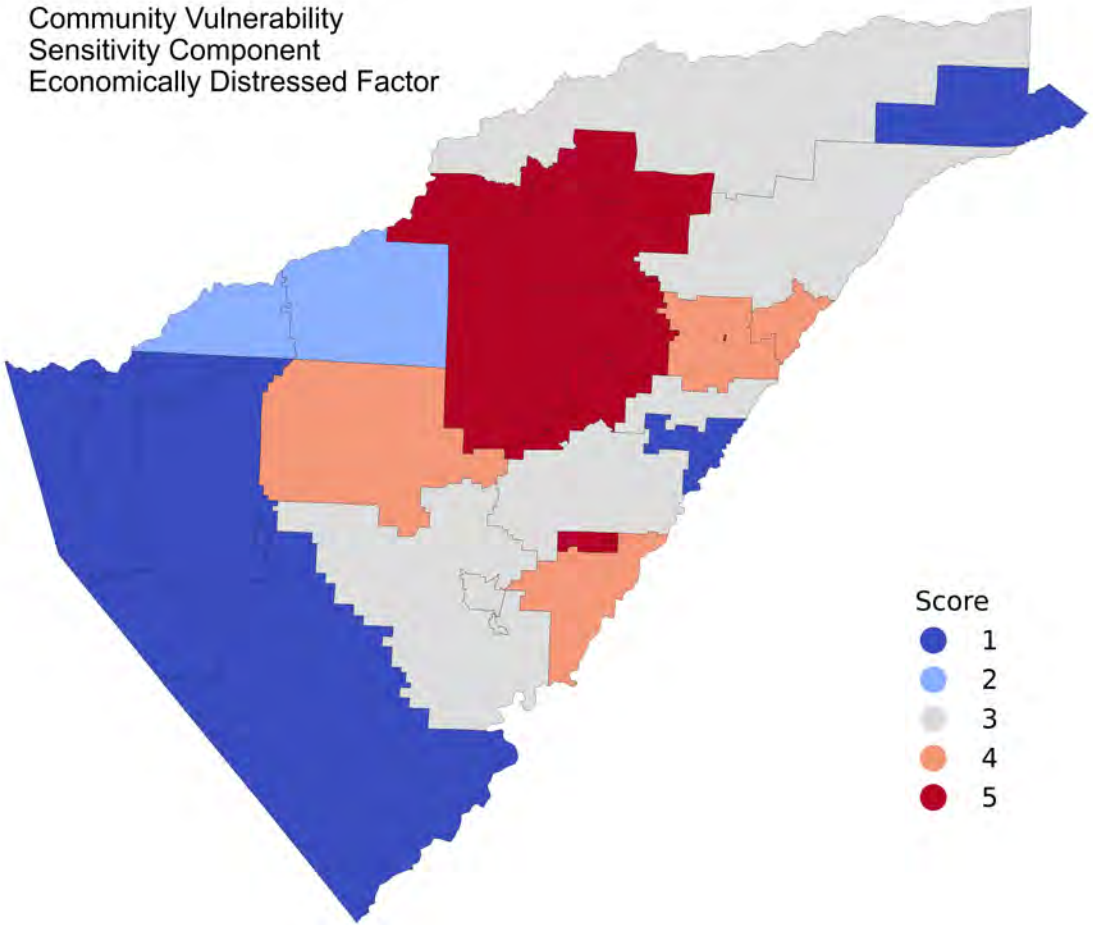

Community Vulnerability
Exposure Component
Precipitation Change Factor
Score
1
2
3
4
5

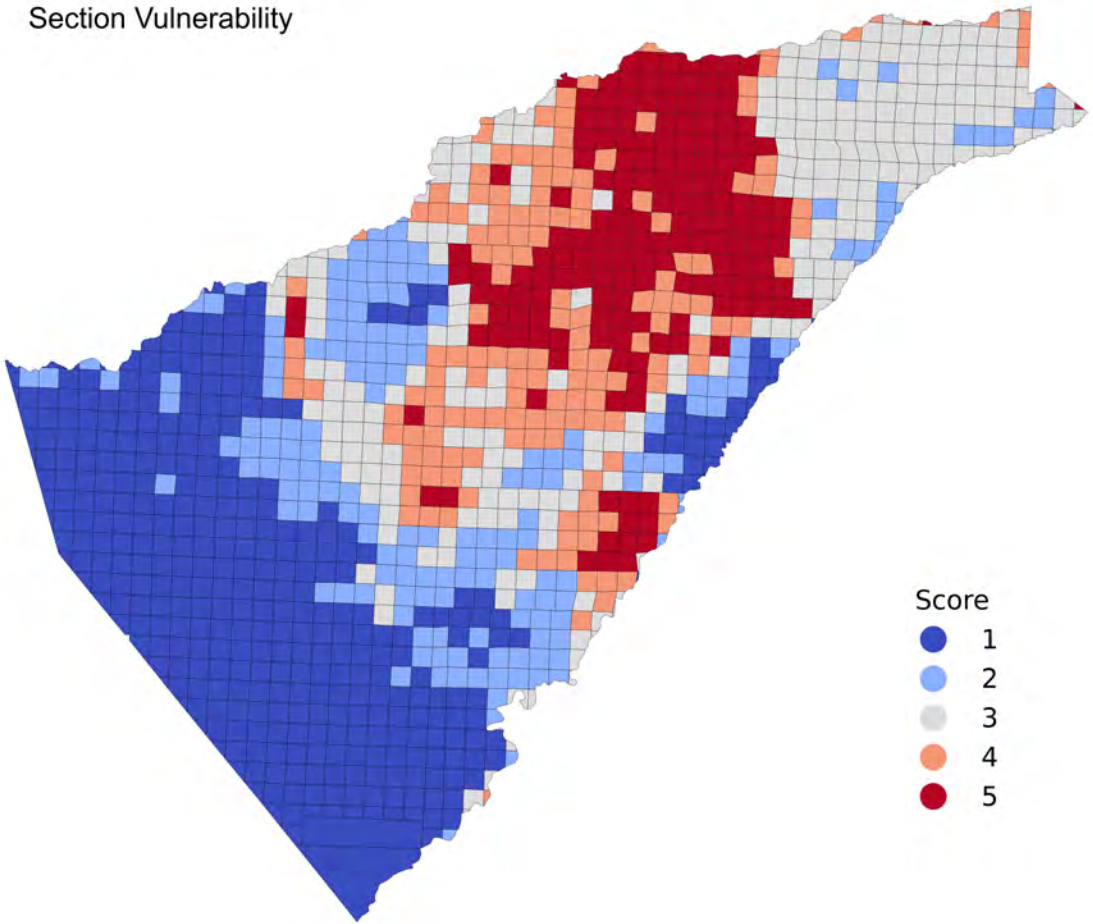

Community Vulnerability
Exposure Component
Estimated Annual Loss Factor
Score
1
2
3
4
5

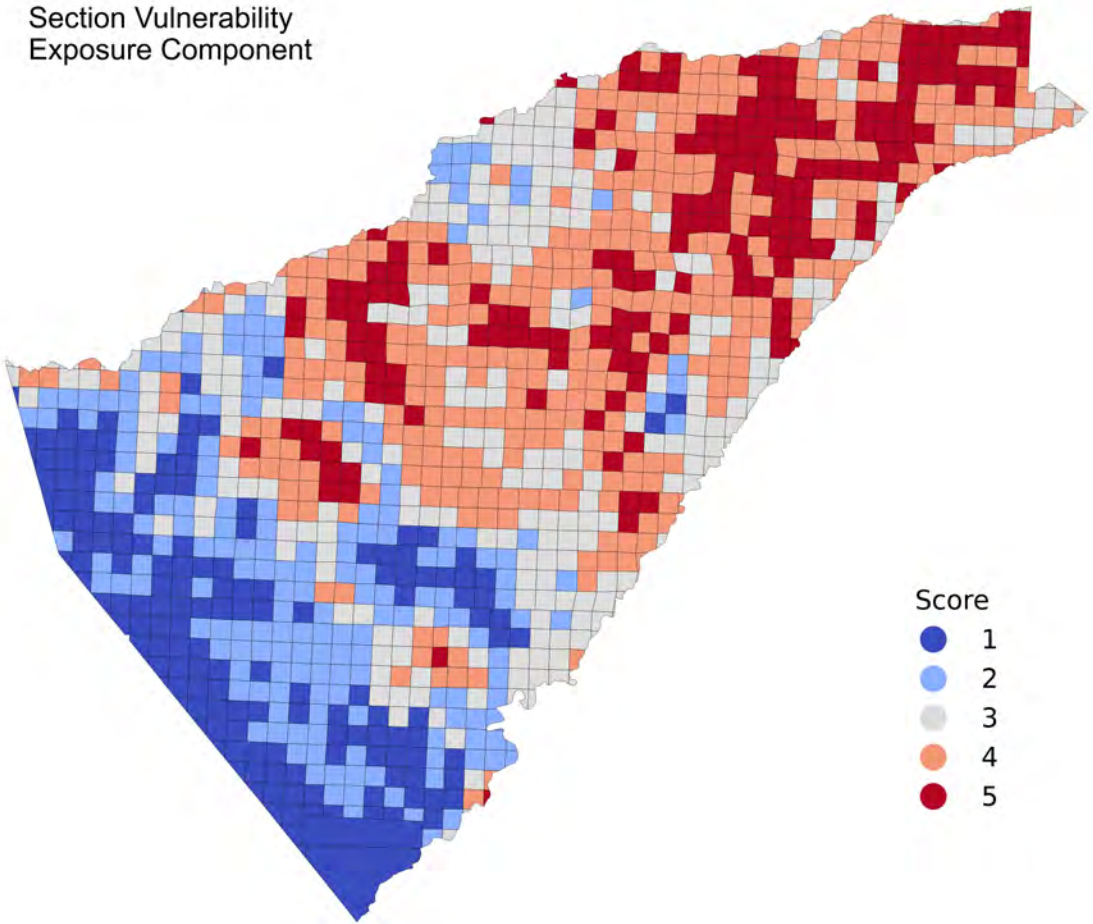

Community Vulnerability
Sensitivity Component
Score
1
2
3
4
5

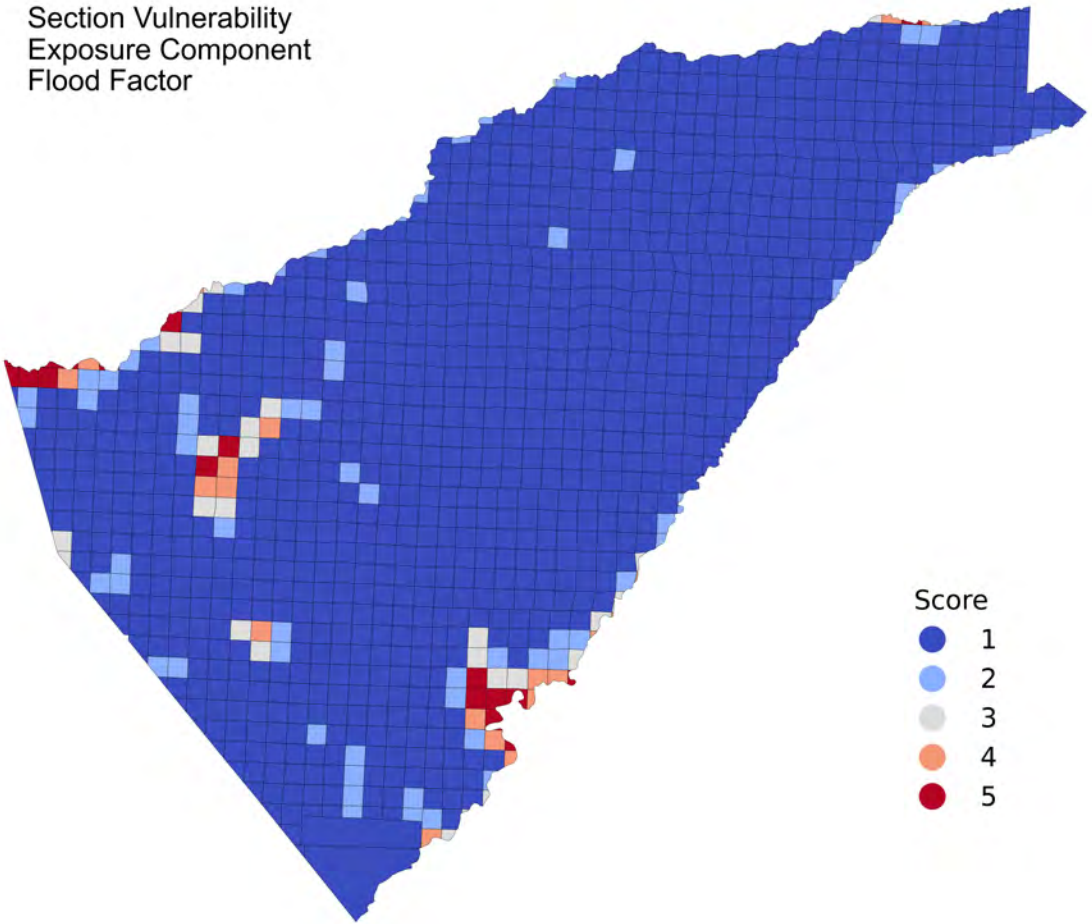

Community Vulnerability
Sensitivity Component
Social Vulnerability Factor
Score
1
2
3
4
5

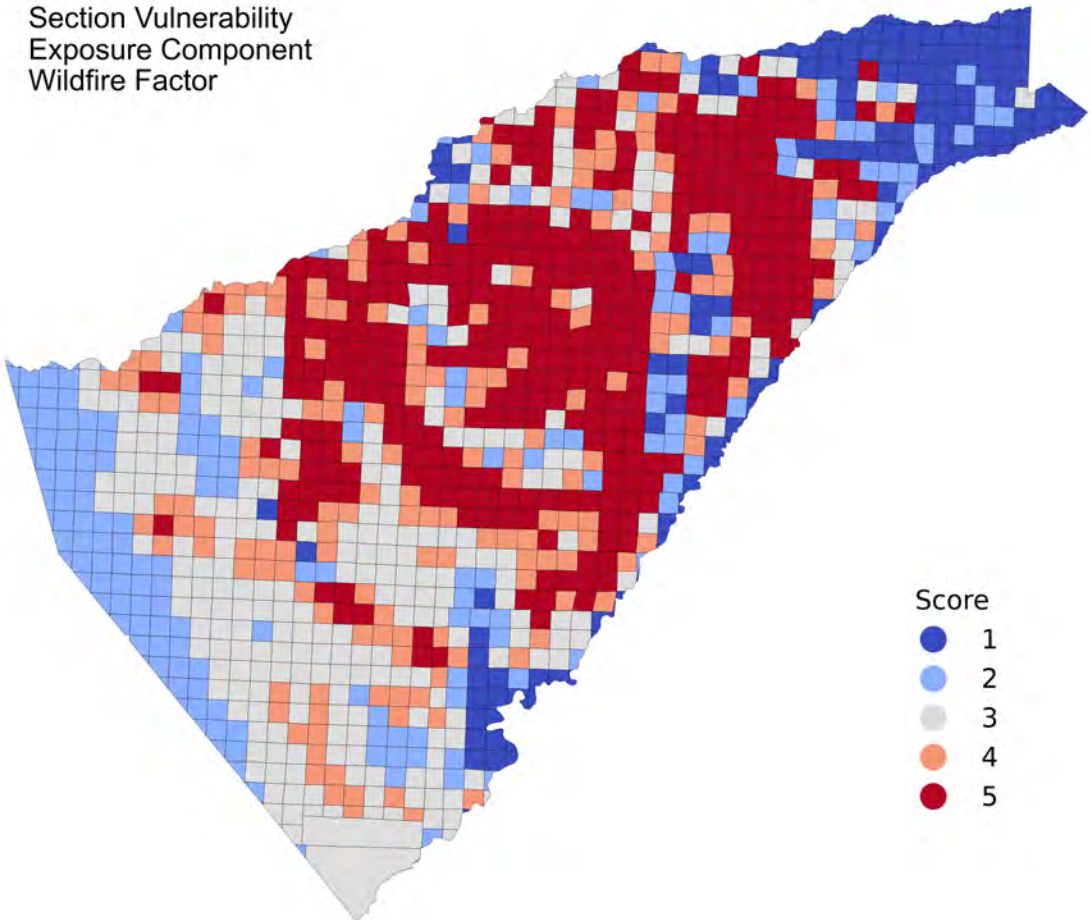

Community Vulnerability
Sensitivity Component
Disadvantaged Community Factor
Score
1
2
3
4
5

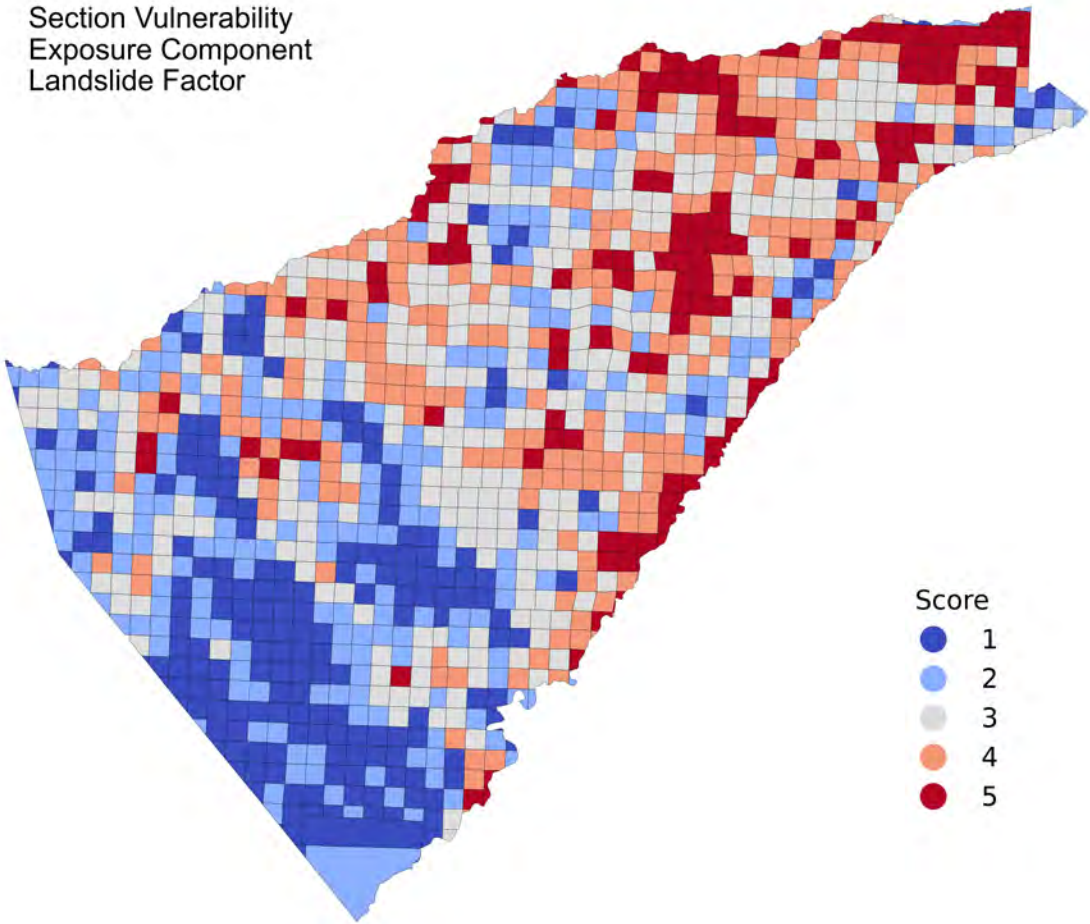

Community Vulnerability
Sensitivity Component
Economically Distressed Factor
Score
1
2
3
4
5

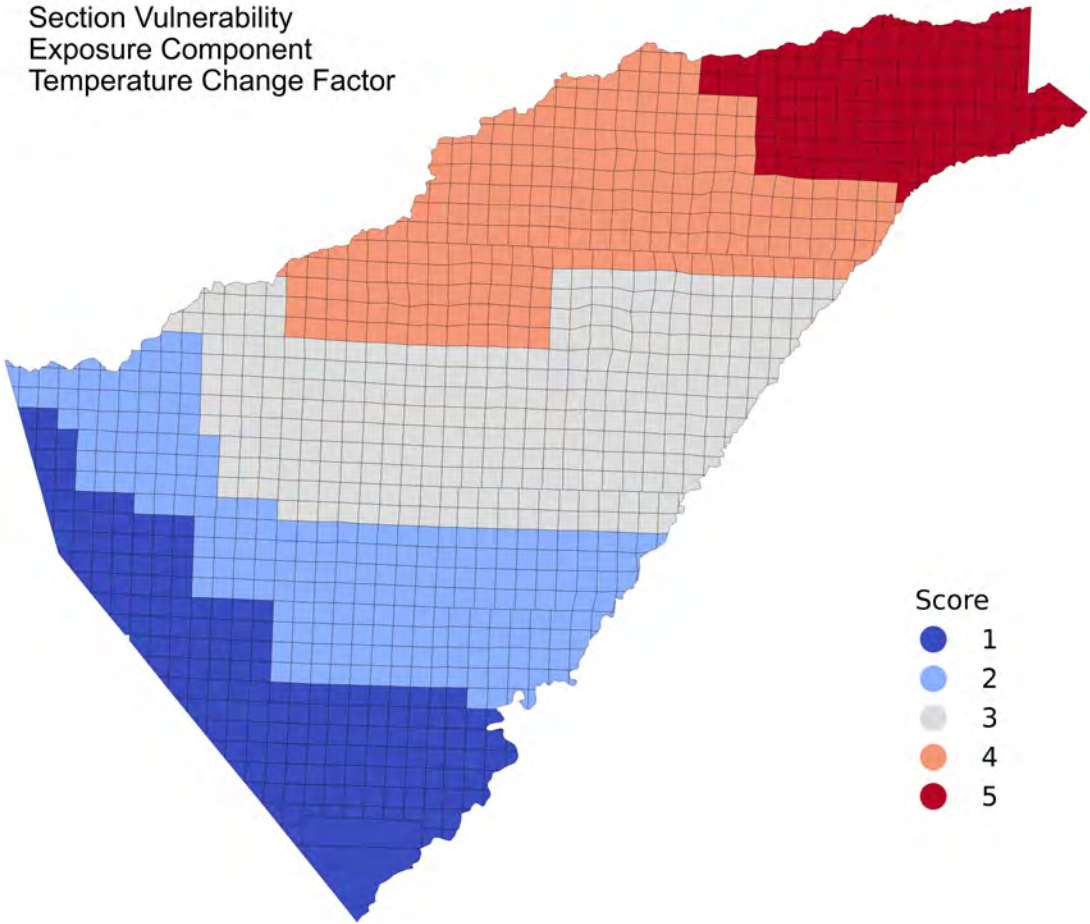

Section Vulnerability
Score
1
2
3
4
5

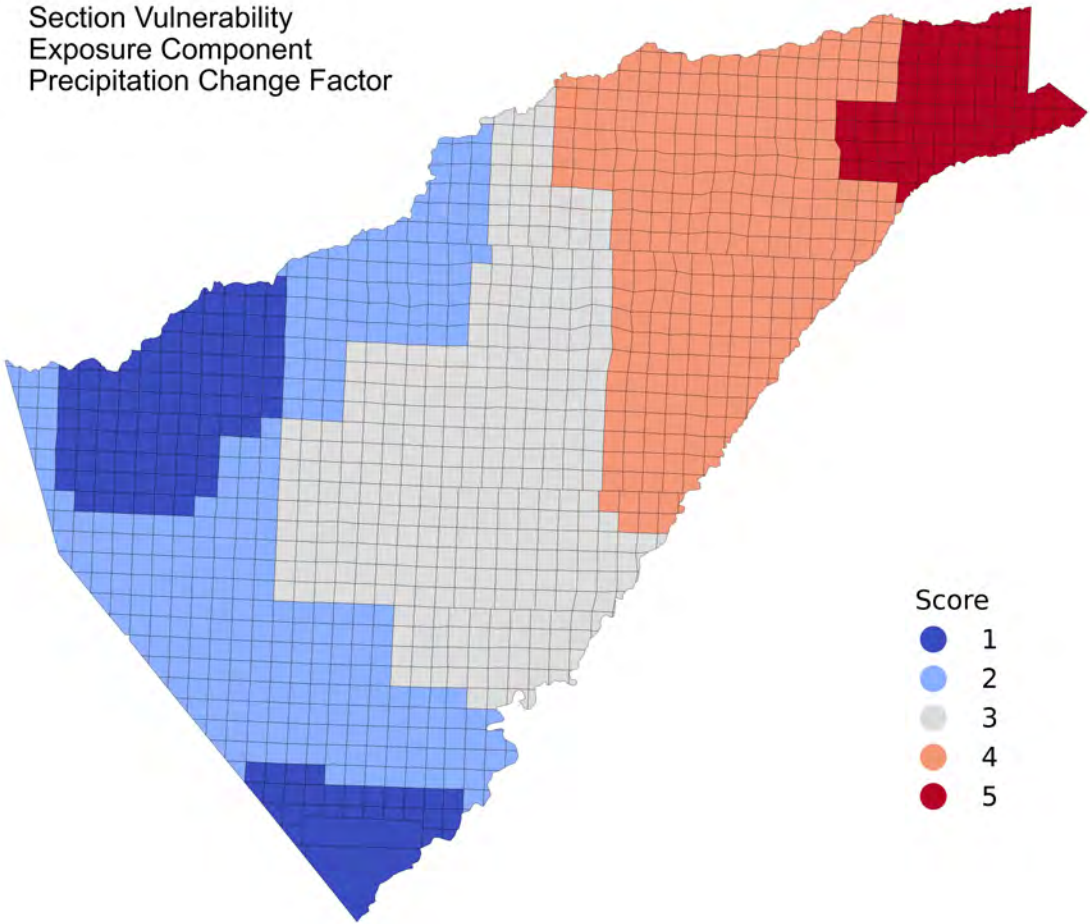

Section Vulnerability
Exposure Component
Score
1
2
3
4
5

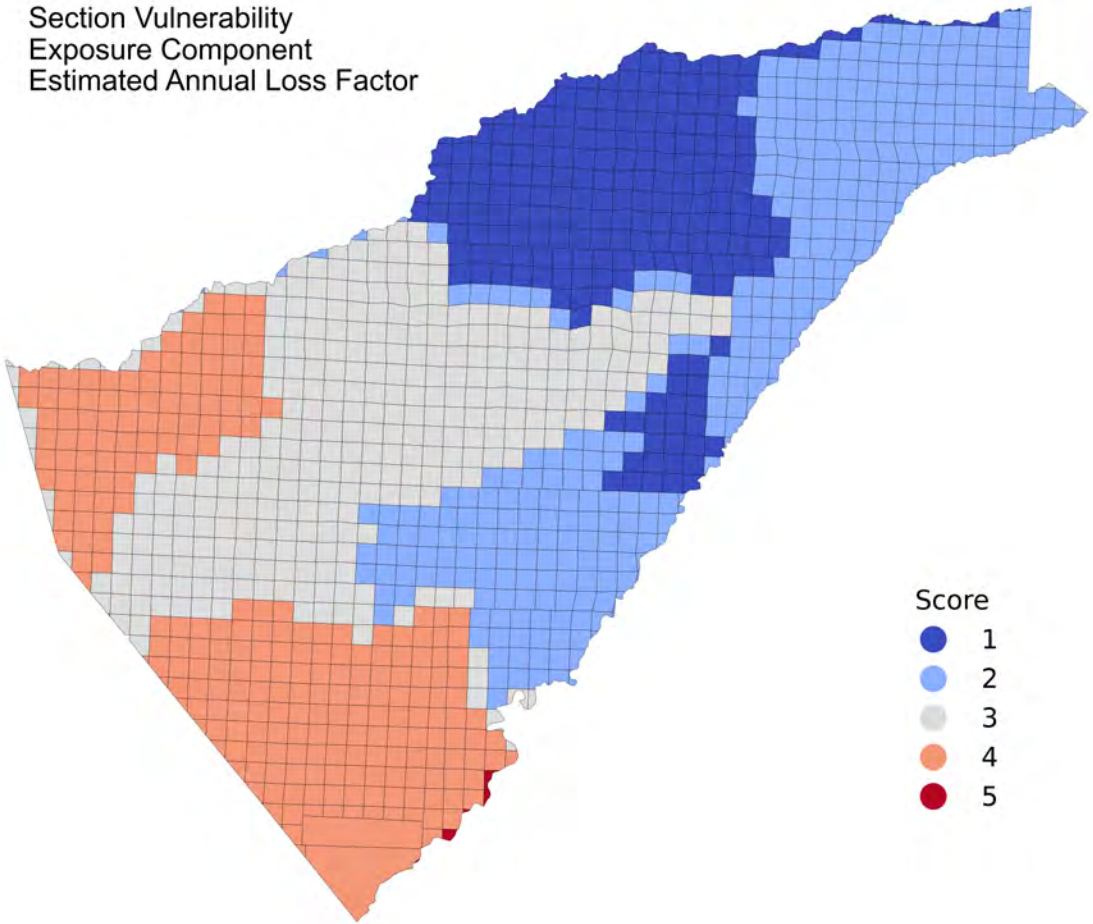

Section Vulnerability
Exposure Component
Flood Factor
Score
1
2
3
4
5

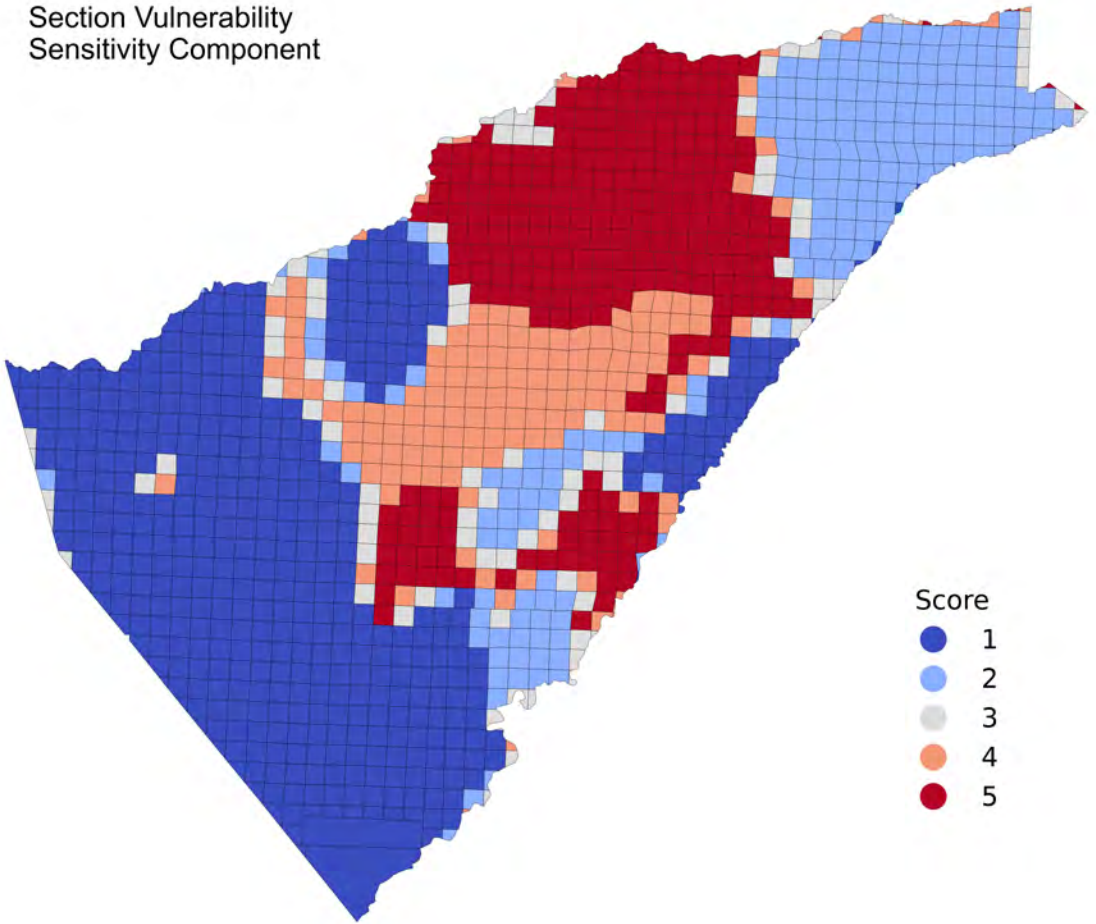

Section Vulnerability
Exposure Component
Wildfire Factor
Score
1
2
3
4
5

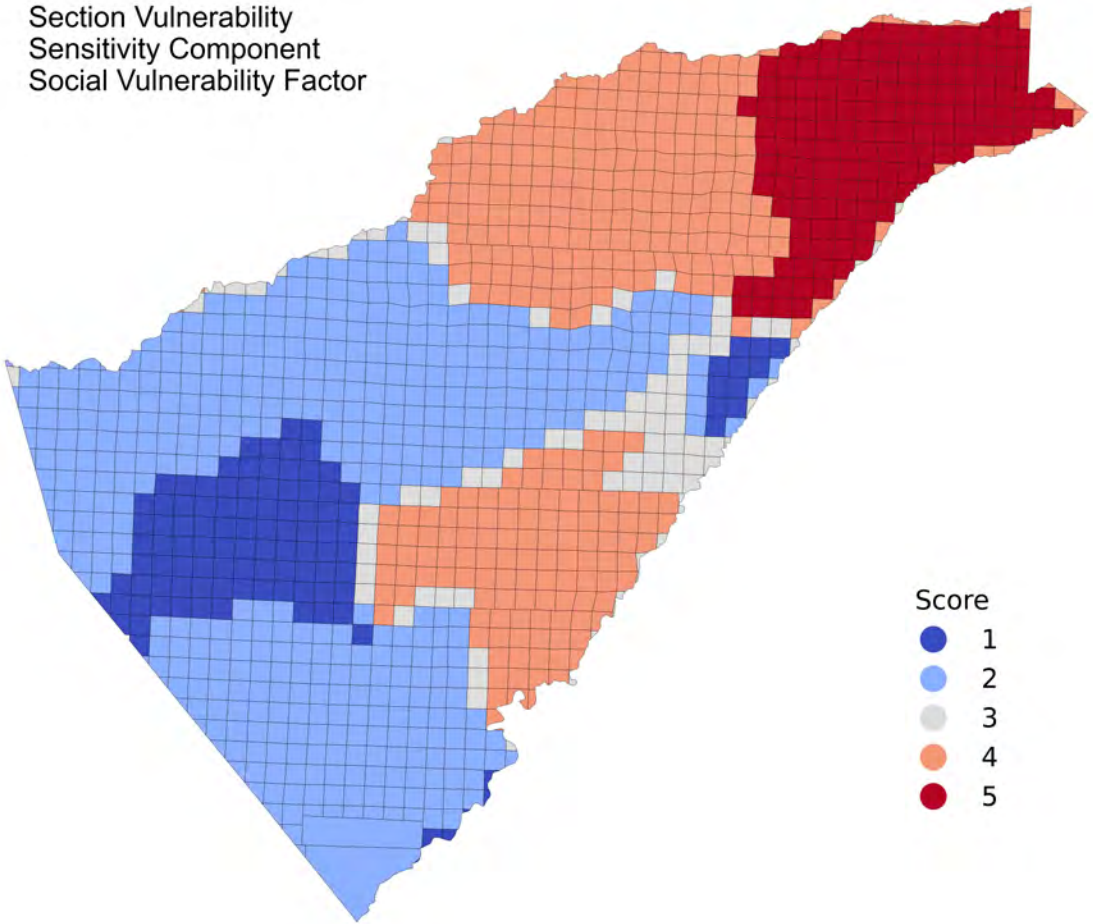

Section Vulnerability
Exposure Component
Landslide Factor
Score
1
2
3
4
5

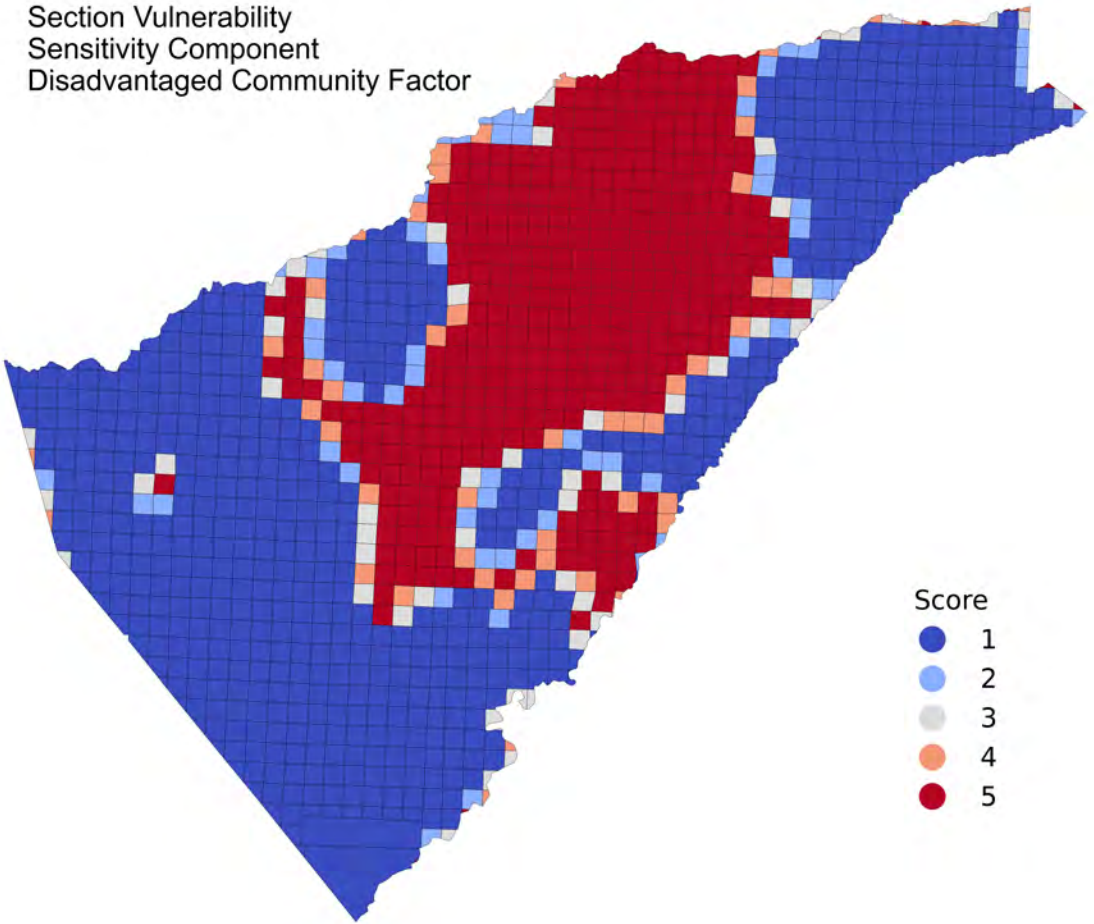

Section Vulnerability
Exposure Component
Temperature Change Factor
Score
1
2
3
4
5

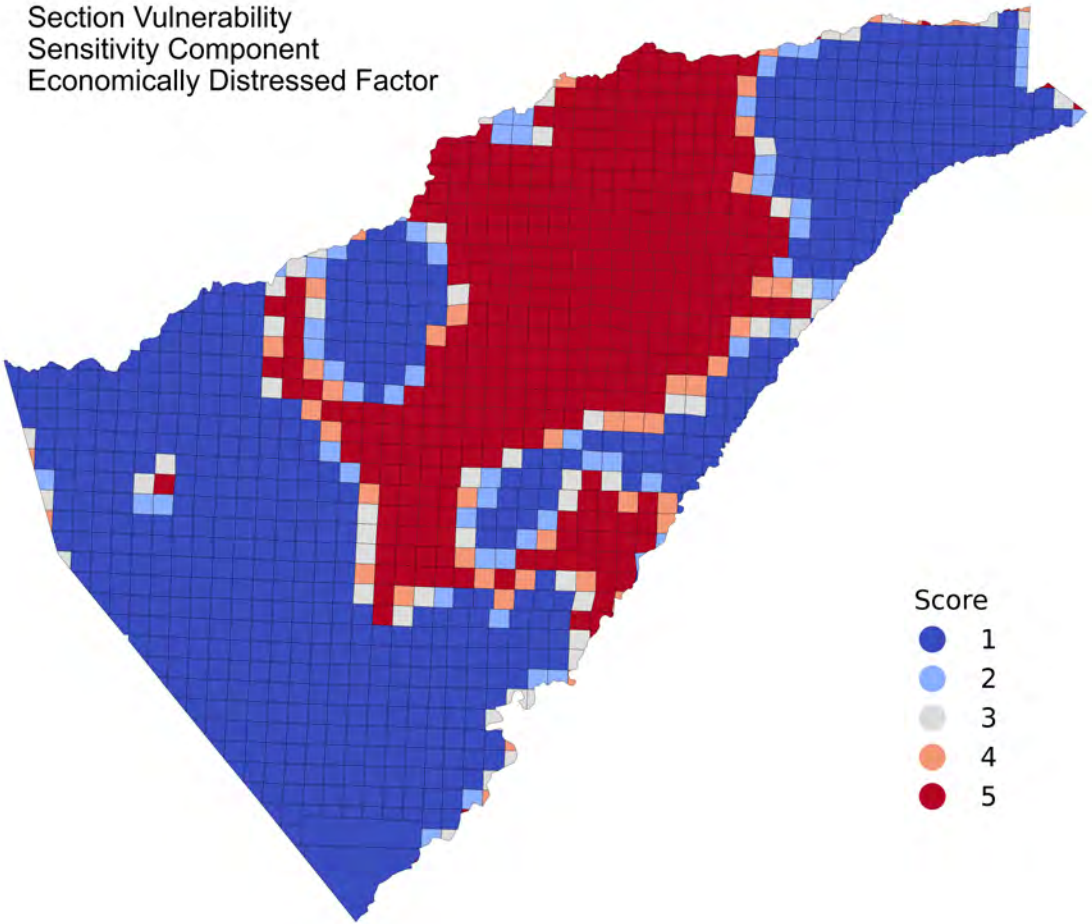

Section Vulnerability
Exposure Component
Precipitation Change Factor
Score
1
2
3
4
5

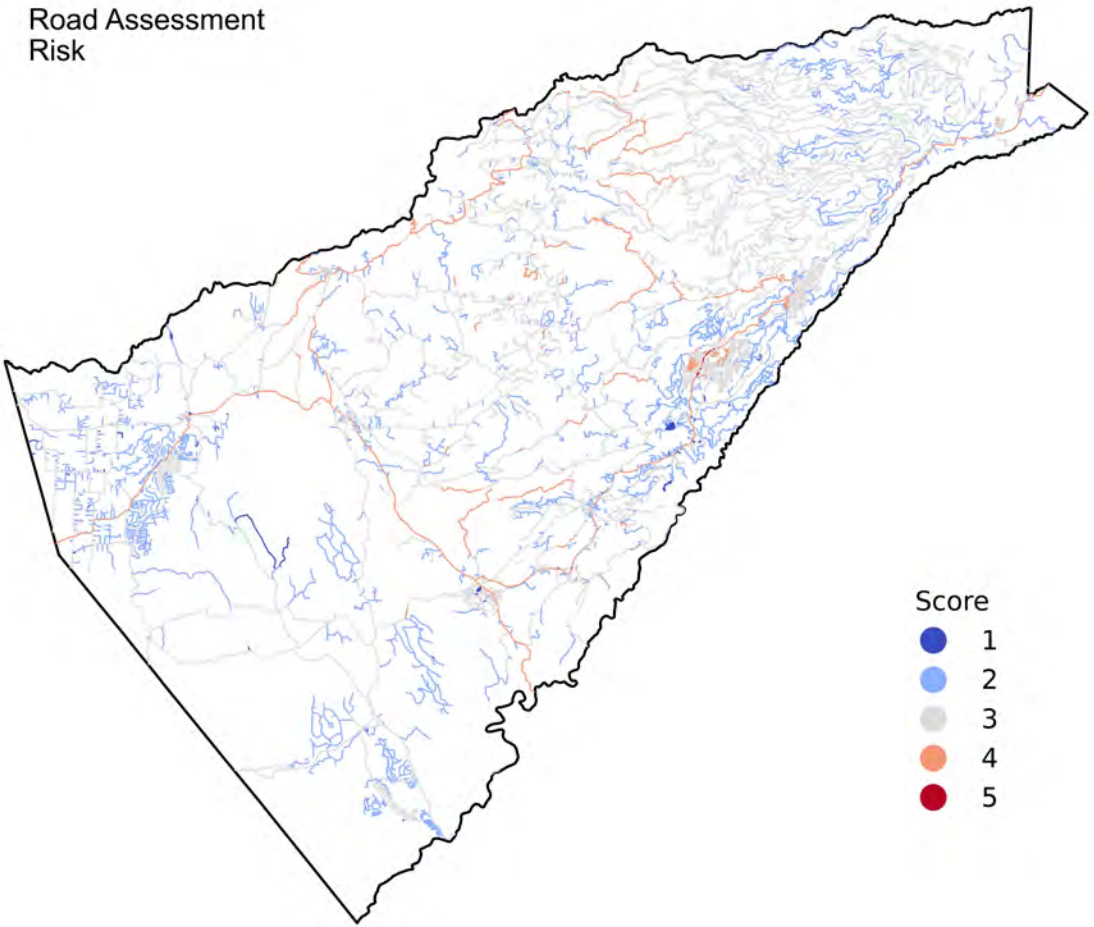

Section Vulnerability
Exposure Component
Estimated Annual Loss Factor
Score
1
2
3
4
5

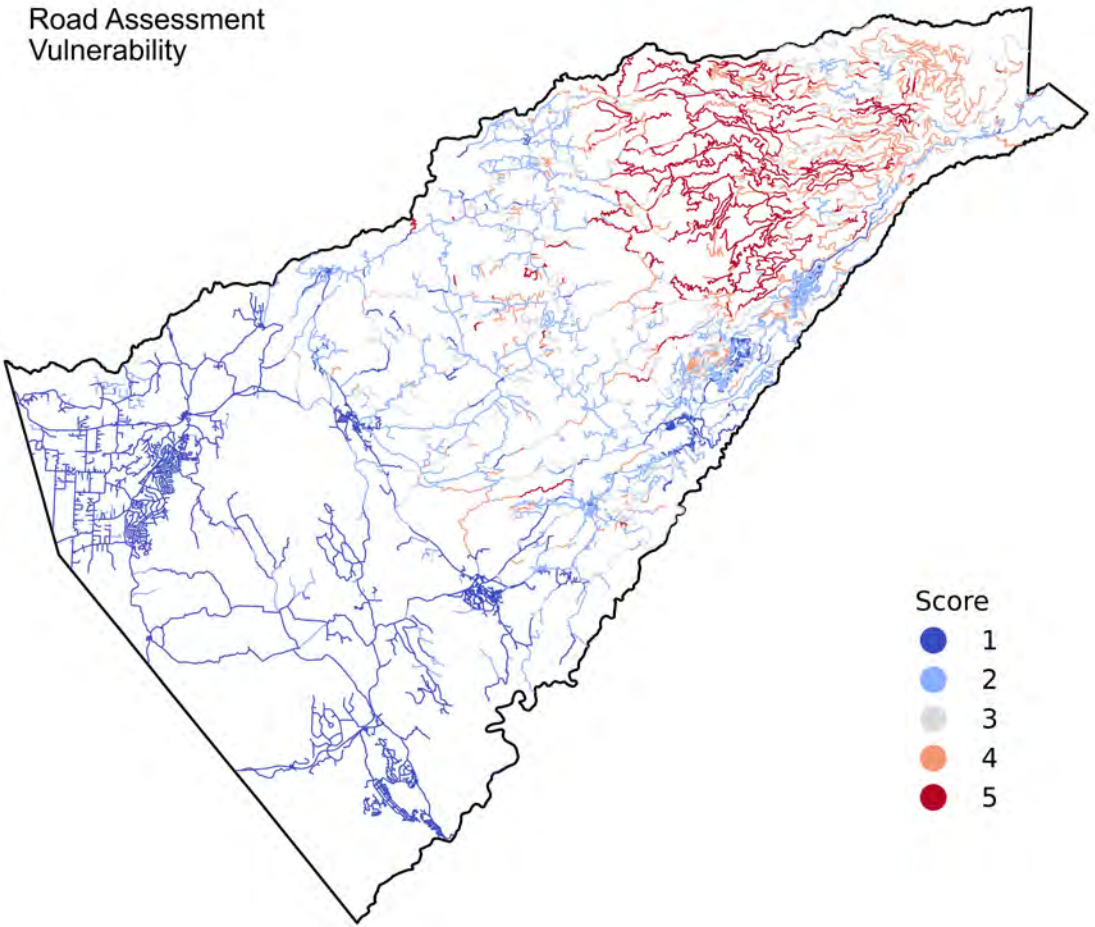

Section Vulnerability
Sensitivity Component
Score
1
2
3
4
5

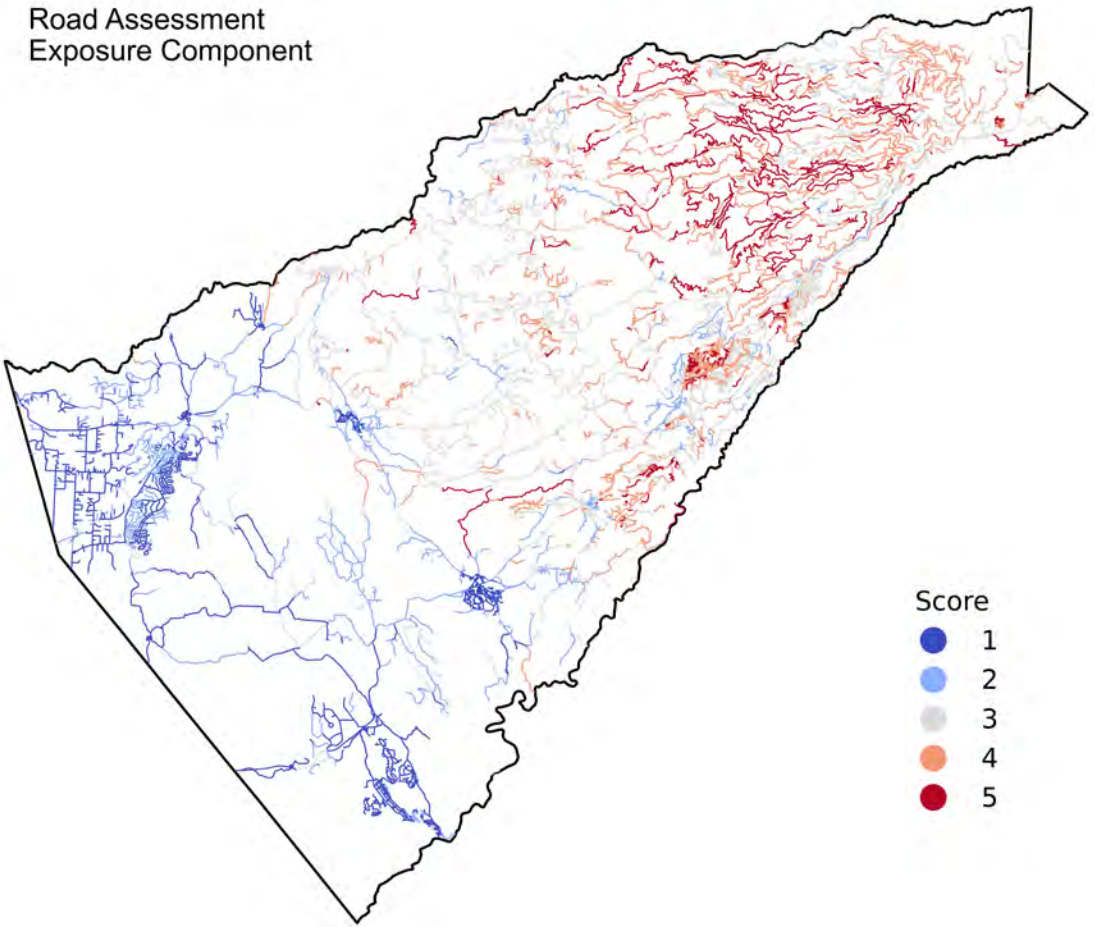

Section Vulnerability
Sensitivity Component
Social Vulnerability Factor
Score
1
2
3
4
5

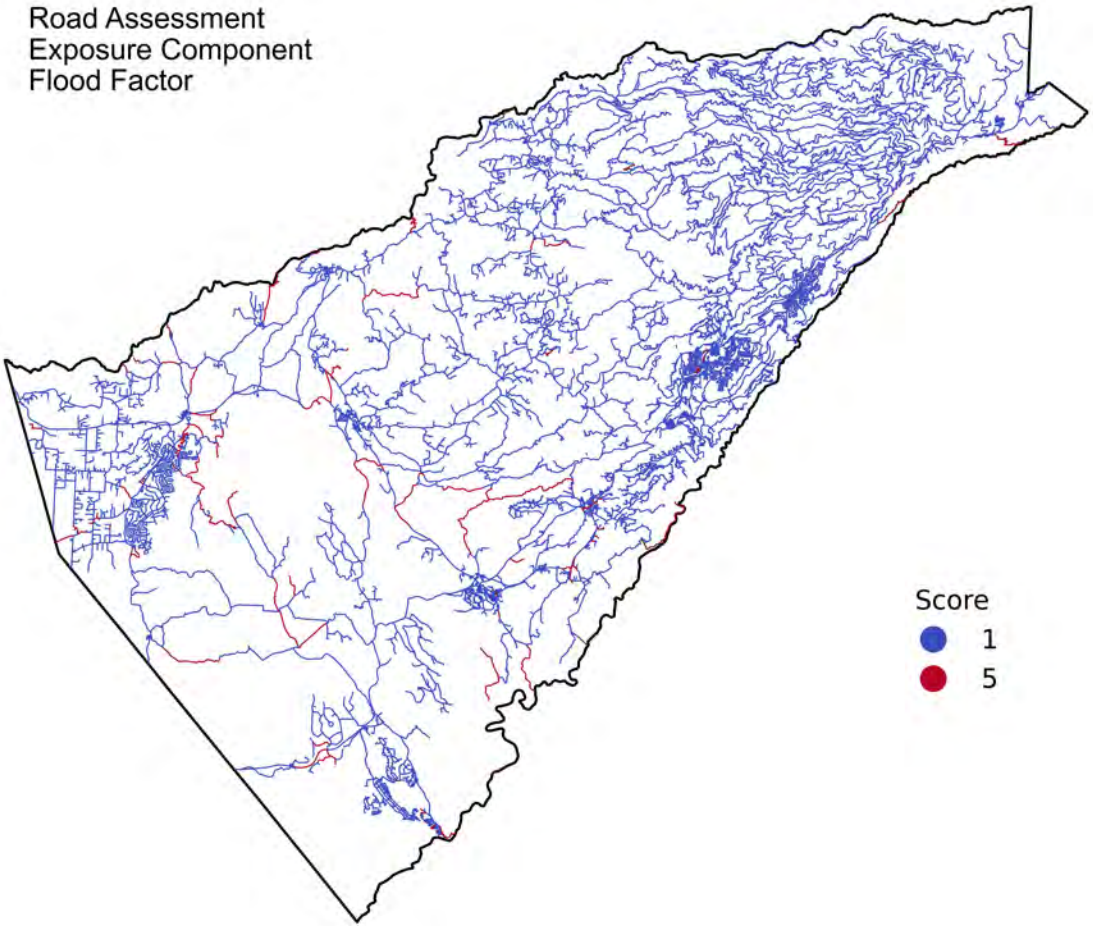

Section Vulnerability
Sensitivity Component
Disadvantaged Community Factor
Score
1
2
3
4
5

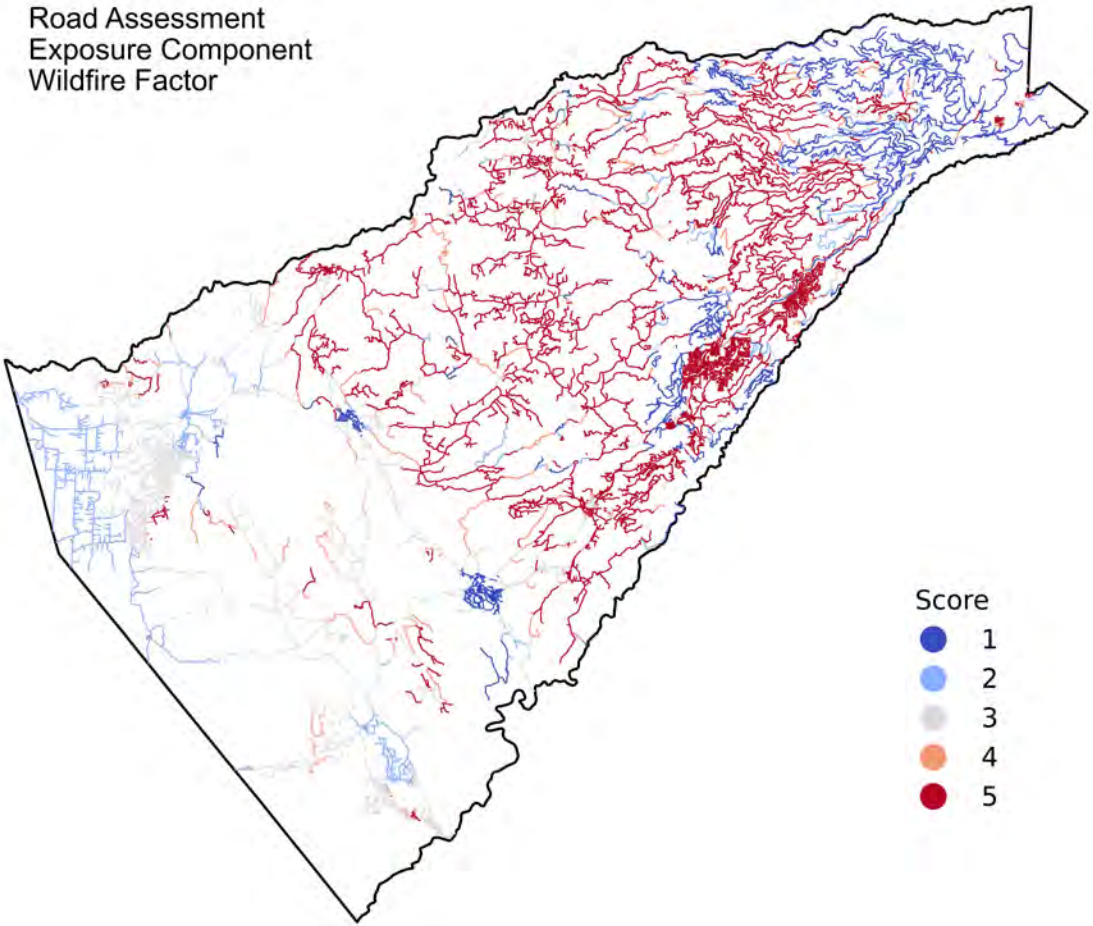

Section Vulnerability
Sensitivity Component
Economically Distressed Factor
Score
1
2
3
4
5

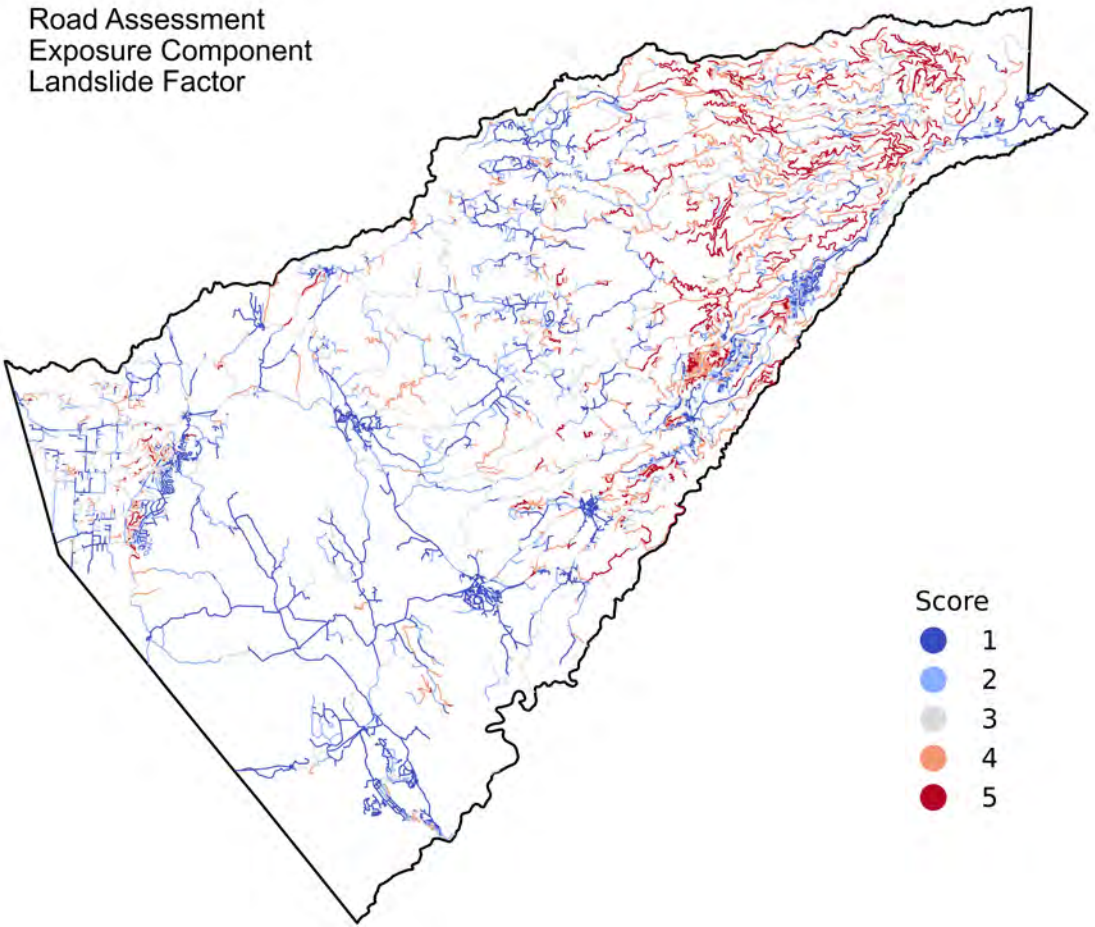

Road Assessment
Risk
Score
1
2
3
4
5

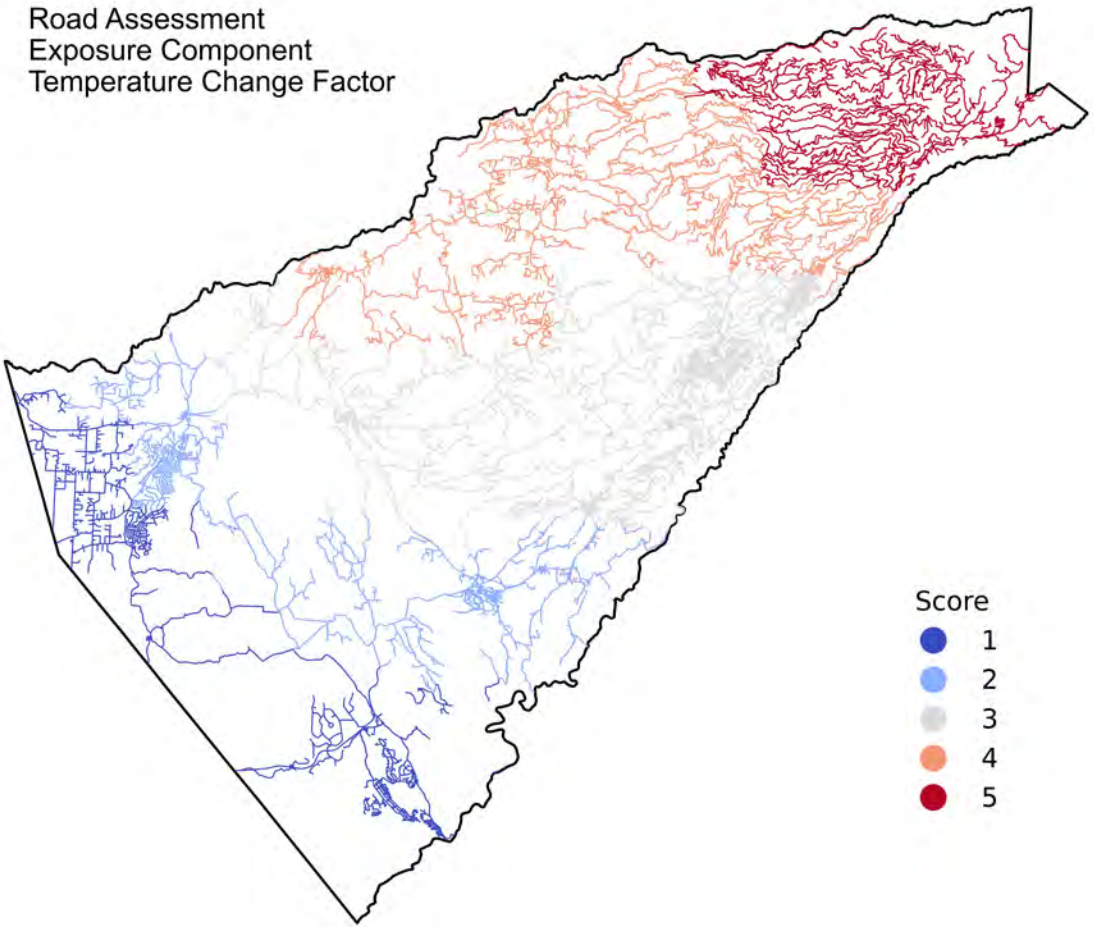

Road Assessment
Vulnerability
Score
1
2
3
4
5

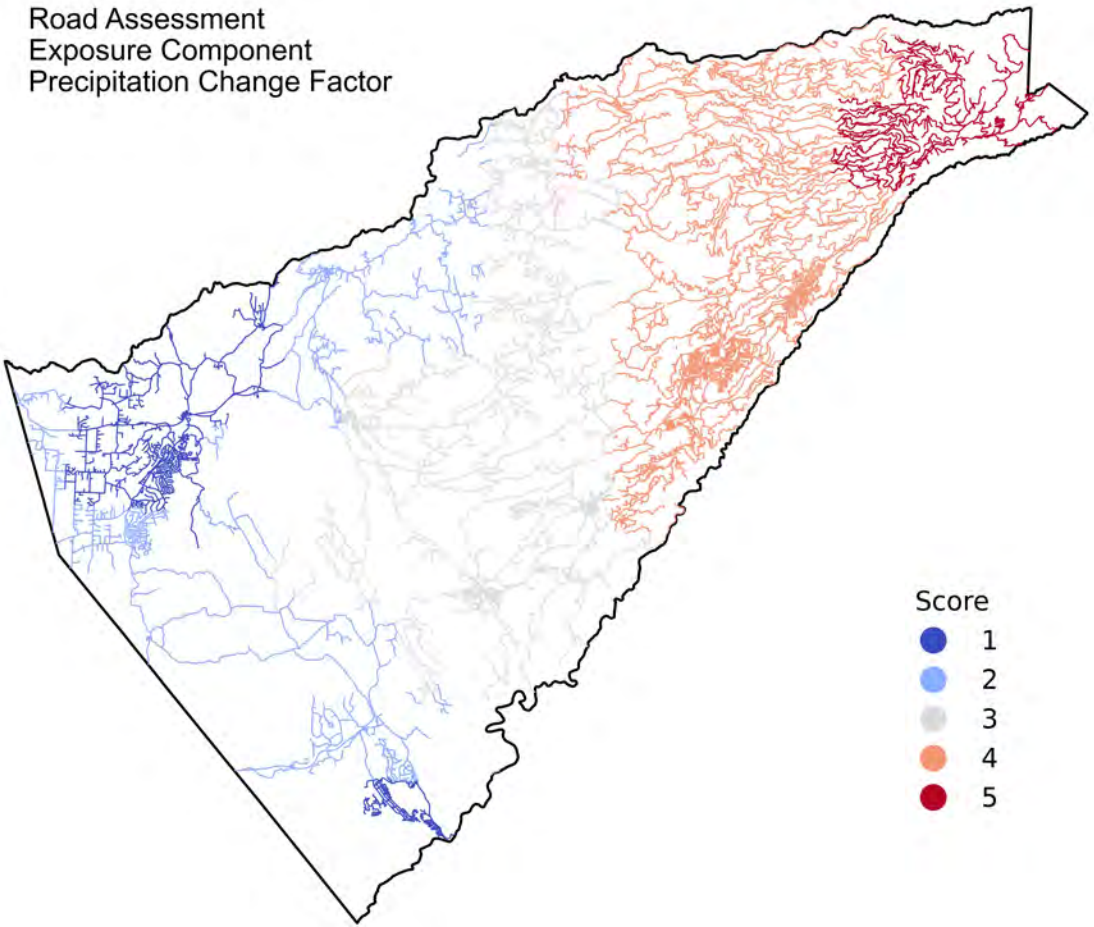

Road Assessment
Exposure Component
Score
1
2
3
4
5

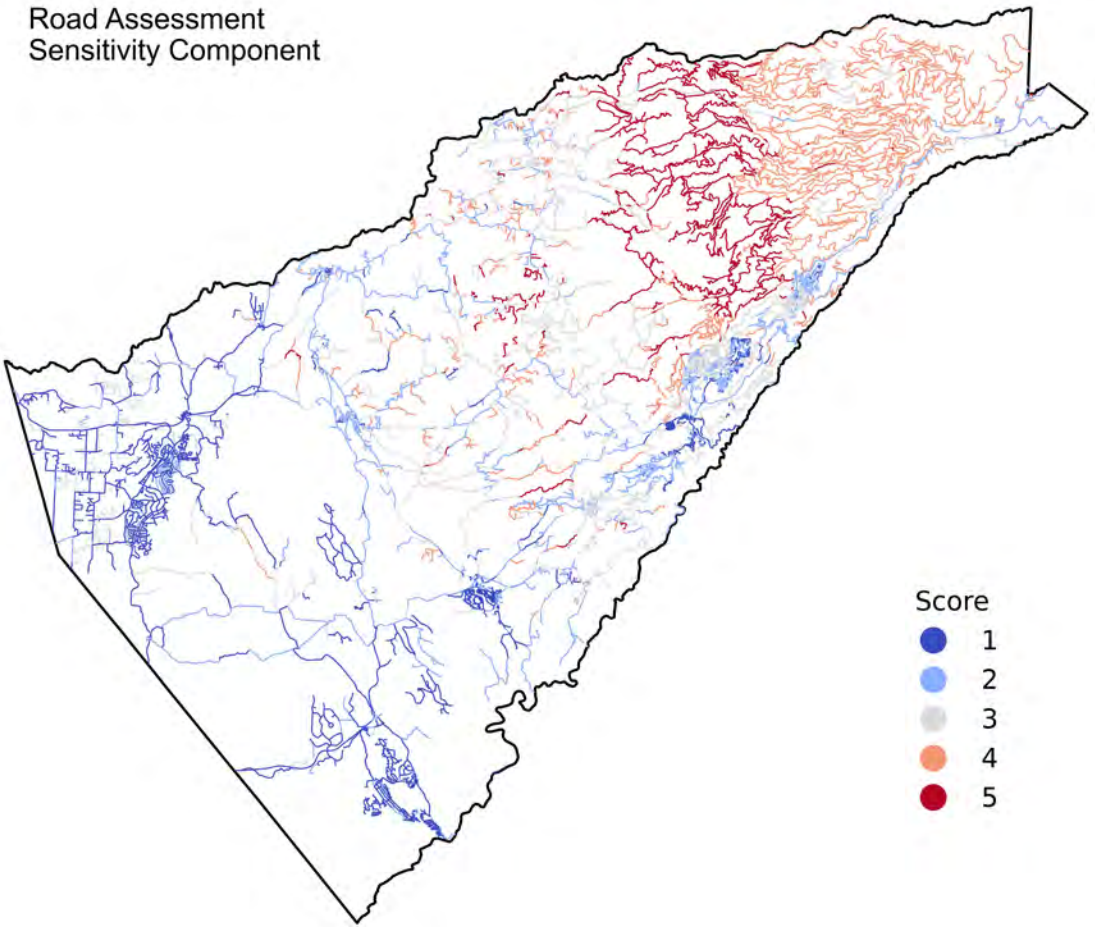

Road Assessment
Exposure Component
Flood Factor
Score
1
5

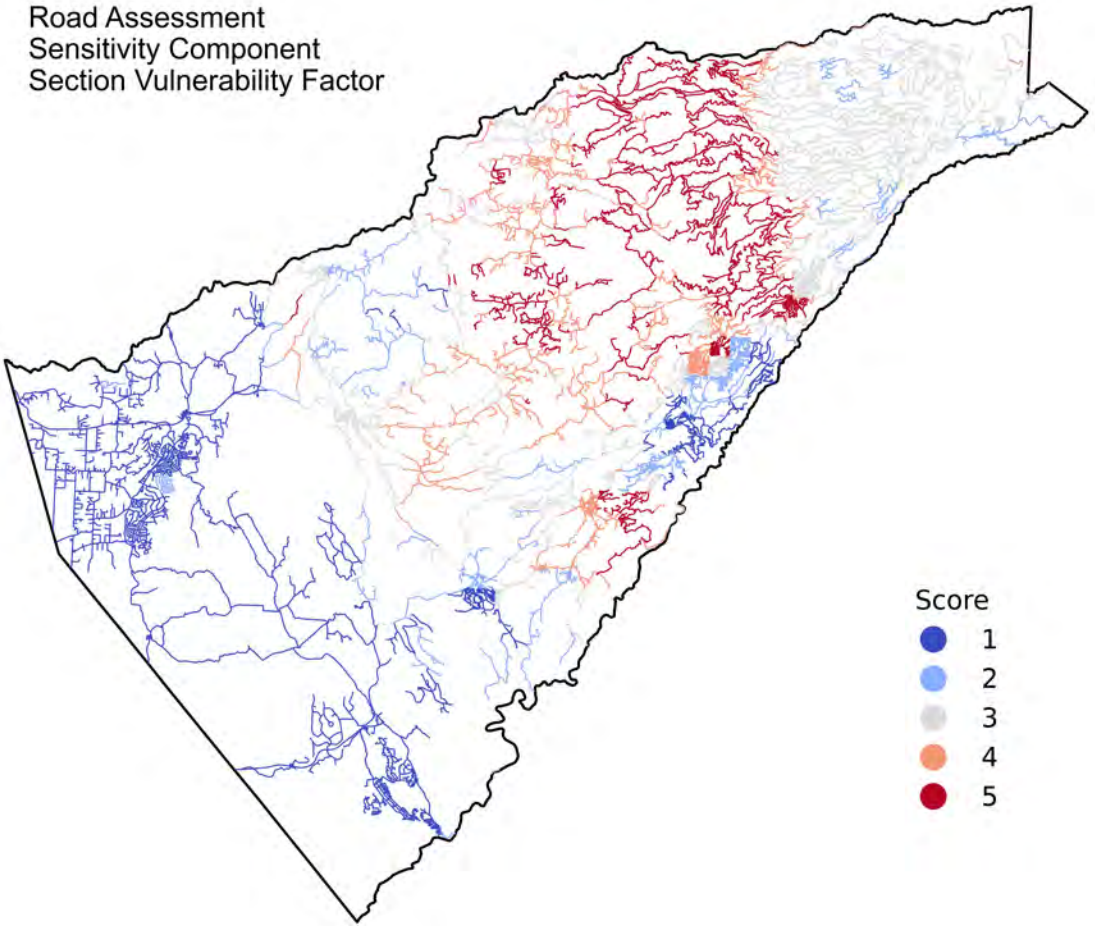

Road Assessment
Exposure Component
Wildfire Factor
Score
1
2
3
4
5


Road Assessment
Exposure Component
Landslide Factor
Score
1
2
3
4
5


Road Assessment
Exposure Component
Temperature Change Factor
Score
1
2
3
4
5


Road Assessment
Exposure Component
Precipitation Change Factor
Score
1
2
3
4
5


Road Assessment
Sensitivity Component
Score
1
2
3
4
5


Road Assessment
Sensitivity Component
Section Vulnerability Factor
Score
1
2
3
4
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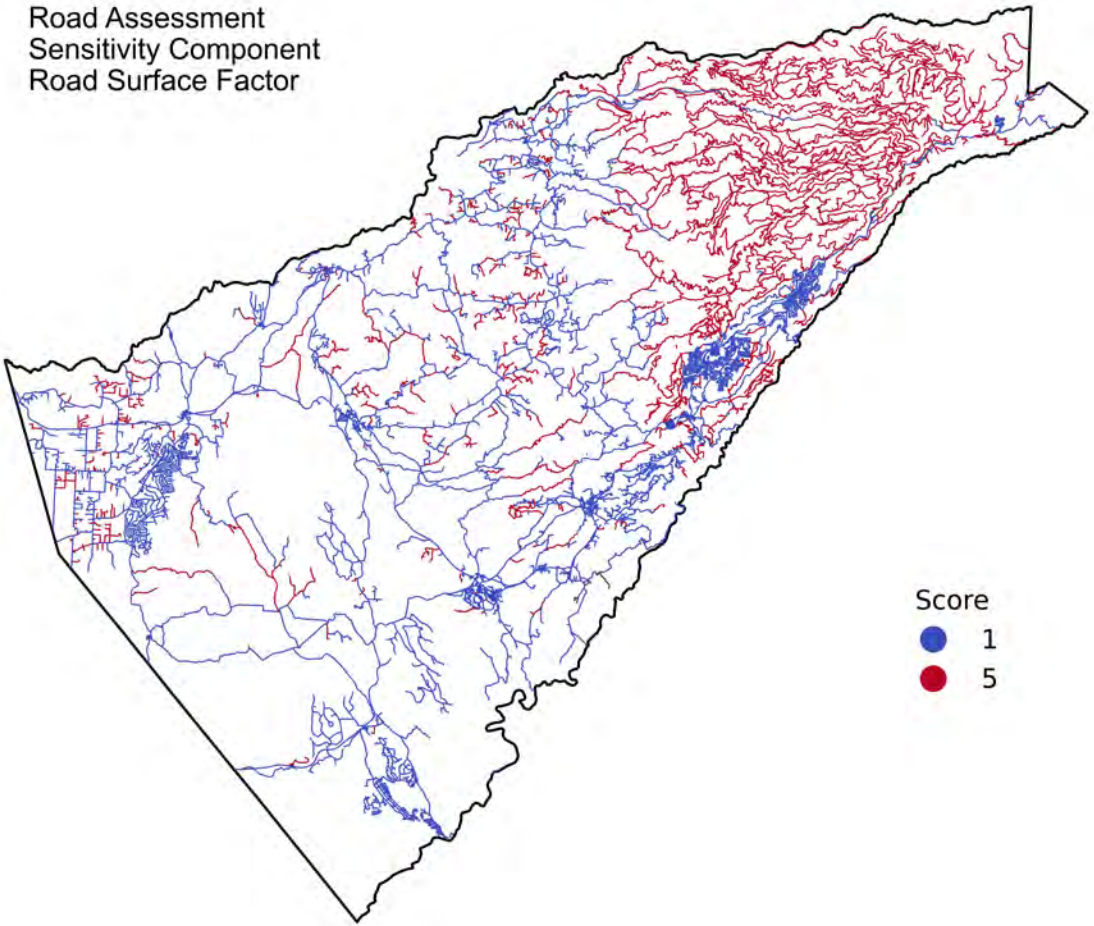
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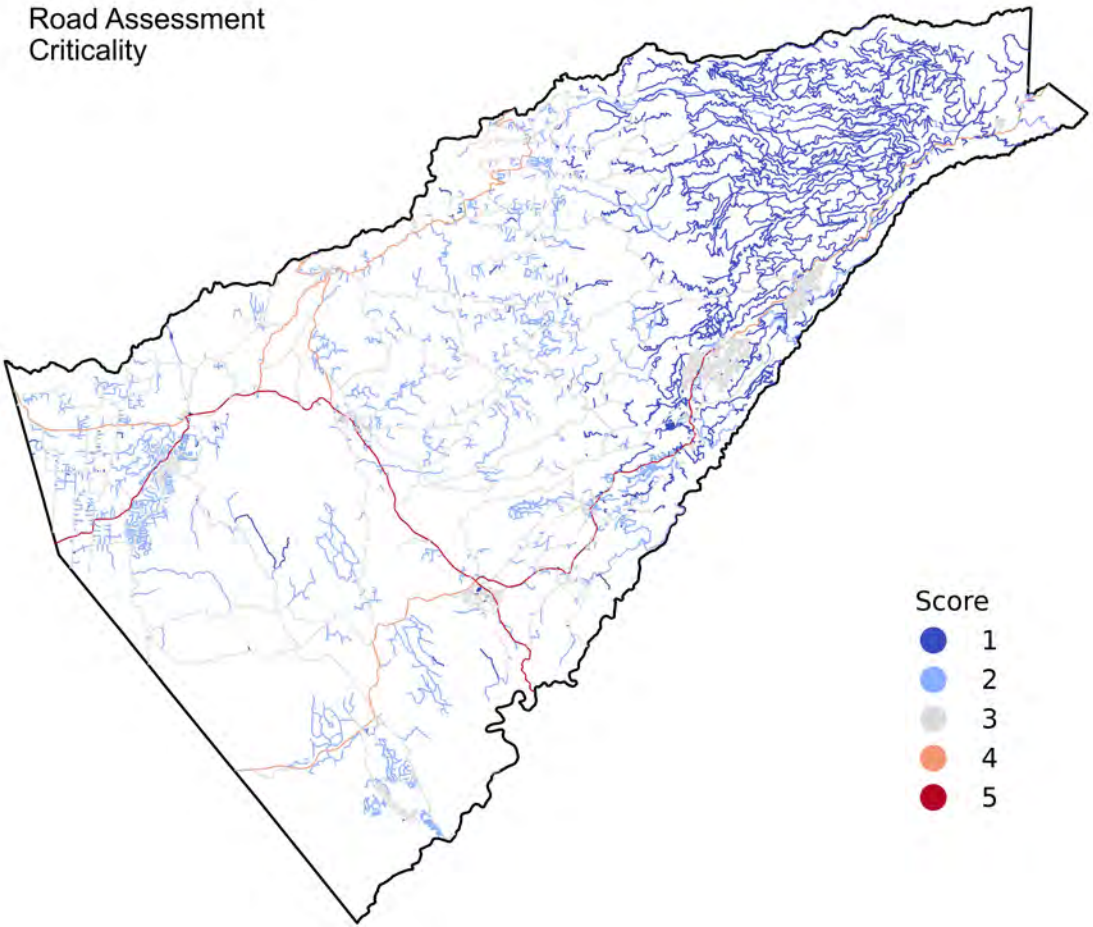
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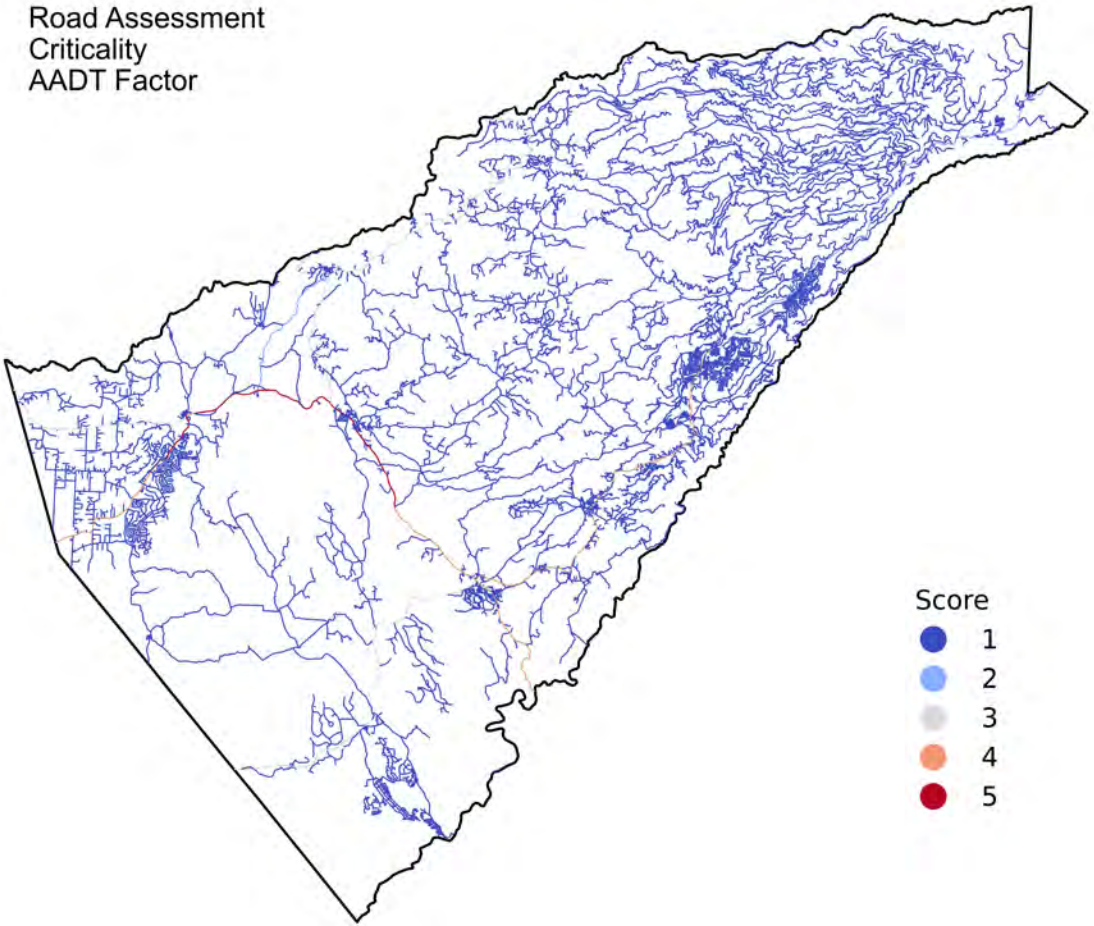
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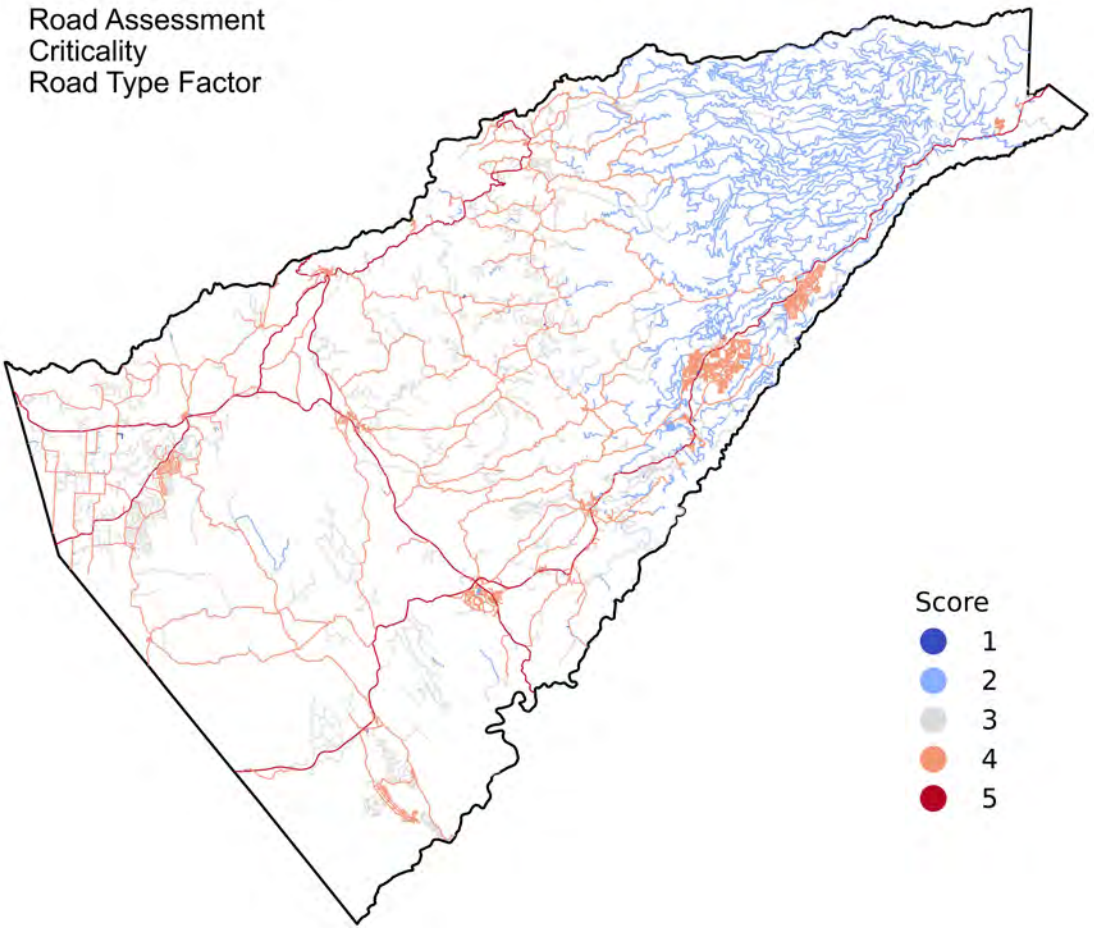
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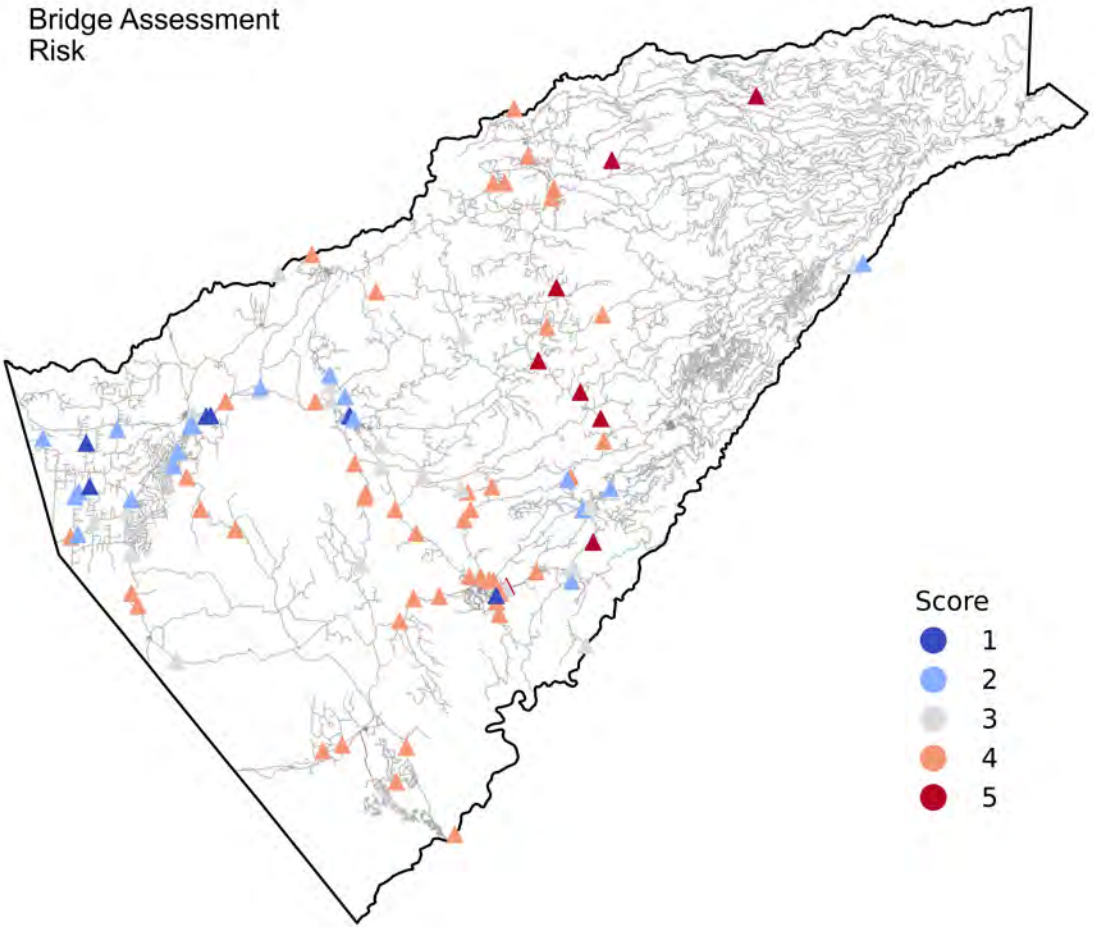
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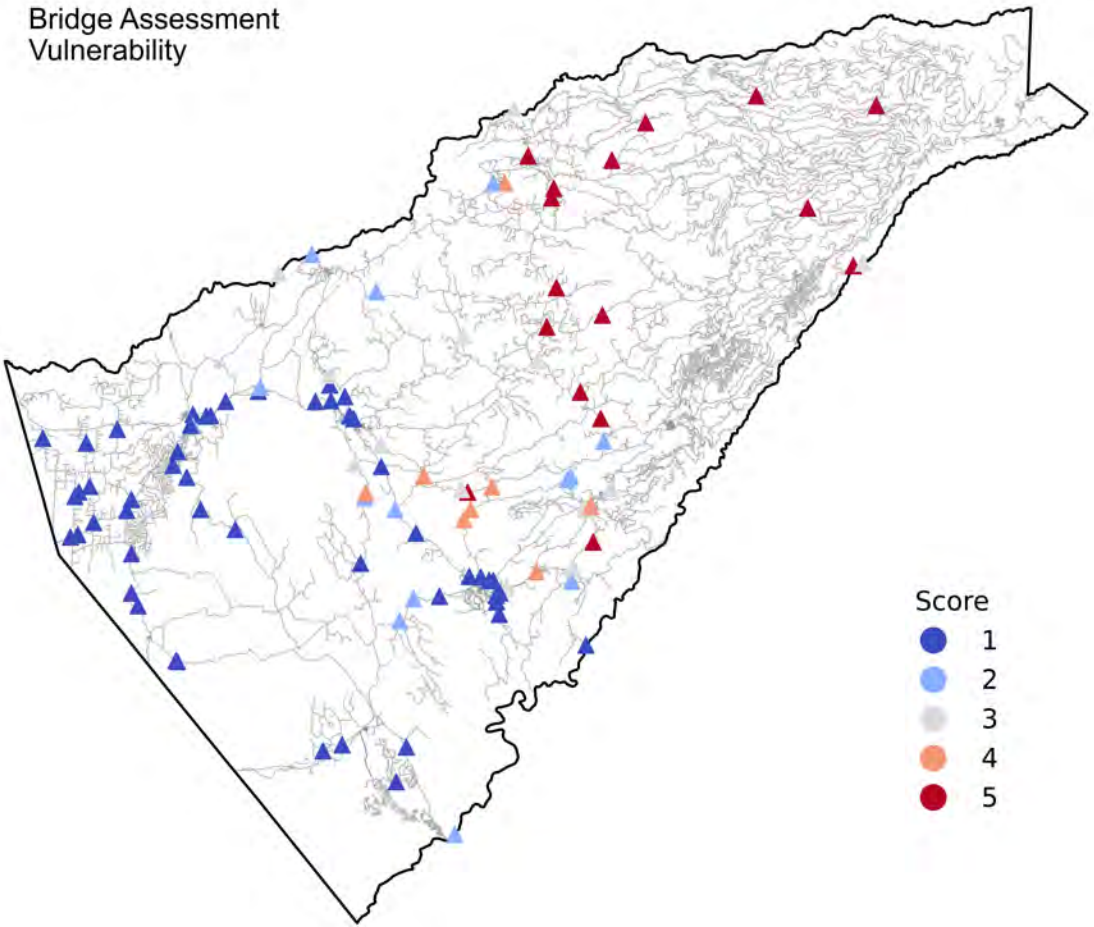
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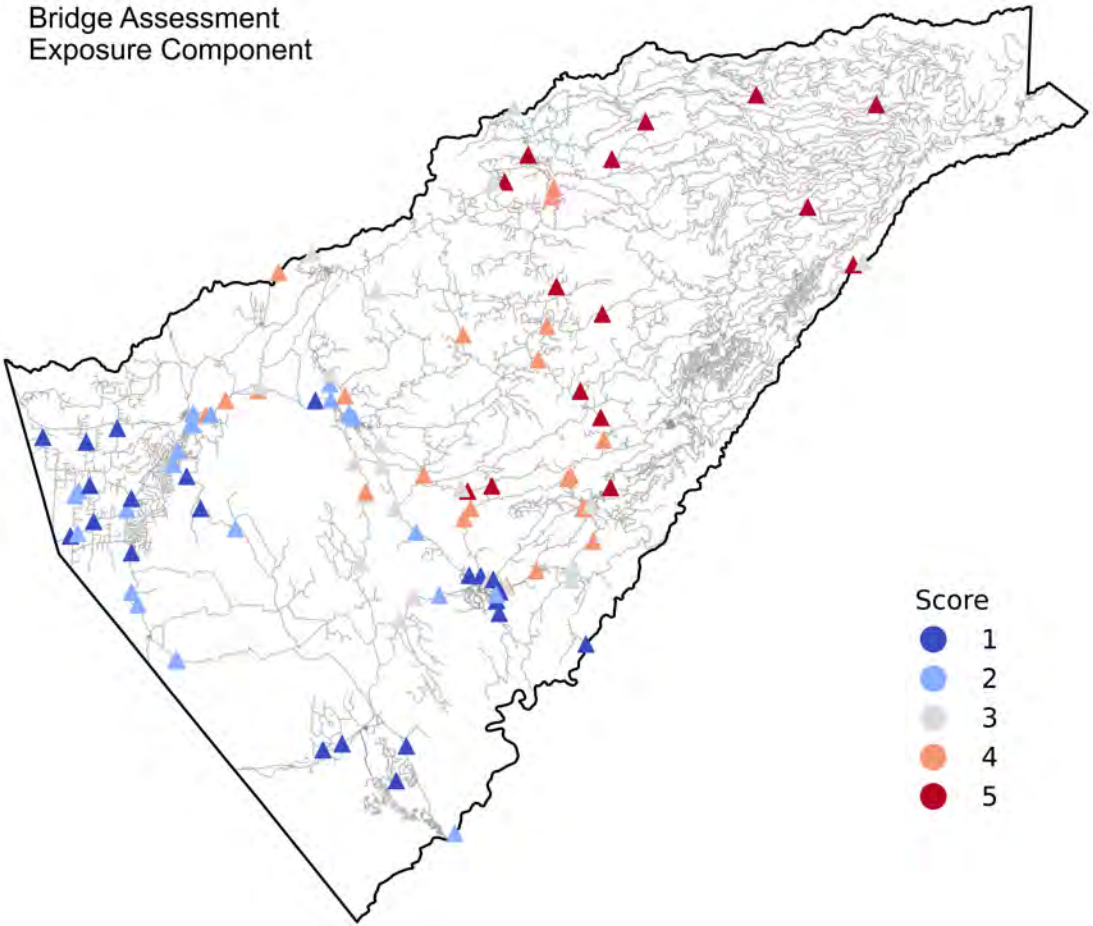
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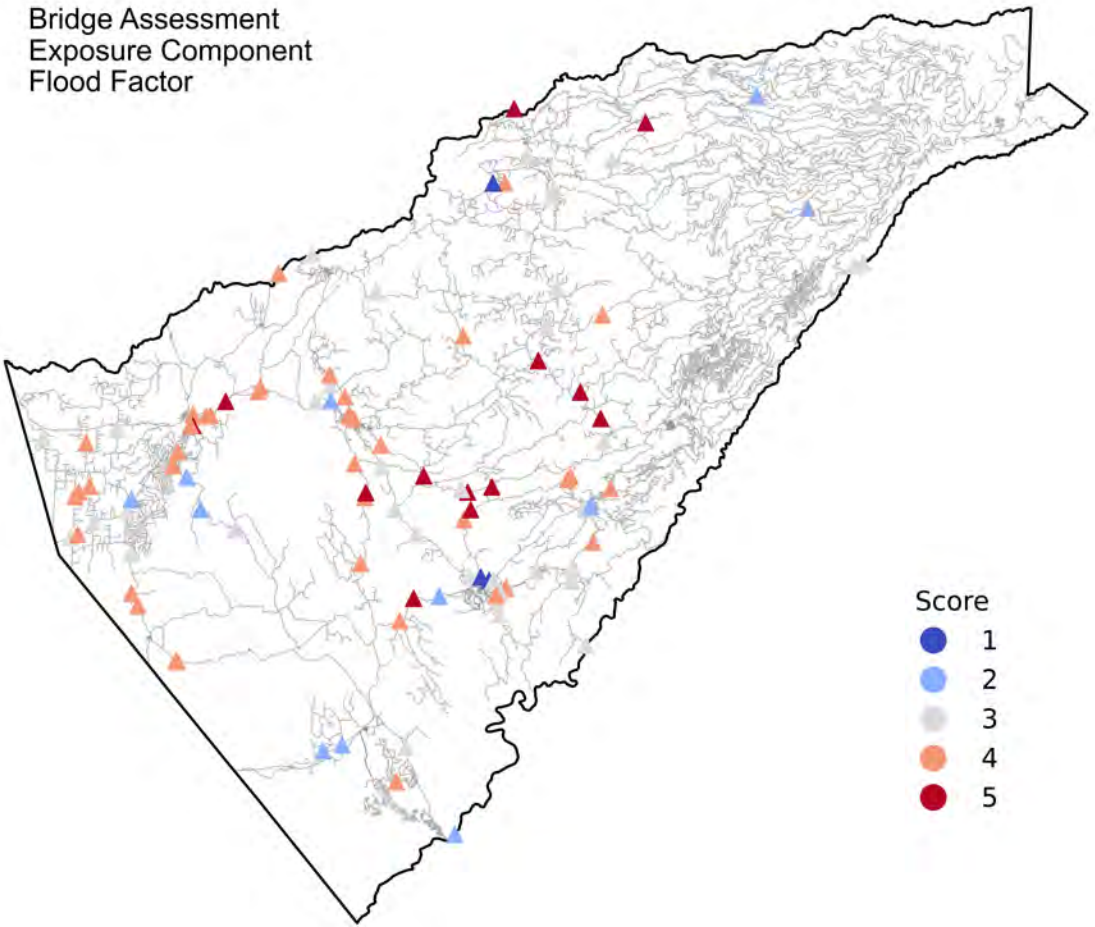
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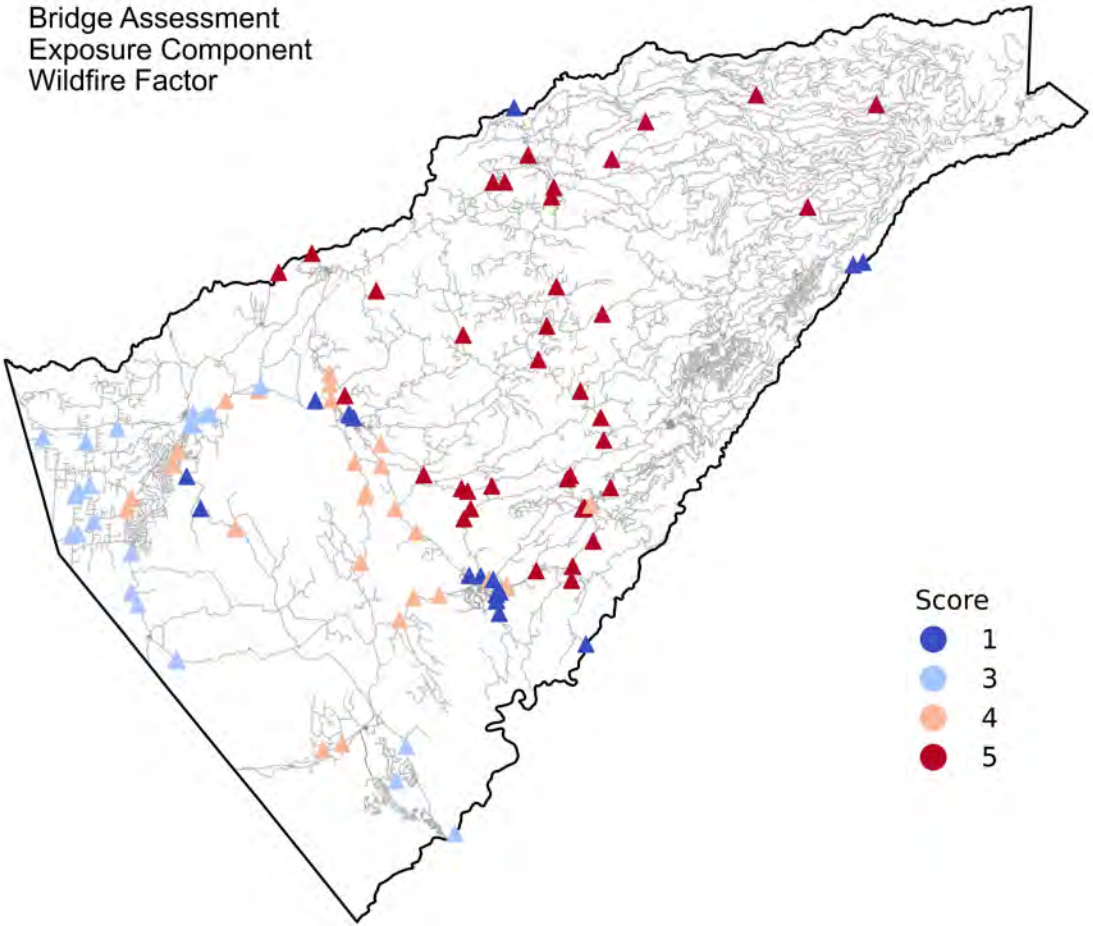
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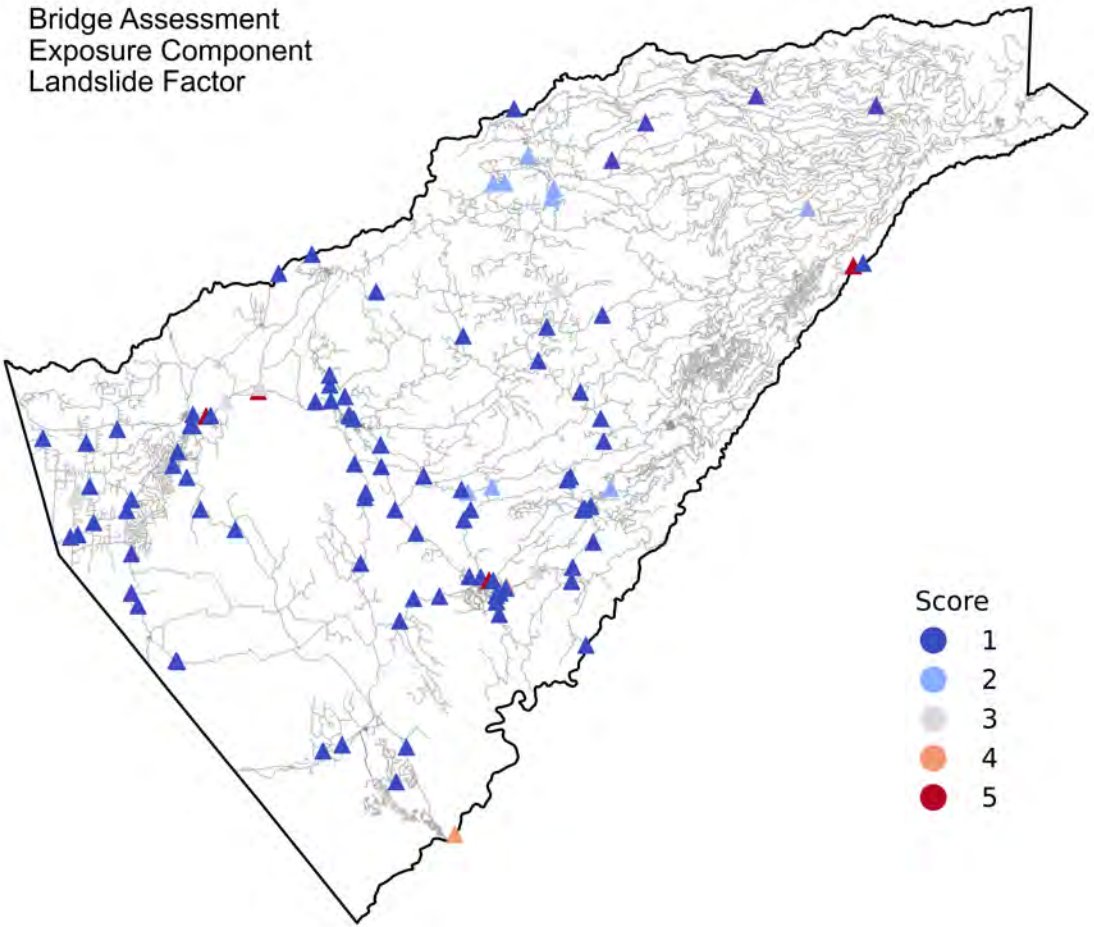
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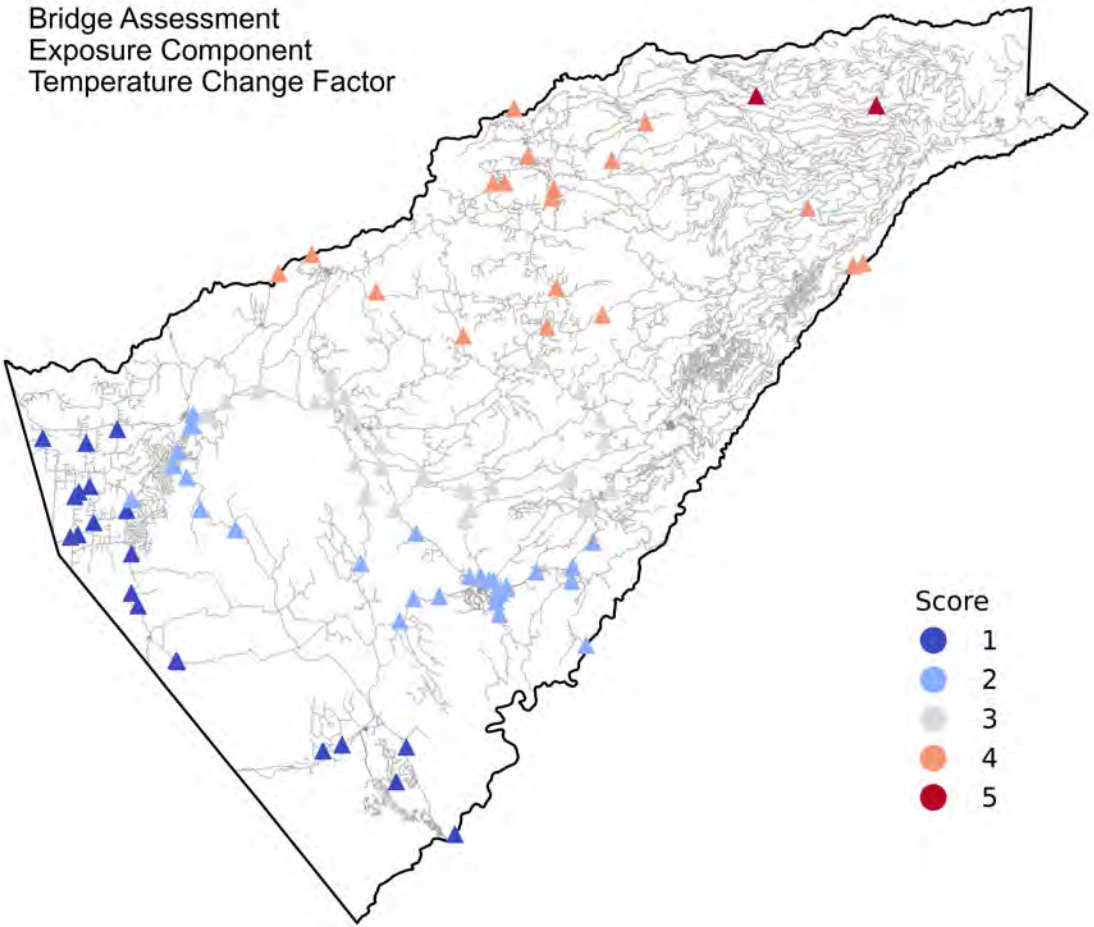
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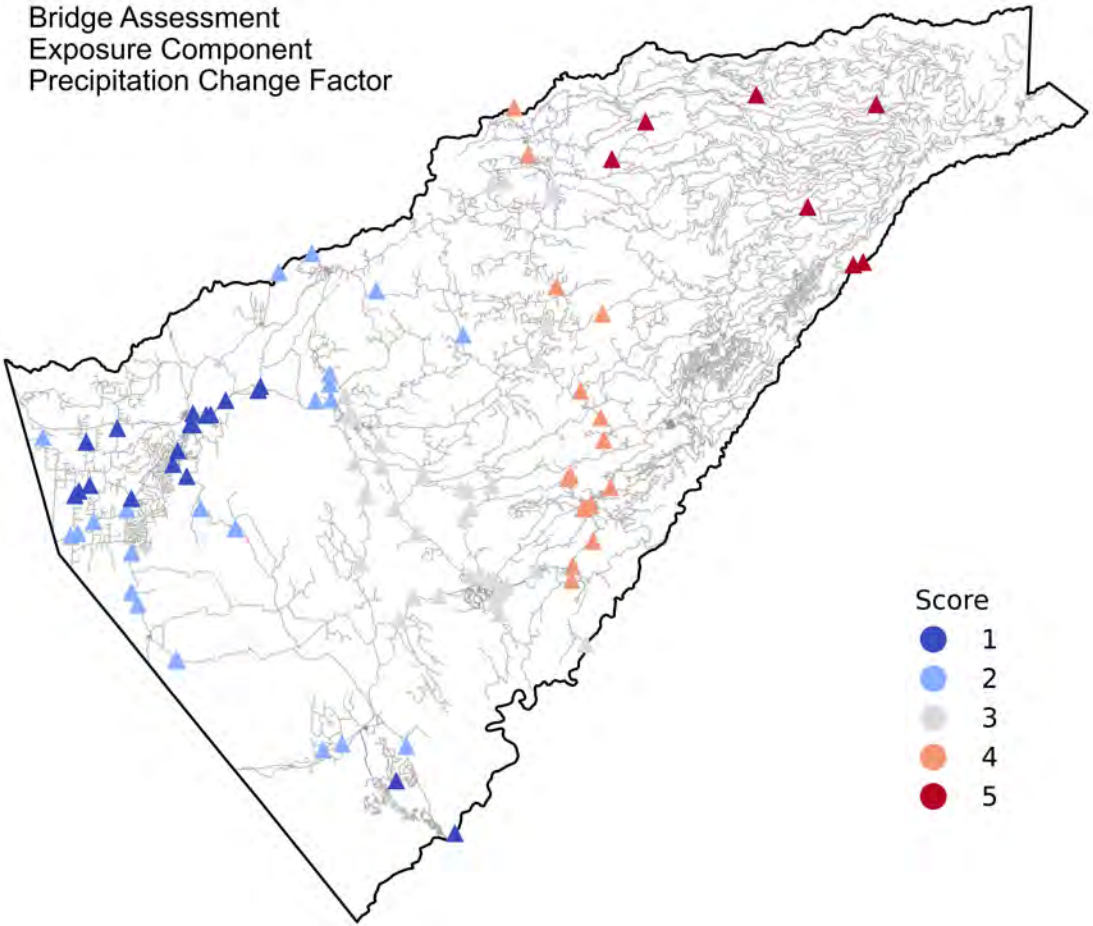
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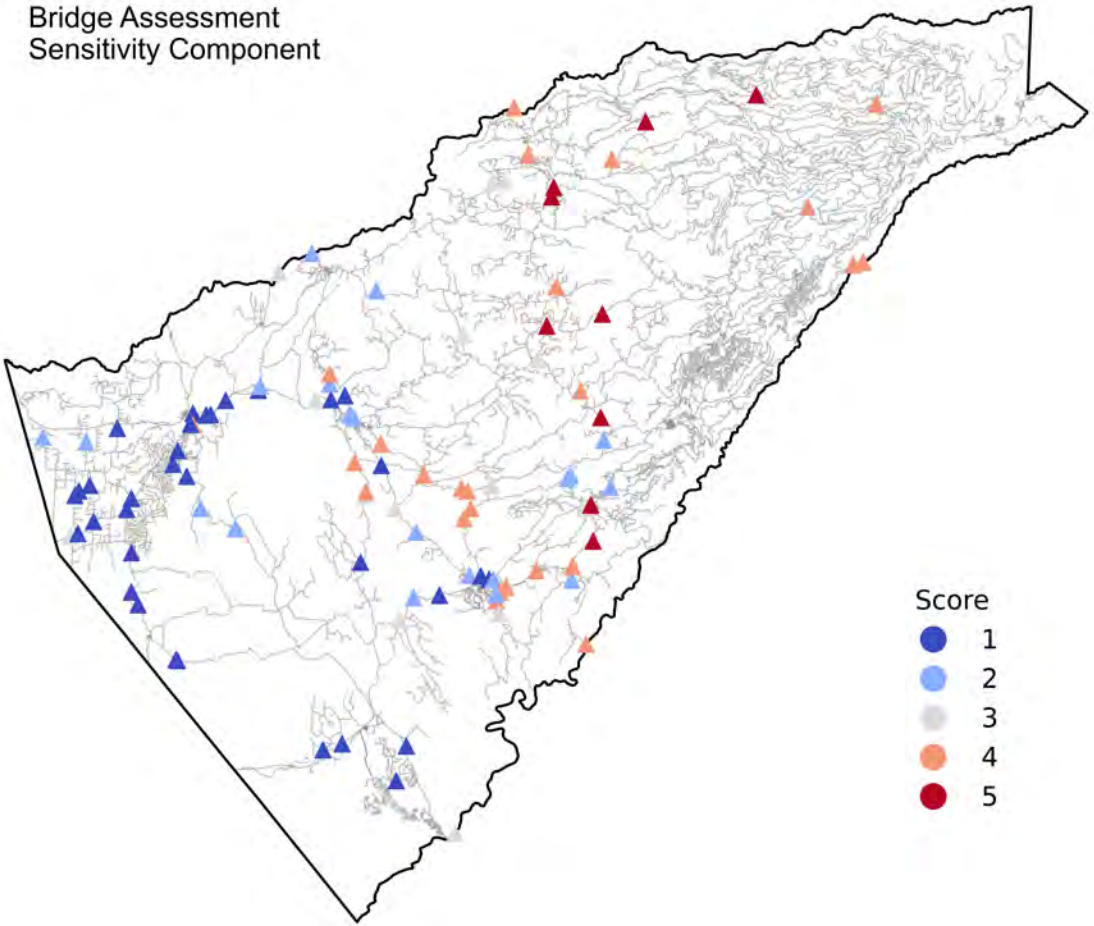
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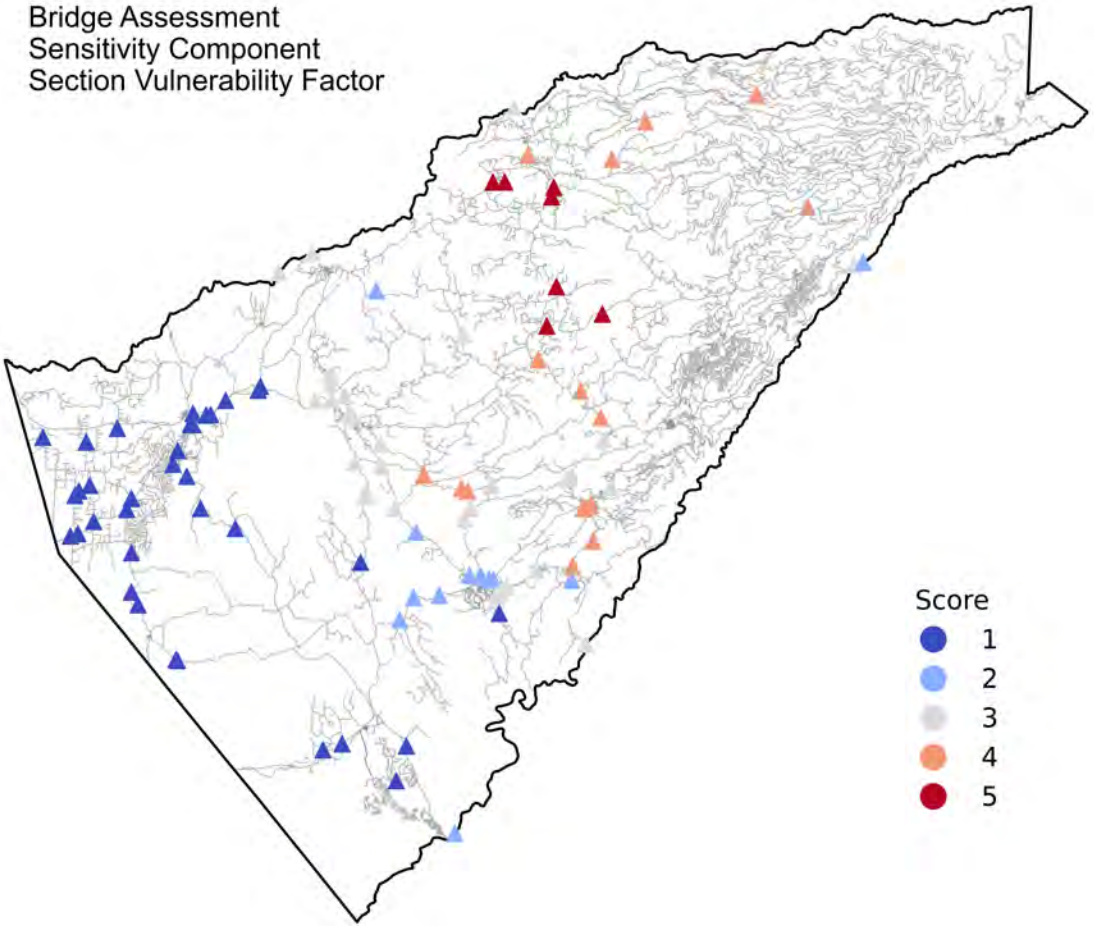
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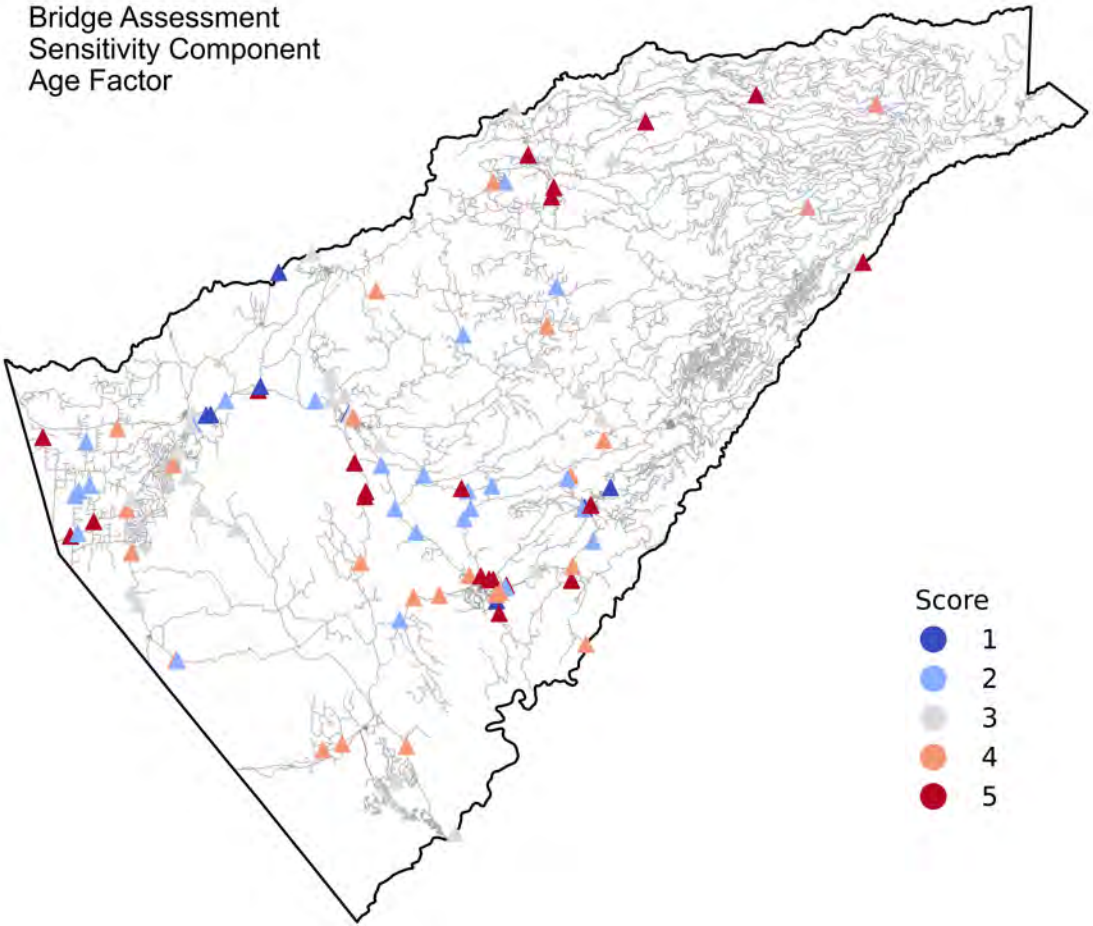
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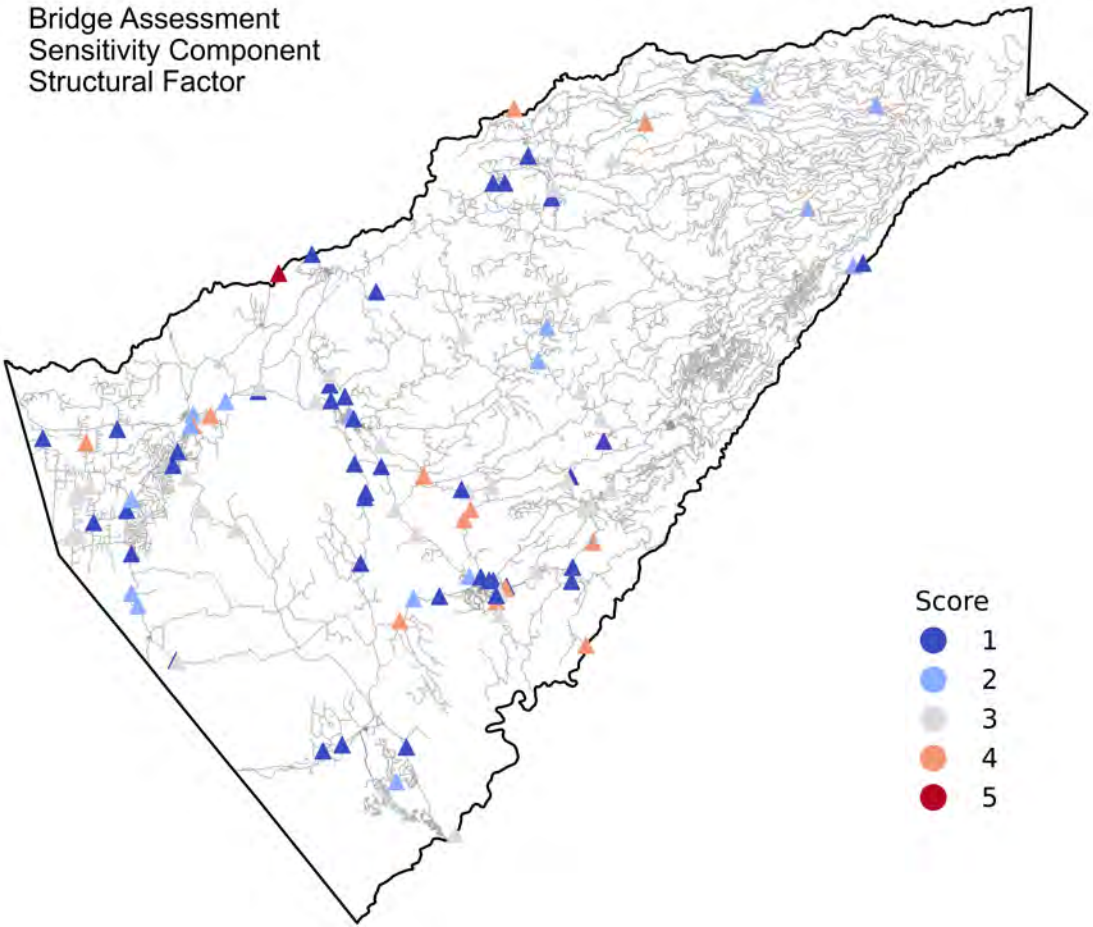
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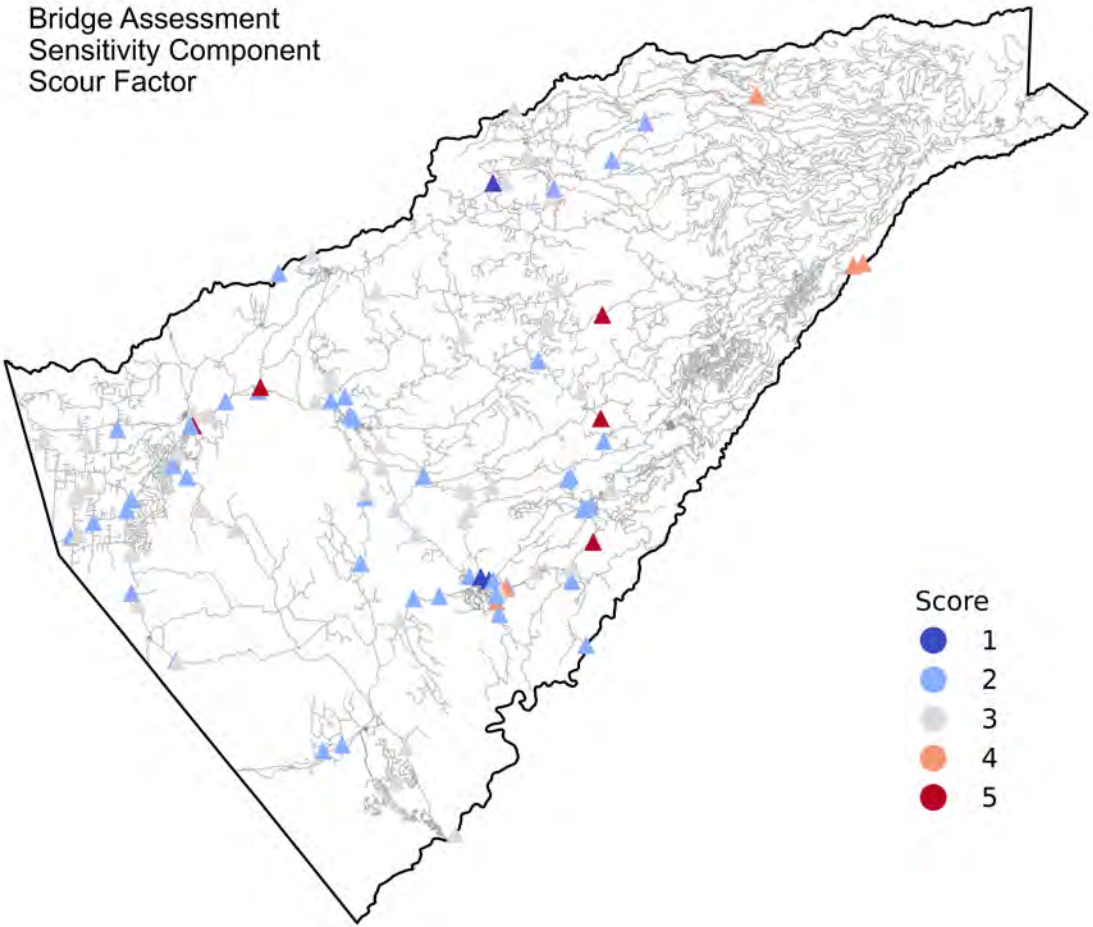
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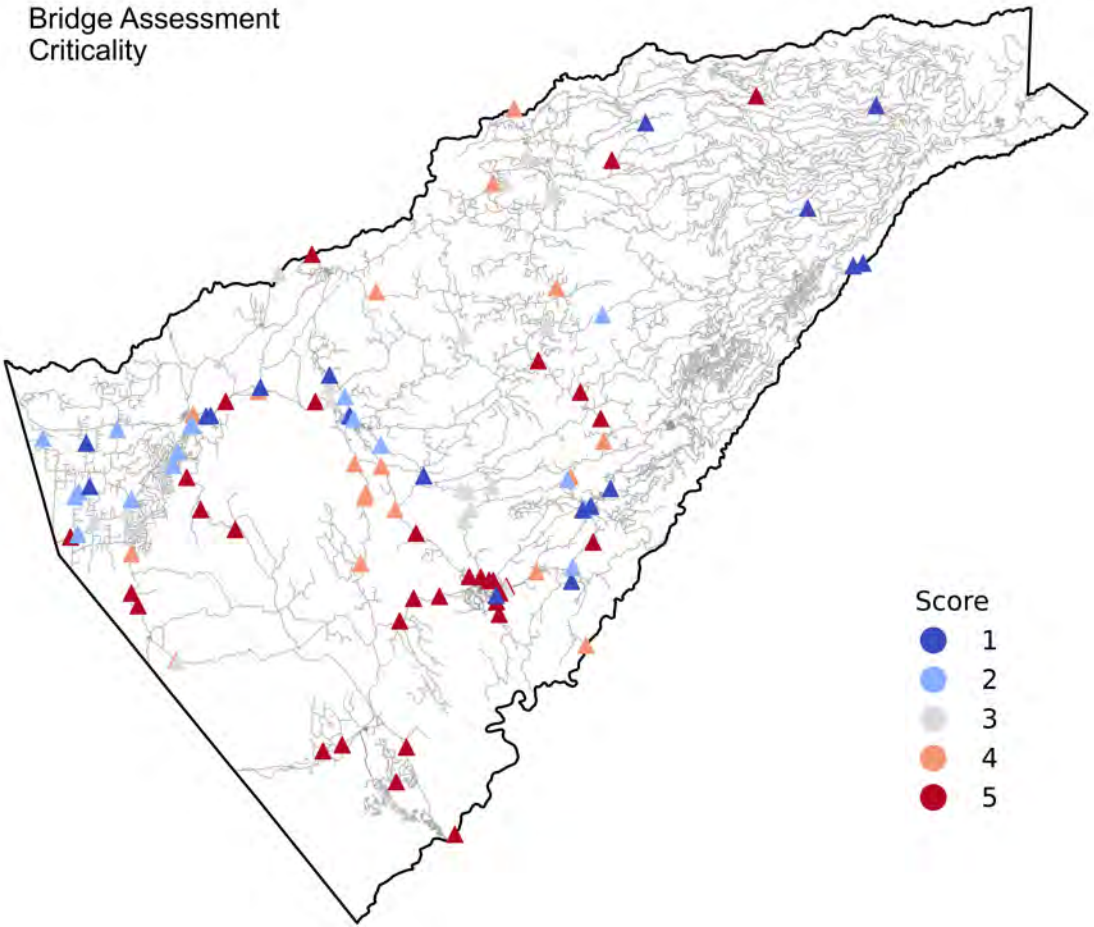
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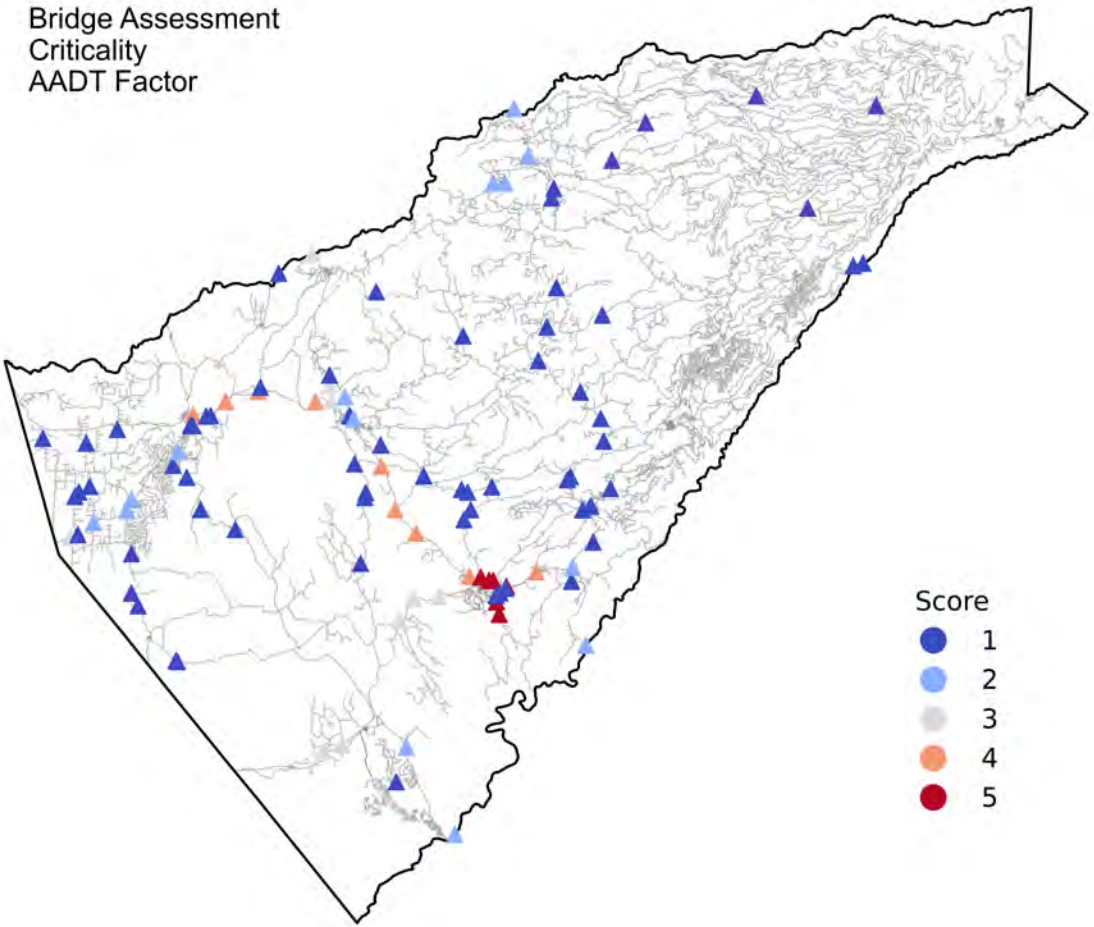
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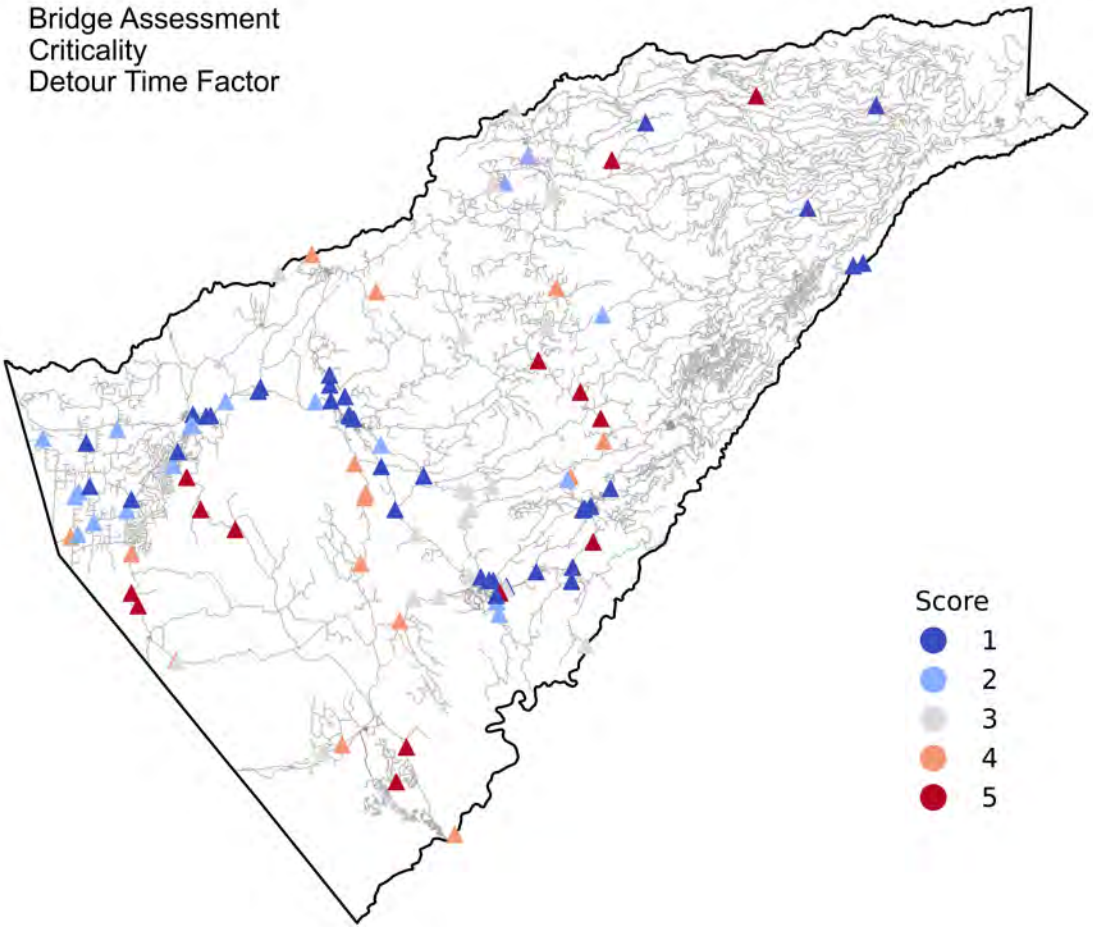
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Appendix G

Priority Corridors and Key Considerations for Future Evacuation Plans

CALAVERAS COUNTY EVACUATION AND NEEDS ASSESSMENT AND PREPAREDNESS PLAN

Priority Corridors and Key Considerations for Future Evacuation Plans

APRIL 2023

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Evacuation Routes and Emergency Access Needs

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1. Introduction

The Calaveras County Council of Governments (CCOG) is developing an Evacuation and Access Needs Assessment and Preparedness Plan for Calaveras County. The next step in developing this plan is identifying residents' priority routes and communications during evacuation events. Two tools were utilized to understand how the County functions during an evacuation event. Section 2 presents the results of this data platform which utilizes location data of devices and vehicles to understand which routes residents currently use to travel through and exit the County. Section 3 presents the results of a community-wide survey designed to understand concerns related to evacuation routes and communication platforms. And Section 4 presents projects aimed at mitigating the risks along the priority corridors.

2. Priority Corridors

A foundational element of this evacuation needs assessment is understanding the County's current roadway network use. For example, which roads does each community rely on? Which roads are the most heavily traveled? And which local roads are used as bypasses or parallel routes? To answer these questions, we used a web-based data platform Replica®. This platform utilizes GPS-based data from smartphones and vehicle computers to understand who travels on roadway segments and for what purpose. For this initiative, data was filtered only to report the following:

- Trips by Calaveras County Residents
- Starting at their home location
- Traveling a distance greater than 65 miles

With these data filters, the platform highlighted exit routes and the percentage of vehicles on each road. Calaveras County has a considerable number of part-time residents and vacation homes; however, this information was not able to be modeled or filtered using Replica®. The reader is cautioned that this data platform uses a combination of actual data and algorithms to create a travel pattern model. These models can provide less-than-perfect vehicle counts, but they provide highly reliable percentages. Therefore, the data in the tables below are shown as percentages. This model run utilized an average Thursday in the Fall of 2021. The model cannot be run to pinpoint a specific event day, so the trips presented reflect the travel patterns under non-emergency conditions.

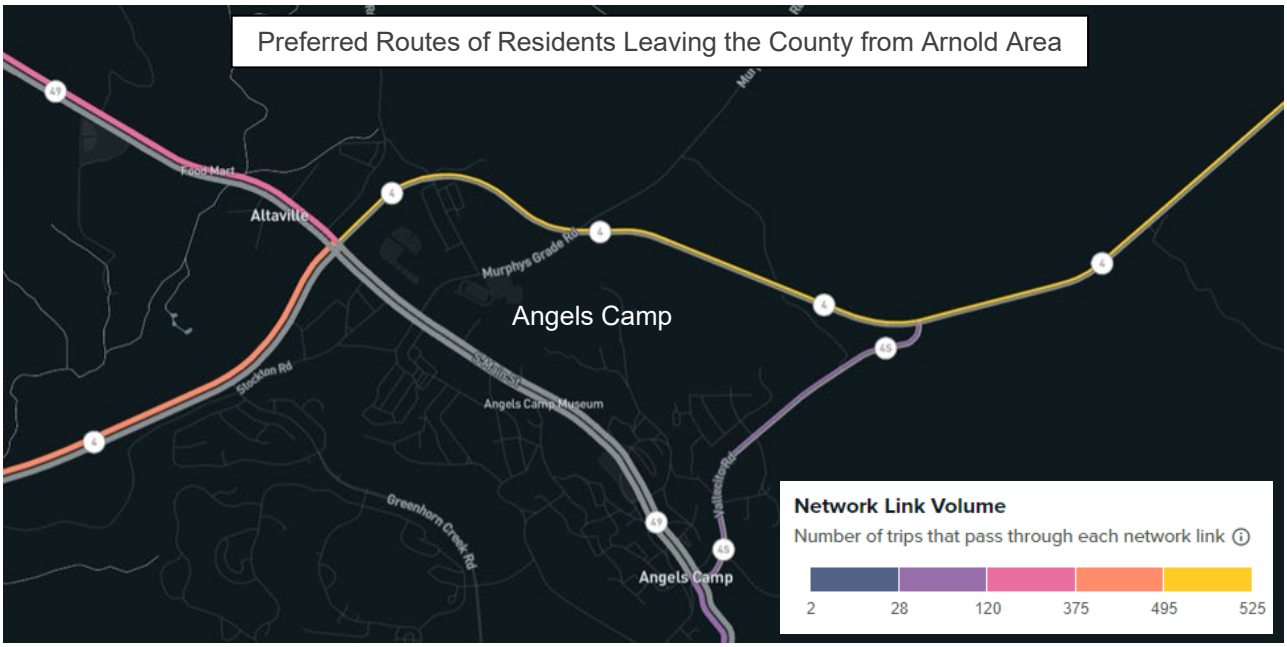


Figure 1: Routes of Hwy 4 Up-Country Residents Leaving the County

While Calaveras County has just one incorporated City, it has many Census-Designated Places (CDPs). CDPs are statistical geographic entities representing closely settled, unincorporated communities locally recognized and identified by name. They are the statistical equivalents of incorporated cities but lack legally defined boundaries and governmental structure administered by elected officials. CDPs are areas with a population concentration with a locally recognized name. Figure 2 shows the CDPs within Calaveras County and the comparative populations of each.

Interestingly the model illuminated several County Maintained roads that are used as more direct routes through and out of the County. Therefore, each local roadway exiting CDPs was evaluated, and the percentage of traffic carried was reported. As a result, these local roads should be given priority in future evacuation plans.

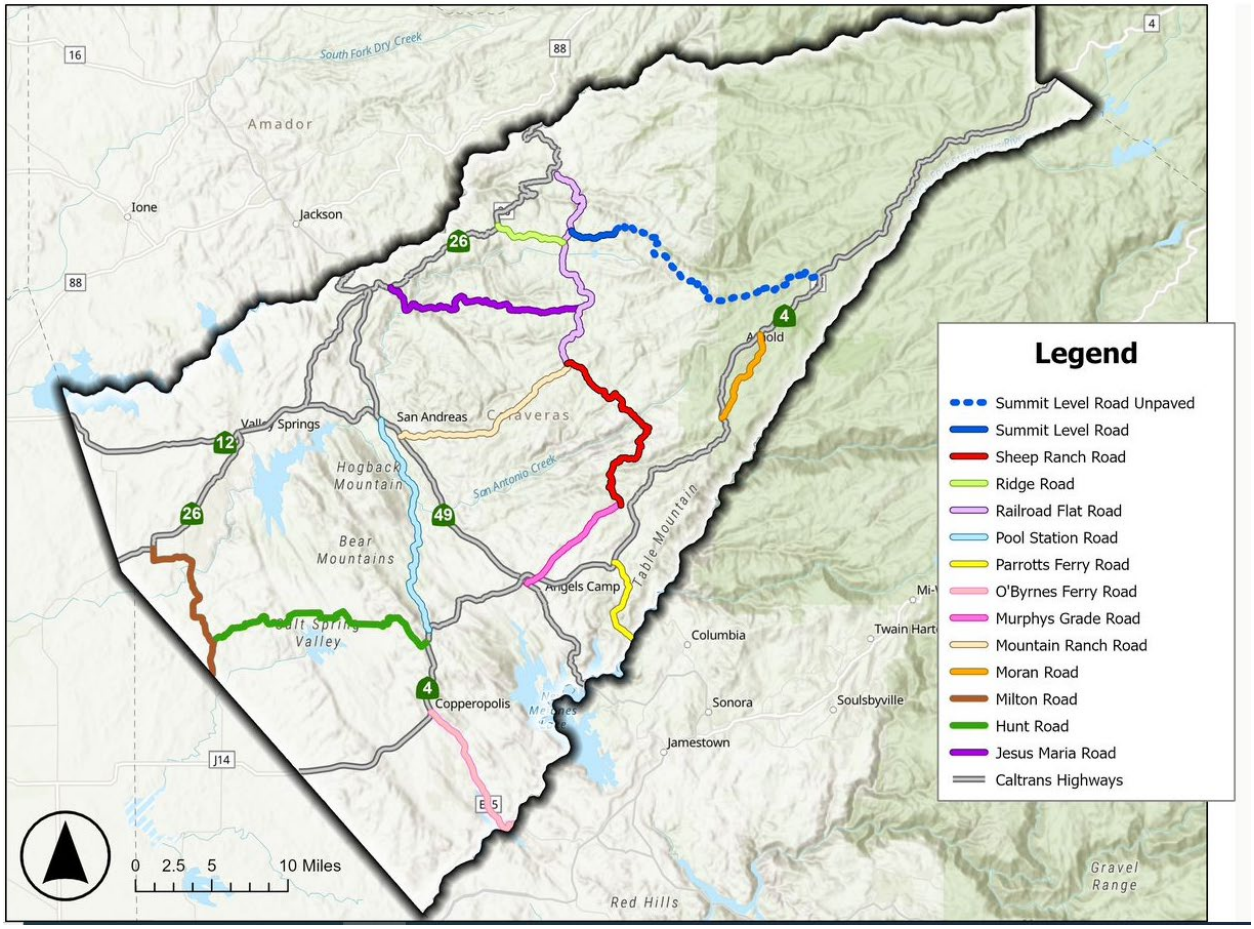


Figure 2: Census Designated Places and Primary Roadways

2.1 Priority Exit Routes

Four two-lane state highways and three local roads serve Calaveras County and provide exit routes. The state highways are State Route (SR) SR-4, SR-49, SR-12, and SR-26, and the local roads are O'Byrnes Ferry Road, Parrotts Ferry Road, Milton Road and Burson Road. State Routes 4, 12, and 26 run east-west, with SR-4 being the only route to exit the County's eastern boundary. SR-12, 26, and 4 exit the County's southern border. SR-49 is the only north-south running route. However, SR-26, which generally runs east-west, turns north at its eastern end, crossing the county boundary 12 miles east of the SR-49 county exit. Altogether these routes provide ten entrances and exits from the County. The state highways are maintained by Caltrans, which staffs four maintenance facilities throughout the County. These facilities are in Angels Camp (SR-49), West Point (SR-26), Camp Connell (SR-4), and Cabbage Patch (SR-4, winter only). The County Public Works Department maintains the local roads.

In addition to the priority exit routes, it is important to note the westside, north/south connection corridor, Burson Road, from Comanche Parkway to Milton Road for State Routes, SR-4, 26, 12, and 88. This connection is crucial and allows emergency response teams an alternative route, avoiding bottlenecks and road closures on the State Routes.

Table 1 presents the roadways residents use to leave the County. For this analysis, the whole County was selected as the trip origin, and surrounding counties were selected as destinations. Table 2 below isolates each community to understand community-specific preferred exit routes better. For this analysis, the distance traveled by residents when leaving the County was

Table 1: Routes Used by Residents to Leave the County							
Route		AADT*	Trip Length When Leaving the County				Average Use of Route by Residents Leaving the County
			> 15 Mi	> 30 Mi	> 45 Mi	> 60 Mi	
West	CA 4	6070	12%	21%	33%	36%	25%
East	CA 4	692	0%	0%	1%	1%	1%
South	CA 49	7840	9%	4%	4%	2%	5%
North	CA 49	5880	17%	7%	8%	9%	10%
West	CA 12	6630	21%	29%	28%	28%	27%
South west	CA 26	4750	17%	23%	12%	13%	16%
North East	CA 26	1110	3%	2%	3%	4%	3%
O'Byrnes Ferry Rd		4010	7%	3%	3%	2%	4%
Parrotts Ferry Road		2760	7%	3%	1%	0%	3%
Milton Road		1120	2%	3%	2%	2%	2%
Pardee Dam Road		1550	3%	3%	5%	2%	3%

*AADT: Annual Average Daily Traffic
**Average percentages of residents utilizing each route for trips longer than 15, 30, 45, or 60 miles.

The data above in Table 1 were filtered by the following:

- Trips by Calaveras County Residents;
- Trips that start from Calaveras County;
- Trips that conclude in counties other than Calaveras County; and
- Traveling a distance greater than 15, 30, 45, and 60 miles.

Table 1 summarizes results from the Replica® model for the eleven roadways that can be used to exit the County. To adequately capture data that is representative of the County, the model was run for four different scenarios with travelling distances set at 15, 30, 45, and 60 miles, respectively. The purpose of running the model with varying travelling distances was to make certain all residents were included - from those who live close to the County border i.e, West Point, and residents who live further from the County

border, i.e, centralized communities. To conclude the results, an average percentage from the various traveling distances was determined.

The data run reveals that for residents traveling 15 miles or more to leave the County, 21% of residents use SR-12, 17% of residents use both SR-49 (north) and SR-26 (south west) and 12% of residents use SR-4 (west). Each of the remaining corridors are all utilized less than 10% for residents leaving the County.

Results for residents traveling 60 miles or more to leave the County indicates that SR-4 (west) is utilized the most with 36% of residents using the route. 28% and 13% utilize SR- 12 (west) and SR-26 (southwest), respectively. Less than 10% of residents utilize each of the remaining routes.

The average percentage from all travel distances revealed SR-12 (west) being the most used corridor with 27% of residents choosing the route as a county exit. SR-4 (west), SR-26 (southwest) and SR-49 (north) had average percentages of 25%, 16% and 10%, respectively. The SR-12 route provides the shortest path to Sacramento, while both SR-26 and SR-4 lead to Stockton. SR-49 serves as a primary connector for the respective State Routes. All four roadways offer access to SR-99 and Interstate-5 (I-5), both regionally significant north-south freeways used to access California's central Valley. SR-4 ultimately connects to the San Francisco Bay Area.

Once the County resident's exit road preferences were understood, the model was refined to understand the exit routes for each populated area. Residents rely on state highways as the primary routes through the County. However, several small towns in the northern and central portions of the County rely on County maintained roads to access the state highway system.

Table 2 shows the preferred exit roads for each community and the percentage of residents that use each. Similar to the limited roadway options for residents in the center of the County, the SR-4 corridor north of Vallecito provides access to one of the largest population groups. Unfortunately, this corridor has few alternate roadways and similarly will require special considerations for evacuation.

Table 2: Community Prefered Exit Routes

Community(s)		POPULATION	W 4	W 12	N 49	SW 26	E 4	NE 26	S 49	SW OBYRNESF ERRY ROAD	S PARROTTS FERRY ROAD	S MILTON ROAD	SW MURPHYSG RAD ROAD	W RAILROAD FLAT ROAD
North County	HWY-4 Up-Country Corridor	8,156	50%	2%	9%		2%		7%		24%		4%	
	West Point, Rail Road Flat	1,004		26%	11%	2%		40%	6%			6%		9%
	Mountain Ranch, Sheep Ranch	275	2%	42%	21%	13%			11%		10%			
Central County	Mokelumne Hill	691		31%	39%	29%								
	San Andreas	2,994		59%	12%	9%			15%					
	Angels Camp	3,667	72%	12%	7%	1%			5%					
South County	Copperopolis	3,400	70%				1%		1%	24%				
	Valley Springs & Rancho Calaveras	9,369		39%	2%	47%			4%			5%		

The data above in Table 2 were filtered by the following:

- Trips by Calaveras County Residents;
- Trips that start from each community based on block groups;
- Trips that conclude in counties other than Calaveras County; and
- Traveling a distance greater than 30 miles.

2.2 Priority Local Roads

State-maintained highways pass through most population centers in Calaveras County. While having a highway double as a Main Street has disadvantages, the trade-off occurs with improved access. Caltrans maintains high-quality roads through evolving design criteria and continuous investment. However, the County does not have access to the same resources, so County roads do not evolve at the same pace.

As shown in Figure 2 and confirmed with Table 2, several Calaveras County Communities do not benefit from direct access to a state highway. These communities are Mountain Ranch, Sheep Ranch, and Rail Road Flat. Therefore, these communities will require special consideration while developing an Evacuation Plan.

An interesting observation from this community-focused model run is that residents on the north-to-south running routes of SR-4 and SR-12/SR-26 use the connection of SR-49 between San Andreas and Angels Camp to cross to the other north-south route. While SR-4 is the most heavily used exit point, SR-49 between San Andreas and Angels Camp is the most heavily traveled east-west roadway segment. Therefore, this roadway segment also merits careful consideration for evacuation.

Most Calaveras County communities have less than four viable exit routes. And even the communities with more than two exit routes rely heavily on one or two primary roadways, with the third used by single-digit percentages of the population.

In addition to State Highways, several two-lane local roads are used as parallel routes, bypasses, and arterial roadways. Table 3 identifies key local roads, their direction, and the communities they serve.

Table 3: Priority Local Roads and the Communities Served

Local Road	Community(s) served	Direction of Route
Parrotts Ferry Road	Vallecito, Communities east and west of Vallecito on SR-4, Angels Camp	North-South to SR-4
O'Byrnes Ferry Road	Copperopolis	North-South to and from SR-4
Pool Station Road	San Andreas, Copperopolis	North-South Between SR-49 and SR-4
Milton Road	Valley Springs, Rancho Calaveras	North-South to and from SR-26
Sheep Ranch Road	Sheep Ranch, Mountain Ranch	North-South to SR-4
Mountain Ranch Road	Mountain Ranch, Sheep Ranch	East-West to SR-49
Jesus Maria Road	Railroad Flat	East-West to SR-26
Railroad Flat Road	Railroad Flat and Sheep Ranch	North-South to Ridge Road and Sheep Ranch Road
Ridge Road	Railroad Flat	East-West to SR-26
Summit Road	Railroad Flat, Dorrington	East-West
Vallecito Road	Angels Camp	North South Bypass for SR-4 to SR-49

3. Community Outreach Survey Data

To fully understand the evacuation needs of Calaveras County and supplement the stakeholder interviews, online surveys were prepared for three different focus groups: Community, First Responders, and Critical Facilities. These interactive online surveys were available for two months. The community was asked to take the survey through a variety of outreach methods, including:

- Email with survey links provided to the project stakeholders.
- Direct email to each stakeholder
- Targeted emails to representatives of community groups and facilities
- Through outreach materials handed out at a widely attended Angels Camp Farmers Market
- Links provided on the project website
- Calaveras Council of Governments (CCOG) Facebook posts and on the CCOG August Meeting Agenda

A unique aspect of the selected survey platform is the ability for survey takers to share the survey link on various social media platforms, expanding the survey reach.

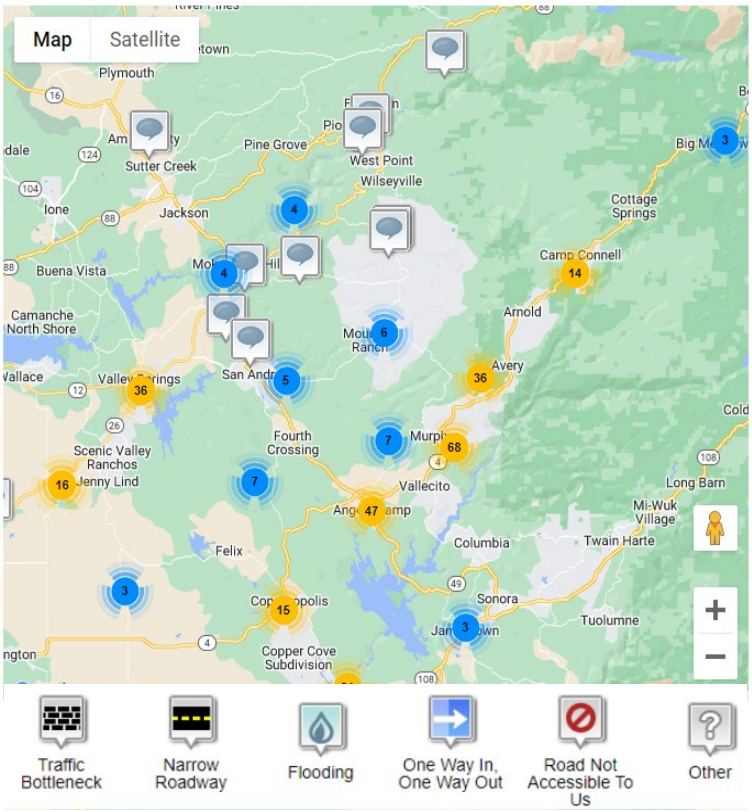


Figure 3: MetroQuest Map Markers Results

Each survey consisted of five screens, the first being the welcome and introduction and the last being the wrap-up. The second screen asked a series of questions in a standard survey format. After the questions screen, each survey had an interactive screen that presented options to help identify priorities. For example, the Community Concerns Survey asked survey takers to rank the types of natural disaster events that concern them most, while the First Responders Survey asked about agency preparedness. The fourth slide was also interactive, providing a google earth map that survey takers could zoom in and out of and navigate to specific areas of concern. Once the location had been reached, survey takers could drop markers on the map and tell us more about why they identified that location. As seen from the Map Markers Results screen, figure 3 shows survey takers placed pins all over the map and for all communities indicating the broad reach of the survey. The map screen alone collected three hundred and nine pins. Of those, ninety-seven identified the locations of Traffic Bottlenecks, eighty-three pointed out narrow roadways, seventeen identified flooding issues, and forty-nine *other* pins were placed with associated user comments. A summary of all comments is provided at the end of this report.

In general, the comments received mirrored the sentiments from the in-person interviews. Below are the key survey results, following images of each of the three surveys.

3.1 Disaster Event Concerns

As seen in Figure 4, Wildfire, Extreme Winter Storms, and Extreme Drought were the top three natural disasters that concerned residents the most, followed closely by Extreme Heat.

Of these concerns, wildfires are the only disaster that appears unexpectedly, minimizing the time residents have to evacuate. While all events are cause for serious concern, most comments received related to the County's roadways and capacity to accommodate sudden significant evacuations due to wildfire events.

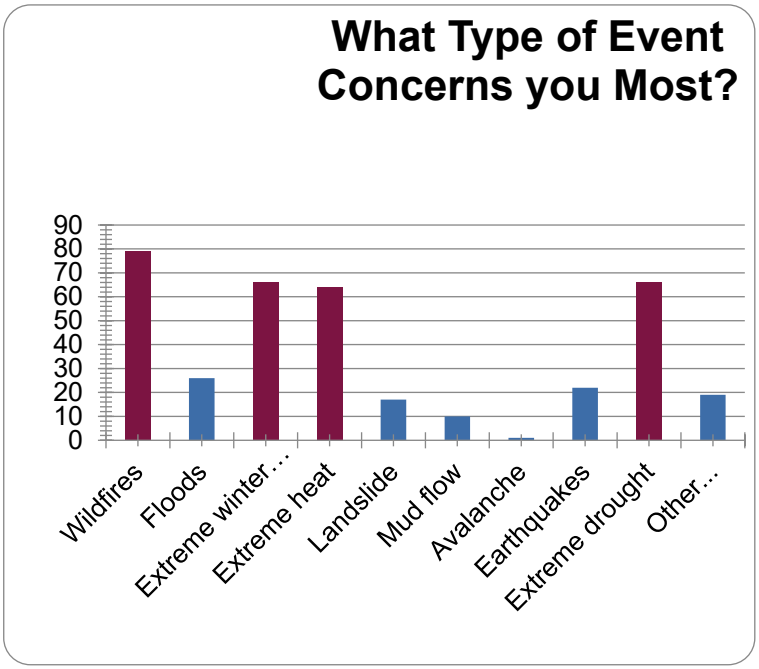


Figure 4: Survey Results – What Types of Events Concern You Most?

3.2 Modes of Transportation

When asked about the type of transportation residents relied on, the overwhelming majority relied on private passenger vehicles for transportation, with just one survey taker relying on public transportation. Informal discussions with residents during an in-person event highlighted several types of facilities where residents cannot drive and would require commercial vehicles for transport. The facilities mentioned were primarily resident care homes and senior living facilities. In addition, transportation would need to be determined for the local hospital and correction facility. While Hospitals and correctional facilities have unique needs that need to be considered in individualized evacuation plans, Calaveras transit (Calaveras Connect) has vehicles that can assist with targeted residential evacuations. Including Calaveras Connect as an option in residential evacuations has the added benefit of reducing the number of single-occupancy vehicles on the roadway network during evacuation events. Early coordination with transit should be considered in care facilities' evacuation plans.

3.3 Local Roads of Concern

All three surveys asked which roads were the highest priority to be maintained for evacuations and access. Figure 5 shows the results of this question. Interestingly, the top four results mirror the results presented in section 1. However, other local roads were identified by a large number of survey takers as high-priority roads. This discrepancy is because while the other roads do not carry much traffic, they are the only routes available to communities with no highway access. Therefore, the roads serving the communities of Sheep Ranch, Mountain Ranch, and Railroad Flat merit special consideration in developing a county-wide evacuation plan.

The other local roads of concern identified in figure 5 are listed in Table 4 below.

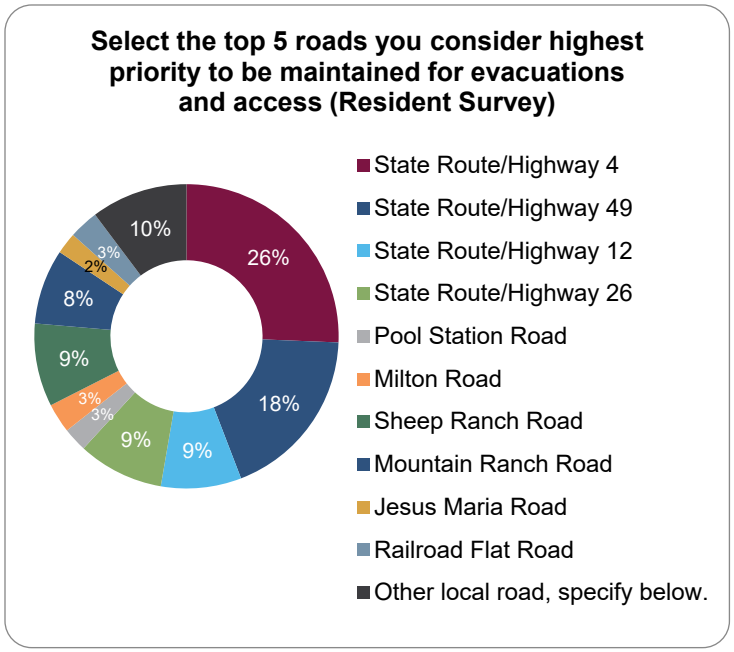


Figure 5: Survey Takers Priority Roads

Table 4: Other Local Roads of Concern			
Finnegan Lane	Monge Ranch Road	Morgan Road	Pennsylvania Gulch Road
Parrotts Ferry	Skyline Drive	Skyhigh Ranch	Lilac Drive
O'Byrnes Ferry Road	Fullen Road	French Gulch	Little John
Ponderosa Camp	Forest Meadows onto Hwy 4	San Domingo	Middle Bar/Guin Mine
Greenhorn Creek Road	Circle XX Roads		

3.4 Emergency Event Notification

Finding Information:

Across the three surveys, a typical response was that residents don't know where to go for information or where to evacuate.

Residents responded that 28% use Calaveras County OES Alert for Emergency Notifications, followed by 19% using various Facebook Groups for emergency information. Additional sources include MyMotherlode.com, fire.ca.gov (CalFire), and PineTree.net. Around twenty different platforms were identified where residents looked for information during emergencies. These sources are listed in Table 5.

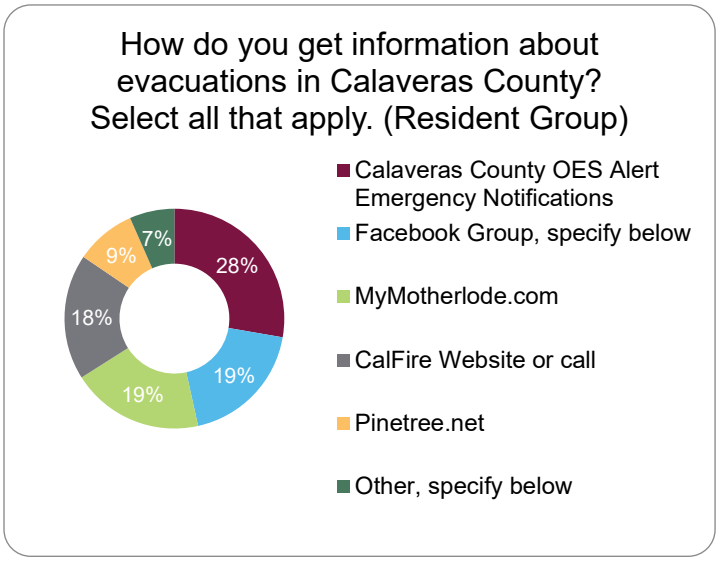


Figure 6: Where do you get your evacuation information?

Several residents commented that they get their information only from neighbors, with one stating that "my granddaughter's parents will call." And one resident said they have no way of knowing about evacuation events.

The First Responders groups stated that they get their information from the following platforms: OES Alerts, the Cal Fire Website, Calaveras Alert, ECC, Radio dispatch, phone, reports, community, Angels Fire, CCSO, dispatch centers, Emergency Command Center, Emergency Command Center TCU, and the Calaveras County Sheriff Office.

Table 5: Media Platforms used for Local information			
CalFire	Multi-County Fire & Police Amador Calaveras Tuolumne Valley Springs	Motherlode Fire & Police	Multi-County EMS
Sheriff's Department	Real Upper Highway 4	Hwy 4 Corridor Facebook Group	Forest Meadows Facebook Group
Tri-County Facebook Group	the Real Highway 4 Facebook Group	Sierra Rising	Ponderosa / Butte Mountain Residents
Citizens of Copper Cove	Murphys Bulletin Board	Neighbors	Watch Duty App
Zonehaven.com	Nixel	Flight Radar	Public Access channels
Nextdoor for Copperopolis	Nextdoor for Greenhorn	Nextdoor for Copper Cove	

Notifying Others:

The First Responders and Critical Facilities groups were asked how they notified people about the need to evacuate: The response was predominantly Text Notifications, with a few responding that they alerted people by email, phone calls, or in-person notifications. There was not a dominant form of notification identified. There was a strong consensus among survey takers that residents do not know what to do or where to go during an evacuation event.

Figures 7, 8, and 9 convey the First Responders and Critical Facilities' feedback about how their residents will respond during an evacuation event. On a scale of one to five, with five being the best, both surveyed groups responded that Calaveras County residents are not well notified during an event, do not know what to do, and do not know where to go. While out of the scope of this initiative, a well-publicized and utilized resident notification platform is recommended.

Figure 7: Are our Residents Well Notified?

An excellent suggestion through the first responder's survey was creating an alert system for Air B&B's, and better yet, a geofenced alert system that would push alerts to anyone with a cell phone within a certain area. An alert system cannot rely on cell phones alone because many areas have poor or no cell phone service.

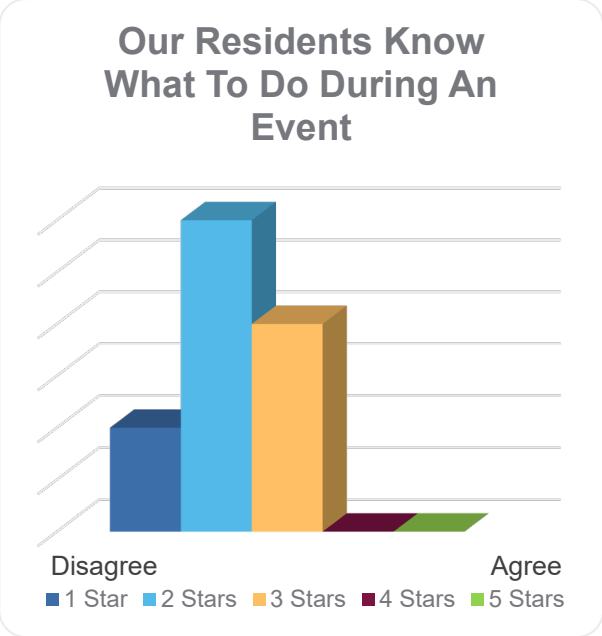


Figure 9: Do Our Residents Know What to Do?

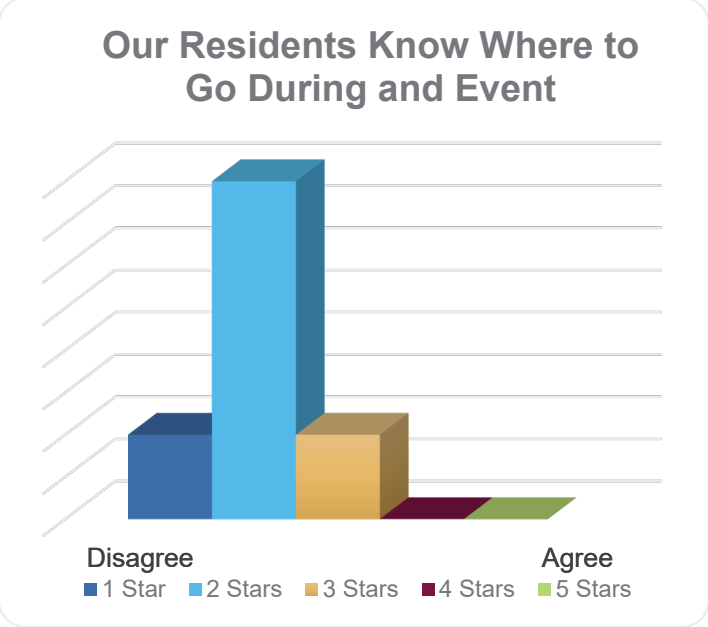


Figure 8: Do our Residents Know Where to Go?

3.5 Challenges Preparing for and Responding to Evacuations

Challenges Preparing:

Of the First Responders and Critical Facilities surveyed, 71% had an operational evacuation plan, and one is working on a plan. Two do not have evacuation plans and are not currently developing them. Of the agencies that had developed plans, the plans were developed in coordination with other agencies.

Both groups were asked what they saw as the biggest challenges in preparing for and responding to evacuations. Survey takers were allowed to check all that applied. Resident preparation before an event and knowledge of what to do during an event were common responses, along with funding challenges, staff, and resources. Figures 10 and 11 present the responses from both of these survey groups.

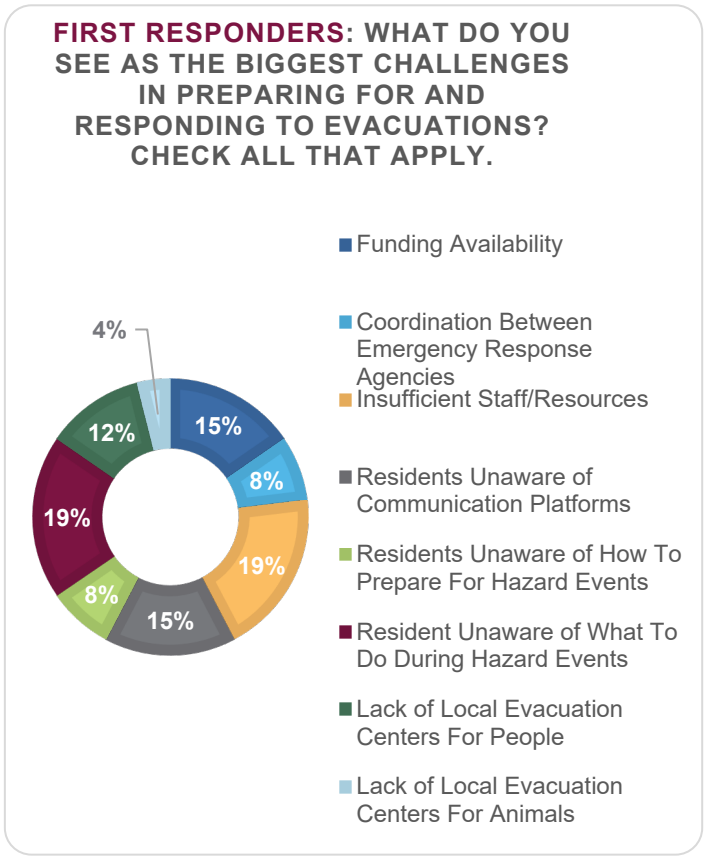


Figure 10: Evacuation Challenges – First Responders Survey

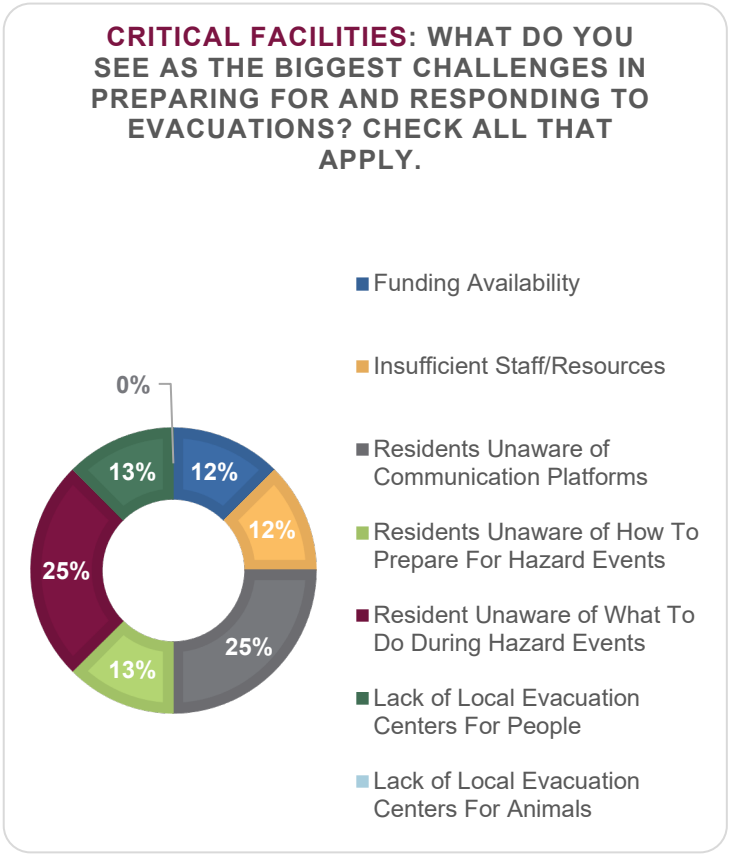


Figure 11: Evacuation Challenges – Critical Facilities Survey

Addressing Challenges:

When asked how each group plans to address these evacuation challenges, both groups plan on utilizing grant writing to obtain additional funding and resources. Both groups also plan to implement Community Education Programs.

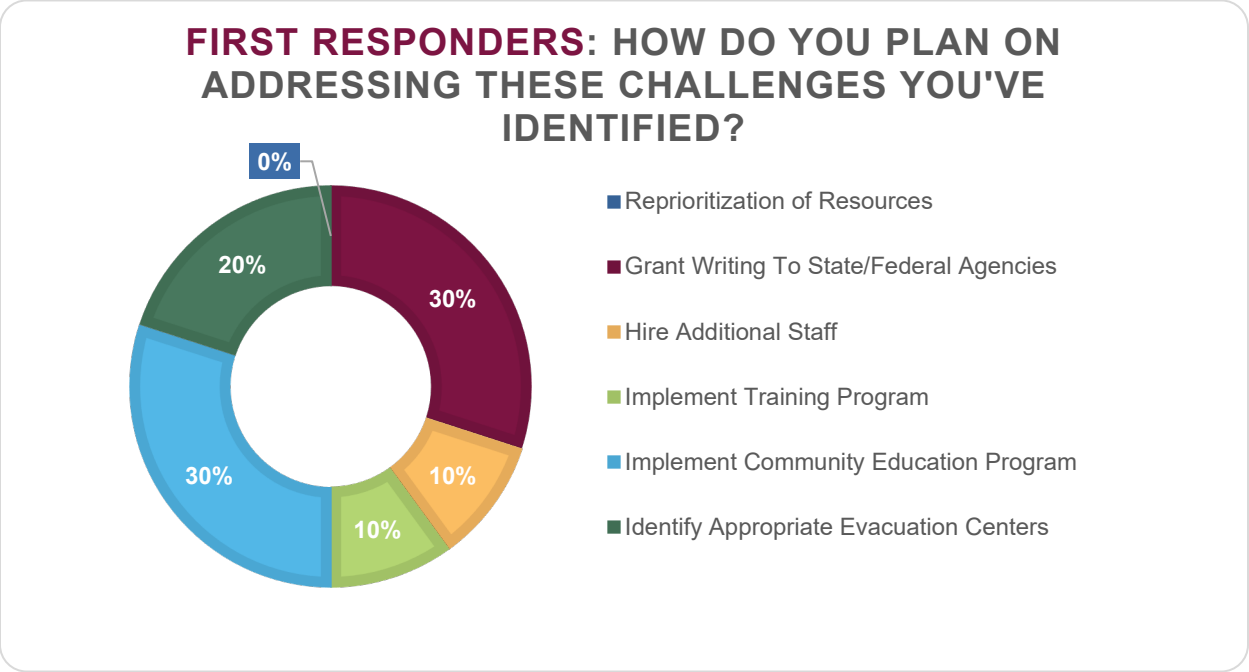


Figure 13: First Responders - Plan to Address Challenges

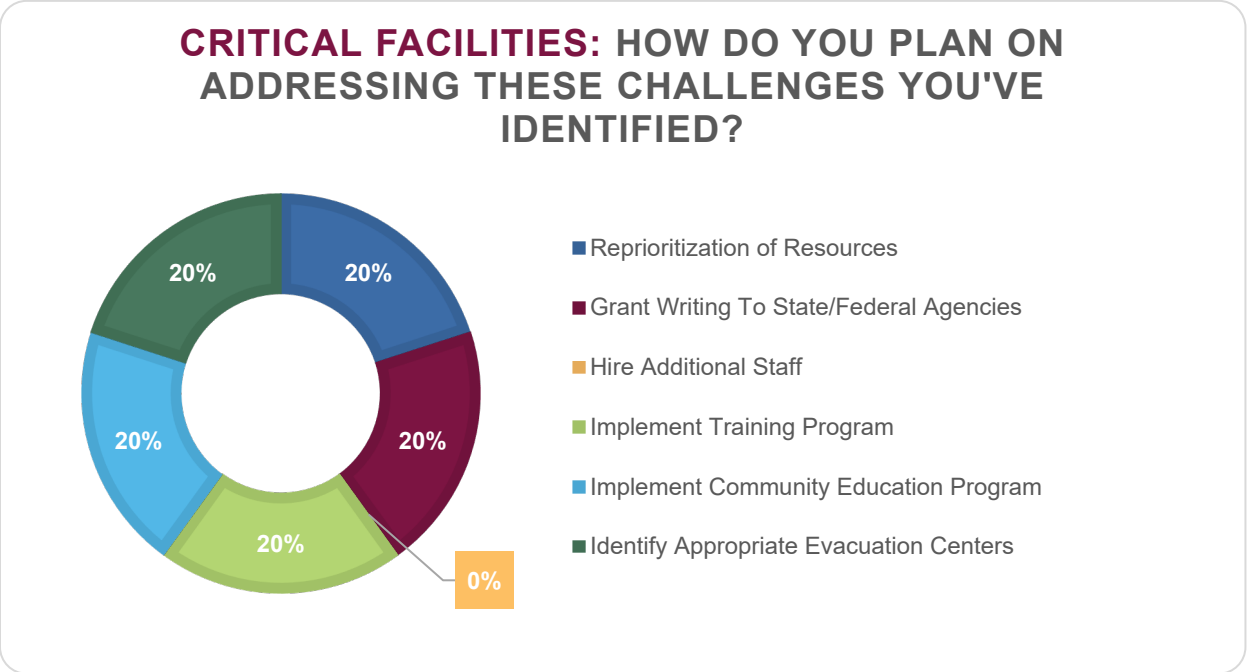


Figure 12: Critical Facilities - Plan to Address Challenges

Most Challenging Roads for Evacuations:

When the First Responders were asked their opinion of the functionality of the Counties Evacuation Routes, the majority response was two stars on a scale of one to five, with five being the highest score. This ranking indicates that the Counties evacuation routes' functionality needs improvement. The following technical memorandum of this initiative will provide options for evacuation route improvement. Please see figure 14 for the functionality ranking.

Not surprisingly, when the First Responders and Critical Facilities were asked which roadways present the most significant challenges to evacuation operations, the responses mirrored that of the general public's reactions. Figure 18 shows that State Route 4 was overwhelmingly identified as the route that posed the most significant difficulty for evacuation events. This response supports the data in section 2, indicating that State Route 4 is the most heavily utilized exit route for traffic leaving Calaveras County.

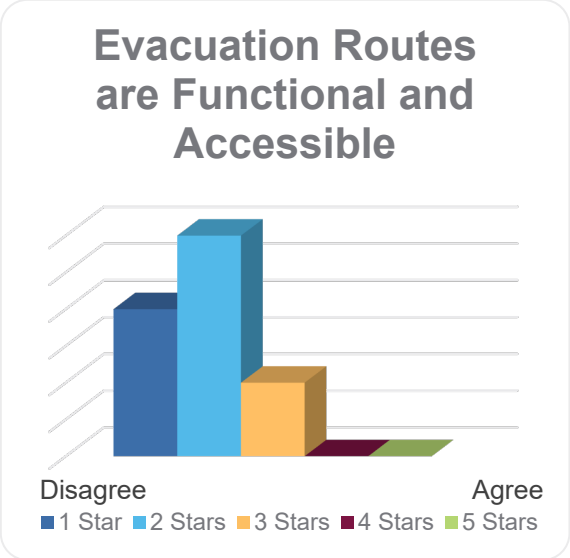


Figure 14: Functionality of Evacuation Routes

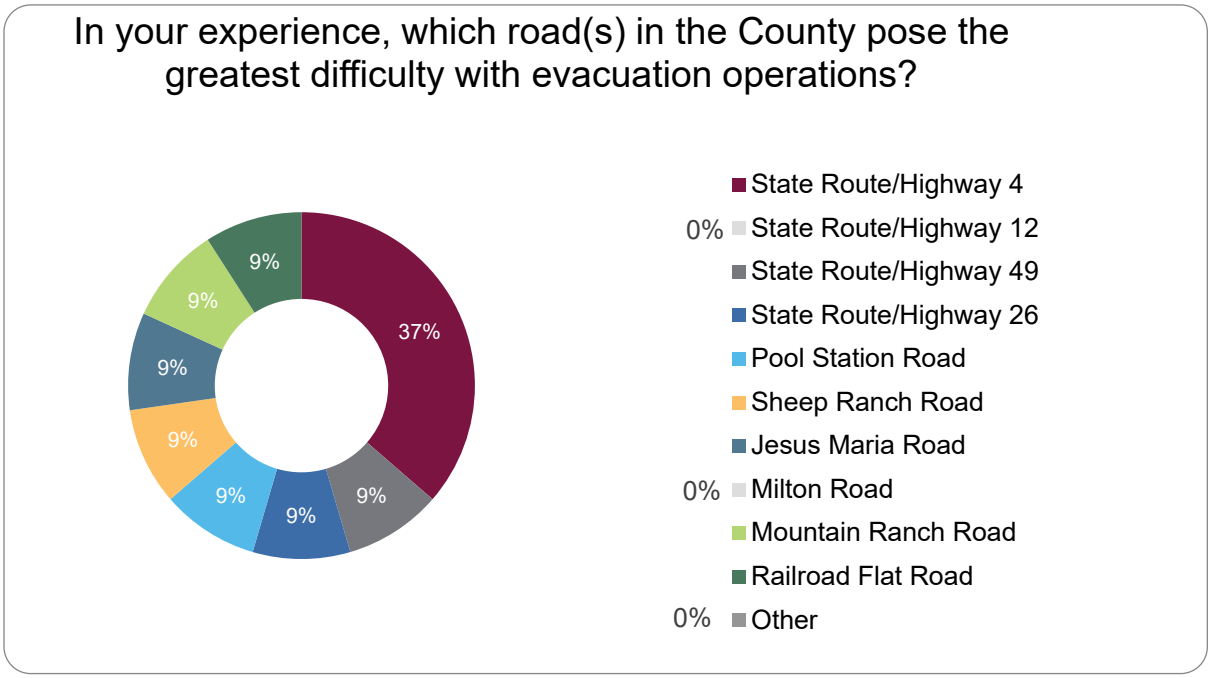


Figure 15: Most Challenging Routes for Evacuation Operations

3.6 First Responders Evacuation Preparedness

While the Evacuation Routes and Resident Communication were identified as areas that need improvement, the First Responders indicated that they are generally well-trained for Evacuation Events, with no one star responses and some five star responses to this question. Interestingly, when presented with a variation of this question, changing the word "training" to "preparation" the positive response decreased with a portion of the group giving one star to the preparation question, and no one responded with five stars. These responses indicate that the First Responders feel well-trained but not fully prepared for an evacuation event. Please see figures 16 and 17 for the specific rankings.

Figure 17: First Responder Training

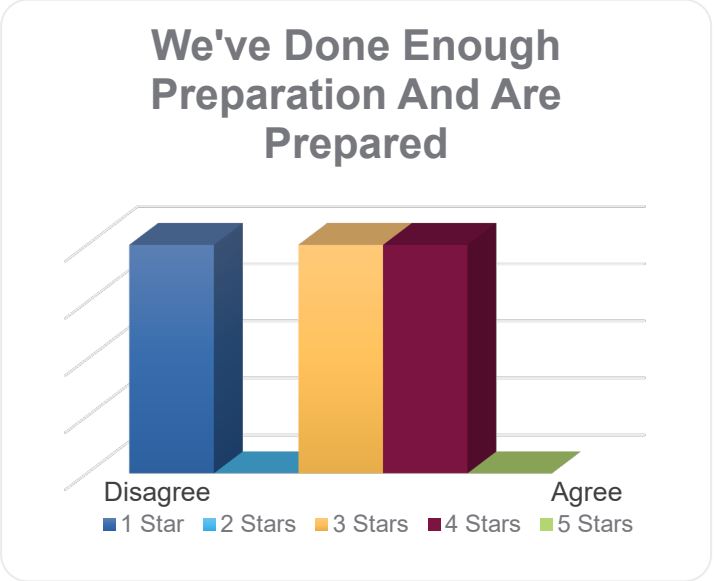


Figure 16: First Responder Preparedness

3.7 Map Markers and Written Comments

As discussed above, all three surveys included an opportunity for survey takers to drop markers on a map and add comments about why the marker was dropped. Pre-set markers included*: Traffic Bottlenecks, Narrow Roadway, Flooding, One Way In/One Way Out,* and *Other*. The First Responders Survey also had a marker for *Road Not Accessible To Us*. The listing of markers, their locations, and any additional comments are provided in Appendix 1

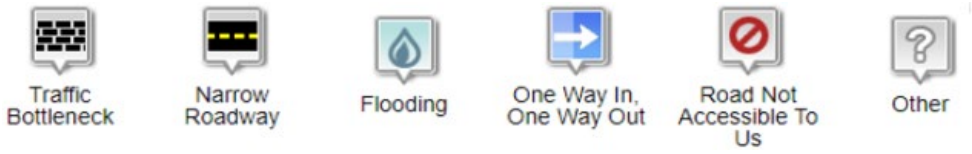


Figure 18: Survey Map Markers

4. Projects to Mitigate Risks Along the Priority Corridors

Hazard Mitigation projects can be divided into three categories. The first is major infrastructure improvements, typically costing several million dollars and taking several years to develop. The second is minor infrastructure projects, generally costing less than a million dollars, that can be implemented within a year or as ongoing maintenance. And the last is planning projects that can be used to prioritize a program of projects or to develop strategies to manage potential emergency events.

The following project recommendations were developed using the Hazard Risk and Vulnerability Assessment, Stakeholder Interviews, and Community Outreach.

4.1 Major Infrastructure Improvements

Combining the community outreach and traffic data platform reveals the three highest-use roadway segments in the County. These segments are listed in order of highest volume:

1. Highway 4 from Angels Camp toward Stockton
2. Highway 49 from Angels Camp to Highway 12 in San Andreas
3. Highway 4 from Angels Camp east to Arnold

The first segment experiences the volume of residential traffic exiting the County due to the large population centers along the Hwy-4 corridor. The second most used roadway segment for residential traffic leaving the County is Hwy-49 between Angels Camp and San Andreas because it is the only north-south highway across the County. And the third highest volume roadway segment for residential traffic leaving the County is the Hwy-4 corridor Northeast of Angels Camp.

While few alternative routes exist, if Hwy-4 is blocked, Highways 12 and 26 could be used to exit the County to the Central Valley. Similarly, Pool Station Road could be an alternate route to Hwy-49; however, Pool Station Road is a narrow two-lane road not recommended for large vehicles and cannot be used by all highway traffic. Additionally, Parrotts Ferry is used as an alternative route to Highway 49 when events or congestion occur at the Fairgrounds. No alternate routes exist for Hwy-4 east of Angels Camp; however, segments of County maintained roads, such as Murphys Grade Road and Moran Road, can provide bypasses for segments of Highway 4

In general, the Caltrans-maintained highways provide the most reliable evacuation routes. Conveniently these highways pass through the major population centers. While a network of County maintained roads connects the smaller population centers, these roads should be used as evacuation routes only for the small number of residents that live along them.

Major Infrastructure Improvement Projects Include:

- Completion of all phases of the Hwy-4 Wagon Trail project
- Shoulder widening on Hwy-49 between Angels Camp and San Andreas (Hwy-12 intersection)
- Defensible Space Clearing along Hwy 4 and Hwy 49
- Hazard Tree Removal along Hwy 4 and Hwy 49
- Replacement of all medium and high-risk bridges
- State Route 49 Mobility Project – Addition of roundabouts and traffic signals at the Highway 4/Highway 49 intersection in Angels Camp

4.2 Minor Infrastructure Improvements

Major themes revealed during outreach were requests for roadside defensible space clearing and drainage improvements. If sufficient funding is identified for a County Wide annual Defensible Space Clearing program, this project can be moved to the Major Infrastructure Improvements. More realistically, roadside defensible space clearing on County and City Maintained Roadways will become part of the roadway maintenance program. Similarly, roadside ditch clearing, grading, and culvert replacement could become part of the prioritized maintenance plan of the County and Angels Camp.

A second online survey is circulating to prompt residents and stakeholders to provide specific locations for targeted maintenance activities. This list will be provided in the final report.

Major Infrastructure Improvement Projects Include:

- Defensible Space Clearing – Prioritized Annual Maintenance Program
- Roadside Ditch Clearing and Grading – Prioritized Annual Maintenance Program
- Culvert Clearing/Replacement – Prioritized Annual Maintenance Program
- Roadside slope evaluation with erosion control / slope stabilization - Prioritized Annual Maintenance Program

4.3 Planning Projects

While the County has a few privately developed evacuation plans, a unified plan does not yet exist. Key challenges discovered with this initiative include residents' inconsistent use of communication platforms. After completing this Evacuation Needs Assessment and Preparedness Plan, the next step is developing a County-wide Evacuation Plan. This plan would identify evacuation routes, shelter locations, communication platforms, interagency partnerships, and ongoing training. For example, Caltrans regularly runs dam failure emergency response training and would be a great partner for emergency response scenario training.

Community outreach is a significant component of a County-wide Evacuation Plan to ensure that all community members are aware of the plan and are regularly reminded about what to do in an evacuation event.

Planning Projects Include:

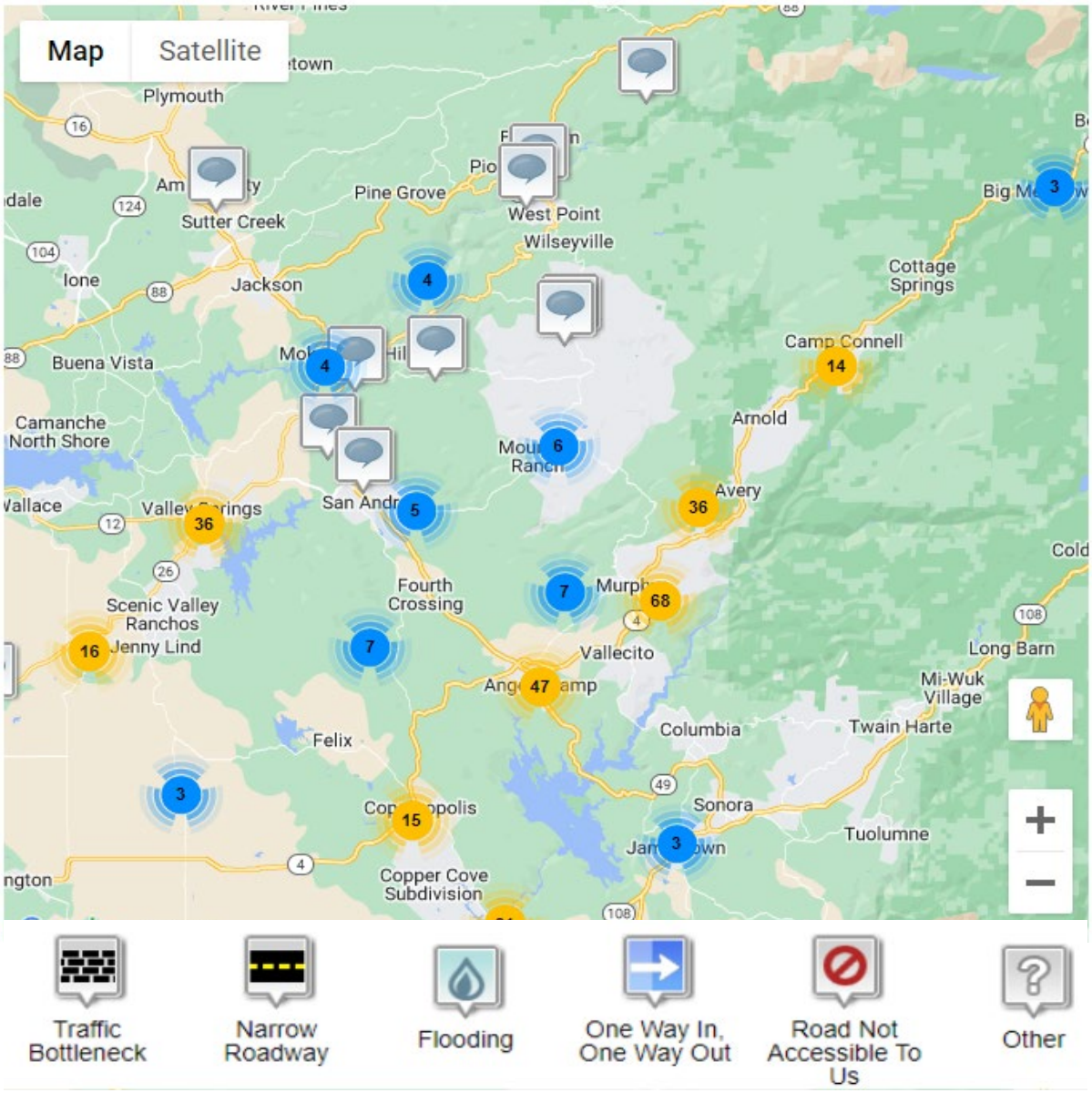
- County-Wide Evacuation Plan
- Unified Notification System that can reach all residents (including those out of cell phone range)
- Annual Training Program for First responders and community leaders.

5. Conclusions

Because most of the population in Calaveras County lives in communities accessed by Caltrans highways, the highest priority evacuation routes are state highways. Highway 4 and Highway 49 (between Angels Camp and San Andreas) are the two routes used by most residents leaving the County. Future investments to protect residents during emergency events should be prioritized along these two corridors. In addition to large Infrastructure projects, prioritized annual maintenance programs are recommended to support communities not served by a highway and along routes that can provide parallel capacity or bypasses for the highways. In addition to infrastructure projects, additional planning work can help residents and first responders understand what to do during emergency evacuation events. The final report for this initiative will include additional information about these projects.

6. Appendix 1 – MetroQuest Data

MetroQuest Map-Markers Screen: Individual Markers with Comments



Traffic Bottleneck	Narrow Roadway	Flooding	One Way In/ One Way Out	Roadway Not Accessible to Us	Other

Community	Commenter: First Responder, Critical Facility, Community Concern	Map Marker Location and Comment
Sheep Ranch Area		
One Way in/One Way Out	First Responder	Armstrong Road
Narrow Roadway	First Responder	Manzanita Ridge Road: This road is one lane south of Sheep Ranch, but would be the only evacuation route for any event north of Mountain Ranch Road
One Way In/One Way Out	Community	Swiss ranch is one way in one way out. Anything but 4x4 isn't going through summit level road, extremely poor signage once you get to summit to even consider it as a viable escape route. Needs road maintenance even just t cover fire crews that may have to operate there.
One Way In/One Way Out	Community	What would happen if this is the only road to use?
One Way In/One Way Out	Community	Armstrong road same issue as in Swiss Ranch.
Traffic Bottlenecks	Community	Pin dropped at Hwy 4 and Sheep Ranch Road intersection, "Hard to get into Hwy at Avery Sheep Ranch Road"
Flooding	Community	Pin dropped near Mountain Ranch and Sheep Ranch intersection: "Various areas on Mt Ranch Road always flood in a heavy storm."
Narrow Roadway	Community	Pin dropped on Sheep Ranch Road
Other	Community	Pin dropped on Sheep Ranch Road: comment, "Road maintenance all the way to Avery (evac route)."
Railroad Flat Area		
One Way In/One Way Out	Community	Doe Road, due to back Doe road property placing gate across doe road illegally, causing residents to be unable to access the full circle (Doe to Buck to Doe)
Other	Community	Pin dropped on Railroad Flat area: comment," Unknown location, road blocked by gate across public road."
West Point Area		
One Way In/One Way Out	Community	Pin dropped in West Point
Traffic Bottlenecks	Community	Pin dropped near Tiger Creek
Other	Community	Pin dropped on West Point: comment, "Overhanging vegetation and roadside woody debris along highway 26 from Moke Hill to the Northeast.
Mokelumne Hill		
Narrow Roadway	First Responder	Jesus Maria Road – "One Lane Road beyond Whiskey Slide"
One Way In/One Way Out	Community	Pin dropped near Hwy 4: comments" Ebbetts Pass Highway ought to be controlled as one way direction during evacuation. It is too narrow for high-volume two-way traffic, especially if folks drive there who are not experienced on mountain roads."

One Way In/One Way Out	Community	Pin dropped near Big Meadow on Hwy 4, “Vegetation clearance is not maintained on only access very narrow road for Sky High Ranch. In case of fire, would be very dangerous for residents and firefighters.”
Traffic Bottlenecks	Community	Commute backup. Excessive racetrack speeding will be a problem in evacuation.
Traffic Bottleneck	Community	Pin dropped on Hwy 26 between Mokelumne Hill and West Point.
Traffic Bottleneck	Community	Pin dropped on Hwy 49 between Sutter Creek and Plymouth
Narrow Roadway	Community	Pin dropped on Ponderosa Way
Narrow Roadway	Community	Pin dropped between Ponderosa Way and Sky-High Dr: comment, “Roadway has needed improvements forever.”
Narrow Roadway	Community	Pin dropped on Jesus Maria Road
Other	Community	Pin dropped on Mokelumne Hill: comment,” Wildfire. Large property live and downed tree overgrowth compaction.”
Other	Community	Pin dropped on Mokelumne Hill: comment,” Wildfire. Large property live and downed tree overgrowth compaction.”
Other	Community	Pin dropped on Mokelumne Hill: comment, “Overhanging vegetation and roadside woody debris along Highway 26 from Moke Hill to the Northeast.”
Other	Community	Pin dropped on Mokelumne Hill: comment,” Wildfire. Large property live and downed tree overgrowth compaction.”
San Andreas Area		
Narrow Roadway	First Responder	pin near Riata Way, west of Fourth Crossing, west of Pool Station Road: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin near Tapadero Street, west of Fourth Crossing, west of Pool Station Road: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin near Jaquima Drive #1, west of Fourth Crossing, west of Pool Station Road: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin near Jaquima Drive #2, west of Fourth Crossing, west of Pool Station Road: “All roads in this area are narrow and not maintained”
Traffic Bottleneck	Community	49 is slow on a good day
Traffic Bottleneck	Community	Pin dropped on highway 49
Traffic Bottleneck	Community	Pin dropped on highway 49
Narrow Roadway	Community	Pin on Mountain Ranch Road: comment,” Evacuation on Mountain Ranch Road during Butte was horrendous. People drive it badly when there is NO urgency.”
Other	Community	Pin dropped on San Andreas: comment,” Wildfire. Large property live and downed tree overgrowth compaction.
Other	Community	Pin dropped on Hwy 49: comment,” Wildfire. Large property live and downed tree overgrowth compaction.
Other	Community	Pin dropped on Hwy 49: comment,” Wildfire. Large property live and downed tree overgrowth compaction.

Other	Community	Pin dropped on Fourth Crossing Road: comment," Narrow Hwy with skinny old bridges. No paved edge on roadway, to allow any correction of going over the outer lane line. No guard rails protecting from steep roadway side drop offs."
Valley Springs		
Traffic Bottlenecks	Community	Concern over no directions being available for fastest route out. No notification of where to avoid Traffic jams.
Traffic Bottlenecks	Community	Pin dropped on W Hwy 12
Traffic Bottleneck	Community	Pin dropped on W Hwy 12
Traffic Bottleneck	Community	"Burson Road intersection with Hwy 12 busy and dangerous; poor sight visibility, no left turn lanes; Burson Road gets backed up trying to get onto Hwy 12. In an evacuation this would be a dangerous mess."
Traffic Bottleneck	Community	Pin dropped on Hwy 26, "Busy hwy 26"
Traffic Bottleneck	Community	Pin dropped on Hwy 26
Traffic Bottleneck	Community	Pin dropped on Hwy 26 "Busy hwy 26"
Traffic Bottleneck	Community	Pin dropped on Jenny Lind Road
Traffic Bottleneck	Community	Pin at Olive Orchard Road intersection, "Olive Orchard Road intersection with Hwy. 26 extremely busy and dangerous; no left turn lanes; Olive Orchard gets backed up. In an evacuation this would be a dangerous mess.
Traffic Bottleneck	Community	Pin dropped on Hwy 26 close to Linden
Flooding	Community	Pin dropped near Josephine Lane and Hwy 26
Flooding	Community	Pin dropped in Hwy 26 and St Andrews Road: comment," Hwy. 26 floods when Cosgrove Creek floods."
Flooding	Community	Pin dropped in Hwy 26: comment," Hwy. 26 floods when Cosgrove Creek floods."
Flooding	Community	Pin dropped in Hwy 26: comment," Hwy. 26 floods when Cosgrove Creek floods."
Flooding	Community	Pin on Hogan Dam Road: comment, "Hogan Dam Road floods when Cosgrove Creek and Springs Creek flood."
Flooding	Community	Pin on Hogan Dam Road: comment, "Hogan Dam Road floods when Cosgrove Creek and Springs Creek flood."
Flooding	Community	Pin on Hogan Dam Road: comment, "Hogan Dam Road floods when Cosgrove Creek and Springs Creek flood."
Narrow Roadway	Community	Pin on Hogan Dam Road
Narrow Roadway	Community	Pin on Hogan Dam Road
Narrow Roadway	Community	Pin on Hogan Dam Road
Narrow Roadway	Community	Pin on Hogan Dam Road

Narrow Roadway	Community	Pin on Hogan Dam Road
Narrow Roadway	Community	Pin on Hwy 26
Narrow Roadway	Community	Pin on Hwy 26 and Olive Orchard Road
Narrow Roadway	Community	Pin on Olive Orchard Road
Narrow Roadway	Community	Pin on Olive Orchard Road
Narrow Roadway	Community	Pin on S Burson Road
Narrow Roadway	Community	Pin on S Burson Road
Narrow Roadway	Community	Pin on S Burson Road
Narrow Roadway	Community	Pin on S Burson Road
Narrow Roadway	Community	Pin on S Burson Road
Narrow Roadway	Community	Pin on Arapaho Way
Other	Community	Pin on Arapaho Way: comment, “Dangerous evacuation route. Road steep, narrow, rutted, especially on curve. Difficult access/egress. Flammable shrubbery next to road.”
Other	Community	Pin drooped on surrounding area of Valley Springs: comment, “Wildlife. Large property lives and downed tree overgrowth compaction.”
Copperopolis		
Road Not Accessible to Us	First Responder	Pinto Drive, Comment: dirt road 4x4 only
One Way In/ One Way Out	First Responder	Dunn Road adjacent to Appaloosa Road
One Way In/ One Way Out	First Responder	Chestnut Way
One Way In/ One Way Out	First Responder	Morgan Road near Appaloosa Road
One Way In/ One Way Out	First Responder	Filly Lane at Shetland Court
One Way In/ One Way Out	First Responder	Poker Flat Road (Subdivision adjacent to Lake Tulloch)
One Way In/ One Way Out	First Responder	Kiva Drive (whole Subdivision)
One Way In/ One Way Out	First Responder	Saddle Creek Lane (whole Subdivision)
One Way In/ One Way Out	First Responder	Horseshoe Lane
Traffic Bottleneck	First Responder	Pin placed on Hwy 4 in Copperopolis (north end of town)

Traffic Bottleneck	First Responder	Pin placed on Hwy 4 in Copperopolis (south end of town)
Narrow Roadway	First Responder	pin on Buckboard Drive: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Hodson Road: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Horseshoe Drive north of Hwy 4: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Hodson Road: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Hodson Lane south of Hwy 4: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Tug Way: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Pommel Way: “All roads in this area are narrow and not maintained”
Narrow Roadway	First Responder	pin on Council Trail
Narrow Roadway	First Responder	pin on Thomson Lane #1
Narrow Roadway	First Responder	pin on Thomson Lane #2
Narrow Roadway	First Responder	pin on Thomson Lane #3
Narrow Roadway	First Responder	pin on Hunt Road at the Lanford Pacheco Road Intersection
Narrow Roadway	First Responder	pin on Hogan Dam Road halfway between Valley Springs and Copperopolis
Narrow Roadway	First Responder	pin on Salt Spring Valley Road halfway between Valley Springs and Copperopolis
One Way In/One Way Out	Community	Connect dead end on Cheyenne so homeowners have a secondary road to get out of area in case of fire/evacuation instead all trying to get a via Copper Cove
One Way In/One Way Out	Community	Cheyenne is a one way in/one way out that serves a large part of the Copper Cove subdivision. If there is a major evacuation, we will probably plow through some fences to get to O’Byrnes or Hwy 4 rather that get stuck on Cheyenne or Copper Cove.
One Way In/One Way Out	Community	Pheasant Rub Dr. Bollards between Copper Meadows and Copper Hill on Copper Crest Dr
One Way In/One Way Out	Community	Copper Cove subdivision
One Way In/One Way Out	Community	Bow Dr, One Way Road, Narrow
One Way In/One Way Out	Community	Copper Cove Subdivision
One Way In/One Way Out	Community	4542 Lakeshore Court
One Way In/One Way Out	Community	Lakeshore Court
One Way In/One Way Out	Community	Copper Cove Dr, See TRAFFIC BOTTLENECK comment

One Way In/One Way Out	Community	Duchess Dr
One Way In/One Way Out	Community	Pin dropped near Jaquima Dr and Copperopolis Fire District Station: comment" Only one entrance and exit"
Traffic Bottlenecks	Community	Pin dropped on Copper Cove Dr: comment "Copper Cove Drive is barely two lanes wide; it traverses along hillsides/canyon it's entire route connecting Little John Road and O'Byrne's Ferry. If there is a problem here the road is unusable."
Traffic Bottlenecks	Community	Pinned dropped at Copper Dr at O'Byrnes Ferry
Traffic Bottlenecks	Community	Pin dropped at O'Byrnes Ferry, "Original plan included other exits. Total of 70 homes here with 1 exit except for road blocked with bollards available to emergency crews. "
Traffic Bottlenecks	Community	Pin dropped on O'Byrnes Ferry Road "In an evacuation situation, there will be A LOT of traffic on this road trying to get to HWY 108"
Traffic Bottlenecks	Community	Kiva Dr at Tomahawk at Lakeshore Court at Lakeshore Dr
Traffic Bottlenecks	Community	Kiva Dr at Little John Road
Traffic Bottlenecks	Community	Little John Road at Kiva Dr
Traffic Bottlenecks	Community	Little John Road at Copper Cove Dr
Traffic Bottlenecks	Community	Pin dropped on Hwy 4, "If wildfire comes at Copperopolis from the direction and Hwy 4 is not accessible, all traffic goes down O'Byrnes Ferry. Or, if Hwy 4 is overwhelmed with traffic from upper communities, how will we get out?!?!"
Traffic Bottlenecks	Community	Pin dropped on Little John Road: comment "In an evacuation situation, there will be A LOT of traffic on this road trying to get to Hwy 4."
Traffic Bottlenecks	Community	Pin dropped on O'Byrnes Road "In an evacuation situation, there will be A LOT of traffic on this road trying to get to Hwy 4."
Traffic Bottlenecks	Community	Pin dropped at Copper Cove Subdivision
Traffic Bottlenecks	Community	Pin dropped at Copper Cove Subdivision
Flooding	Community	Pin dropped on Pool Station Road: comment, "flooding problems in sections."
Flooding	Community	Pin dropped near the town square: comment, "Creek overflow across Road Reeds Turnpike."
Flooding	Community	Pin dropped between Farmington and Copperopolis: comment, "flood and rushing water at low spots on 4"
Flooding	Community	Pin dropped near Milton: comment, "Milton floods too easily."
Narrow Roadway	Community	Pin dropped on Copper Cove Dr
Narrow Roadway	Community	Pin dropped on Copper Cove Dr
Narrow Roadway	Community	Pin dropped on the Arrowhead St in Copper Cove Subdivision
Narrow Roadway	Community	Pin dropped on the Arrowhead St in Copper Cove Subdivision

Narrow Roadway	Community	Pin dropped on Kiva Dr
Narrow Roadway	Community	Pin dropped on Kiva Dr
Narrow Roadway	Community	Pin dropped on O'Byrnes Ferry Road
Narrow Roadway	Community	Pin on O'Byrnes Ferry Road Bridge: comment, "very narrow."
Other	Community	Pin dropped on Copper Cove Subdivision: comment, "Bolla Roads available to emergency crews."
Other	Community	Pin dropped on Lake Tulloch bridge: comment, "1. If there is a problem at the bridge making and traffic cannot get across, all traffic will head back down O'Byrnes to get to Hwy 4.2. If Hwy 4 is inaccessible, say due to wildfire, the roadway will be overwhelmed by evacuation."
Angels Camp		
One Way In/ One Way Out	First Responder	Mayo Road
One Way In/ One Way Out	First Responder	Hwy 4/49 Intersection, comment: No other exit points when leaving the Eastern Corridor to the County other than possibly Murphys Grade Road which eventually leads back to 4/49
One Way In/ One Way Out	First Responder	Angel Oaks Drive, comment: Only one access in and out of Greenhorn Creek/Angel Oaks Subdivision
One Way In/ One Way Out	First Responder	Tapadero Street (off Riata Way and Pool Station Road)
One Way In/ One Way Out	First Responder	Behind Spence Ranch and Feed Supply off of North Main Street (SR-49)
One Way In/ One Way Out	First Responder	Gelding Road
One Way In/ One Way Out	First Responder	Pony Way
One Way In/ One Way Out	First Responder	Appaloosa Road
One Way In/ One Way Out	First Responder	Roan Road
One Way In/ One Way Out	First Responder	Stallion Way
One Way In/ One Way Out	First Responder	Appaloosa Road
Traffic Bottleneck	First Responder	Dogtown Road
Narrow Roadway	First Responder	pin on Stallion Way #1, west of Angels Camp, east of Copperopolis: "All roads in this area are narrow and not maintained"
Narrow Roadway	First Responder	pin on Stallion Way #2, west of Angels Camp, east of Copperopolis: "All roads in this area are narrow and not maintained"
Narrow Roadway	First Responder	pin on Appaloosa Road, west of Angels Camp, east of Copperopolis: "All roads in this area are narrow and not maintained"

Narrow Roadway	First Responder	pin on Buckskin Road, west of Angels Camp, east of Copperopolis: "All roads in this area are narrow and not maintained"
Narrow Roadway	First Responder	pin on Hogan Dam Road west of Copperopolis
Narrow Roadway	First Responder	pin on Buckskin Road, west of Angels Camp, east of Copperopolis: "All roads in this area are narrow and not maintained"
One Way In/One Way Out	Community	Pin dropped on Gunclub Road: comment "Greenhorn Road and Angels Oak."
One Way In/One Way Out	Community	Pin dropped on Kurt Road, "Needs to be connected to Murphys Grade Road. If Kurt Drive over creek floods, residents of the subdivision and Foothill Village would become trapped. "
One Way In/One Way Out	Community	Pin placed on Sam's Way: comment "Narrow and 1 way."
One Way In/One Way Out	Community	Pin dropped on Bush st: comment" Narrow, one-way road with potential for a future trail and increased traffic…needs alternative route or turnouts or???"
One Way In/One Way Out	Community	Highway 49 in Jamestown
Traffic Bottleneck	Community	Pin located on Finnegan Ct: comment "Supposedly "private" road, but potentially key emergency escape route for some Greenhorn residents in case of wildfire."
Traffic Bottleneck	Community	Pin located at Smith Flat Road and Greenhorn Creek Road: Comment "There is a risk because this is a private road and has a gate…narrow and bumpy road."
Traffic Bottleneck	Community	Pin on McCauley Ranch Road, "Only way out for The Gallery"
Traffic Bottleneck	Community	Pin on McCauley Ranch Road: "Road is blocked leaving only one outlet."
Traffic Bottleneck	Community	Pin dropped on San Joaquin Ave
Traffic Bottleneck	Community	Pin located on Demarest St: comment, "Development into through road could alleviate some congestion at SR49/ Murphy's Grade Road and provide alternative/faster evacuation for Big Horn MHP.
Traffic Bottleneck	Community	Pin located on Main St
Traffic Bottleneck	Community	Pin located at Hwy 4 and Hwy 49 intersection: comment, "Bottlenecks at 4/49 intersection AND just north at Dogtown/49. Foundry Lane through road and Caltrans planned improvements would help alleviate this as would construction of "Road A" as identified on the Angels Camp General Plan.
Traffic Bottleneck	Community	Pin at Hwy 4 and Hwy 49 intersection: comment, "intersection is not good."
Traffic Bottleneck	Community	Pin on Hwy 4: comment, "bottleneck during evacuation."
Traffic Bottleneck	Community	Pin on Hwy 49/S Main St between crossroads Gunclub Road and Whittle Road comment: "during large events at fairgrounds."
Traffic Bottleneck	Community	Pin near Jamestown: comment, "Jamestown traffic lights are a major source"
Flooding	Community	Pin near Hwy 4 and Hwy 49 intersection: comment, "In the event of extreme flooding or other disaster affecting this bridge; access to the Annex (south of bridge; access to the Annex (south of the

		bridge) is cut off from emergency response. (See possible by-pass route east of Fairgrounds as possible remedy)
Flooding	Community	Pin near Gold Cliff Road and Finnegan Lane: comment, “Floods during heavy storms.”
Narrow Roadway	Community	Pin near Finnegan Ct: comment,” Gate is usually closed. Dirt road.”
Narrow Roadway	Community	Pin dropped on Finnegan Lane: comment,” Quite narrow in case of emergency evacuation”
Narrow Roadway	Community	Pin dropped on Finnegan Lane: comment,” This could create a risk if a lot of folks are evacuating, and emergency vehicles are on this road”
Narrow Roadway	Community	Pin dropped on Finnegan Lane and Bush st intersection: comment,” This bottleneck in the best of situations”
Narrow Roadway	Community	Pin dropped on Finnegan Lane and Bush st: comment, “Extremely narrow and dangerous when heavy traffic is diverted to Finnegan”
Narrow Roadway	Community	Pin dropped on Tyron Road
Narrow Roadway	Community	Pin dropped near downtown Angels camp: comment,” Potential to provide an alternative access for evacuation from school to SR 4 if SR 49 is blocked..”
Narrow Roadway	Community	Pin dropped on connecting road between Greenhorn Creek Road and Tuolumne: comment,” Needs to be developed as a year-round alternative route/evacuation route.”
Narrow Roadway	Community	Pin dropped on McCauley Ranch Road: comment, “Needs to be developed as evacuation route.”
Narrow Roadway	Community	Pin dropped on McCauley Ranch Road: comment, “Hate it’s always closed.”
Narrow Roadway	Community	Pin dropped on Finnigan Lane: comment,” Need speed controls, there are frequently speeding/reckless drivers.”
Other	Community	Pin dropped on Finnigan Lane: comment, “linkage from Finnegan south to SR 49 to provide an alternative evacuation downtown Angels Camp.”
Other	Community	Pin dropped on Gun club Road at fairgrounds: comment, “Needs connector developed from south of Fairgrounds north to SR 4 Bypass to provide alternative access into and out of the Fairgrounds during large events.
Other	Community	Pin dropped between Angels Camp and Copperopolis: comment,” Wildlife. Large property live and downed tree overgrowth compaction.”
Murphy’s Area		
One Way In/ One Way Out	First Responder	Hwy 4, Comment: Traffic coming down will inhibit emergency vehicles going up
Traffic Bottleneck	First Responder	Pin placed on Hwy 4 in Murphys: “Look what happened on the Camp Fire”
Narrow Roadway	First Responder	Hwy 4 in Murphys: “not wide enough for the volume of traffic evacuating”
One Way In/One Way Out	Community	Pin placed near Hwy 4: “Entire Highway 4 corridor above Murphy’s at extreme risk in wildfire evacuation as it’s the only road in and out for thousands of people. It gives me nightmares.”
One Way In/One Way Out	Community	Pin placed on Thompson Road

One Way In/One Way Out	Community	Pin placed on Ansil Davis Road, Bridge on Monge Ranch Road
One Way In/One Way Out	Community	Highway 4 from Arnold to Angels Camp
One Way In/One Way Out	Community	comment: The entire Big Valley Subdivision and other areas around it have only one drivable way to get in and out. Other roads may exist but are in such bad shape that they are not useable."
One Way In/One Way Out	Community	Penn Gulch and Skunk
One Way In/One Way Out	Community	Pennsylvania Gulch Road, only way out is going back out to the highway which is Hwy 4
One Way In/One Way Out	Community	Pin placed on Pennsylvania Gulch Road
One Way In/One Way Out	Community	Pin placed on Skunk Ranch Road: "Skunk Ranch Road has only one way to enter and leave from Pennsylvania Gulch"
One Way In/One Way Out	Community	Pin placed on Ponderosa way: "We have only 1 way in and out super scary."
One Way In/One Way Out	Community	Pin placed on Ponderosa way; "If a wildfire approached Big Valley from the west and blocked Skunk Ranch Road, there would be no exit route out of Big Valley. Skunk Ranch Road heading north and east ends and Ponderosa Road on the way to Camp 9 is blocked by locked gates. If Skunk Ranch Road heading west is blocked, residents of Big Valley would be trapped."
One Way In/One Way Out	Community	Pin placed on Skunk Ranch Road
One Way In/One Way out	Community	Pin placed on Skunk Ranch Road
One Way In/One Way Out	Community	Only one way out
One Way In/One Way Out	Community	Pin near Butte Mountain Road: "Mine Dump Road is impassable as is Ponderosa to Camp Nine. And now there is even a locked gate on Ponderosa. Pennsylvania Gulch is only one way out."
One Way In/One Way Out	Community	Pin near Butte Mountain Road:" Parts of Skunk Ranch Road, No alternative roads."
One Way In/One Way Out	Community	Pin on Skunk Ranch Road
One Way In/One Way Out	Community	Pin placed near Skunk Ranch Road: "Only one way out."
One Way In/One Way Out	Community	Pin placed in Forest Meadows subdivision: "Forest Meadows Subdivision has only one way out that is drive-able and that is thru a gate onto Hwy 4."
One Way In/One Way Out	Community	Pin placed in Forest Meadows subdivision
One Way In/One Way Out	Community	Pin placed off Buckhorn Drive in Forest Meadows subdivision: "700+ homes with only one main ingress/egress to Highway, secondary locked, gated "back" road with limited capacity that also leads to Highway 4 which could be blocked in an emergency."
One Way In/One Way Out	Community	Pin placed in Forest Meadows Subdivision
One Way In/One Way Out	Community	Pin placed near Hwy 4

One Way In/One Way Out	Community	Hwy 4 between sheep ranch and murphy's proper does not have easily accessible multipoint routes out if Hwy 4 is closed.
One Way In/One Way Out	Community	Pin placed between Murphys and Arnold, comment, "See other comments."
One Way In/One Way Out	Community	Pin placed on Camp 9 Hill, "Camp Nine Road has only one way in and out and is narrow."
One Way In/One Way Out	Community	Pin placed on Ponderosa way
One Way In/One Way Out	Community	Pin placed near Candy Rock Road
Traffic Bottleneck	Community	Pin located at 6-mile Road: comment, "Butte Fire Bottleneck"
Traffic Bottleneck	Community	Pin located near Hwy 4 and central Murphy's: comments, "Events traffic makes it very difficult for residents on Ernest Street to exit onto Hwy 4."
Traffic Bottleneck	Community	Pin at Hwy 4 and Allen Lane intersection: comment," Signal at Big Trees Road and Hwy 4. Last fire/evac back in 2015/16, took 2 hours to get through this from Forest Meadows."
Traffic Bottleneck	Community	Pin dropped at Hwy 4 and Pennsylvania Gulch Road intersection: comment, "Only way in or out. A second connector from the intersection of Pennsylvania Gulch and Skunk Ranch Road to Hwy 49 needs constructed."
Traffic Bottleneck	Community	Pin dropped at Hwy 4 and Pennsylvania Gulch Road intersection: comment, "Access out of Pennsylvania Gulch Road onto Hwy 4 is still difficult. "
Traffic Bottleneck	Community	Murphy's and Big Tree Road intersection pin: comment, "4 way stop at Murphy's and Big Trees Road intersection."
Traffic Bottleneck	Community	Pin dropped on Murphy's and Big Tree Road intersection
Traffic Bottleneck	Community	Pin located at stoplight in Murphy's: comment, "Traffic bottleneck at the stoplight in Murphy's, as seen in the past fires like butte. "
Traffic Bottleneck	Community	Pin dropped at stoplight: comment, "This traffic light has the potential to be a nightmare."
Traffic Bottleneck	Community	Pin dropped on Hwy 4: comment, "Expect long line in evacuation."
Traffic Bottleneck	Community	Pin dropped on Hwy 4: comment, "Traffic bottlenecks on Hwy 4 above Murphy's on busy weekends due to excess cars and traffic signal at bottom of Utica grade. In an emergency, this could be a disaster."
Traffic Bottleneck	Community	Hwy 4 pin: comment, "main way to evacuate to the valley is Hwy 4."
Traffic Bottleneck	Community	Pin dropped at Forest Meadows: comment, "One lane exit at Forest Meadows."
Traffic Bottleneck	Community	Pin dropped at Forest Meadows: comment, "Problem getting out of Forest Meadows due to no stop light at FM entrance/exit and 700+ homeowners in the community."
Traffic Bottleneck	Community	Pin dropped at Forest Meadows: comment, "Only 1 lane exit out of forest meadows."
Traffic Bottleneck	Community	Pin dropped at Forest Meadows
Flooding	Community	Pin dropped in Big Valley

Narrow Roadways	Community	Pin dropped on Hwy 4 through Murphy's
Narrow Roadways	Community	Pin dropped on Hwy 4: comment," Only one lane each way on Hwy 4."
Narrow Roadways	Community	Pin dropped on Hwy 4 near Forest Meadows
Narrow Roadways	Community	Pin dropped on Nob Hill Road: comment," EMS & fire vehicles are large and widening sheep ranch road from Murphy's to Fullen Road to mineral mountain and min. Mtn to Mtn ranch would be good when Hwy 4 is filled with cars to evacuate from wildfire."
Narrow Roadways	Community	Pin on Sheep Ranch Road outside of Murphy's: comment, "Sheep ranch Road was crucial in the butte fire, not wide enough."
Narrow Roadways	Community	Pin on Sheep Ranch Road outside of Murphy's
Narrow Roadways	Community	Pin on Sheep Ranch Road outside of Murphy's
Narrow Roadways	Community	Pin on Sheep Ranch Road outside of Murphy's
Narrow Roadways	Community	Pin of San Domingo Road: comment, "Lack of maintenance of narrow back roads, vegetation overgrown further narrowing passage."
Narrow Roadways	Community	Pin of San Domingo Road: comment, "San Domingo Road very narrow and overgrown."
Narrow Roadways	Community	Pin on Monge Ranch Road: comment, "One way bridge on Monge Ranch Road and road in poor condition."
Narrow Roadways	Community	Pin on Ponderosa Way
Narrow Roadways	Community	Pin on Ponderosa Way
Narrow Roadways	Community	Pin on Butte Mountain Road
Narrow Roadways	Community	Pin on Butte Mountain Road
Narrow Roadways	Community	Pin on Skunk Ranch Road
Narrow Roadways	Community	Pin on Sandy Wash Road
Narrow Roadways	Community	Pin on Skunk Ranch Road: comment," Skunk Ranch Road and Penn Gulch Road are both narrow and the subdivision roads that feed into them are even worse."
Narrow Roadways	Community	Pin on Vineya Road Terrace Ct: comment, "Full of dry brush everywhere along the road."
Other	Community	Pin dropped on Red Hill Road: comment," access to emergency medical care."
Other	Community	Pin dropped at Parrotts Ferry Road: comment," emergency notifications when power is out-back up power at towers."
Other	Community	Pin dropped near Douglas Flat: comment," Wildfire. Large property live and downed tree overgrowth compaction."
Other	Community	Pin dropped near La Honda Park: comment," Wildfire. Large property live and downed tree overgrowth compaction."

Other	Community	Pin dropped near Tom Bell Road: comment," Traffic light control at Murphy's Tom Bell Road Answers received by CHP & fire department is not convincing it will ne properly set for evacuation (flashing yellow).
Other	Community	Pin dropped in Pennsylvania Gulch Road: comment, "brush cause visibility issues along road."
Other	Community	Pin dropped on Skunk Ranch Road
Other	Community	Pin dropped on Ponderosa Way: comment," Locked gate + impassible to exit at Camp 9."
Other	Community	Pin dropped on Butte Mountain Road: comment," Impassible."
Other	Community	Pin dropped off Skunk Ranch Road: comment, "full of dry brush and fuel for fire and very narrow."
Other	Community	Pin dropped on Peppermint Lane: comment," Access from Forest Meadows to Pennsylvania Gulch Road provides a needed back up route to go west. But the connector between the community at Oakwood Drive down to Penn. Gulch is not drivable for many drivers.
Other	Community	Pin dropped off Skunk Ranch Road: comment, "culverts not maintained and cause flooding."
Other	Community	Pin dropped near Camp nine hiking: comment," emergency notifications when power is out- back up at a tower."
Other	Community	Pin dropped near Camp nine hiking: comment, "Wildfire. Large property live and downed tree overgrowth compaction."
Arnold Area		
One Way In/One Way Out	Community	Pin on Calaveras Big Trees State Park Fire Road: comment "often blocked by snow in winter."
One Way In/One Way Out	Community	Pin placed near Ponderosa way: comment "In general, for Arnold, it's Hwy 4 E or W for a lot of traffic. My biggest fear!"
One Way In/One Way Out	Community	Highway 4 needs more passing or middle lane to support traffic and responder space
One Way In/One Way Out	Community	Pin on Hwy 4: "Highway 4, only one well known way in/out for anything above Murphy's other than going up."
One Way In/One Way Out	Community	Pin on Hwy 4: "Fire spreading uphill."
One Way In/One Way Out	Community	All of Highway 4. Also trees and vegetation too close to road for wildfire
One Way In/One Way Out	Community	Camp Nine Road has only one way in and out and is narrow
One Way In/One Way Out	Community	Pin placed on Lightning Lane: comment" Hi 4 generally only evac route from Markleeville to Angels Camp. Moran Road provide a short alternative for Arnold."
One Way In/One Way Out	Community	Pin on Silver Dr, "Highway 4 needs more passing or middle lane to support traffic and responder space."
One Way In/One Way Out	Community	Pin placed on Lilac Dr
Traffic Bottleneck	Community	Pin on Hwy 4: comment," traffic in emergency evacuation."
Traffic Bottleneck	Community	Pin on Country Club Drive and Linnet Lane
Traffic Bottleneck	Community	Pin on Calaveras Big Trees State Park Fire Road: comment, "traffic in emergency evacuation."

Traffic Bottleneck	Community	Pin on Hwy 4 through Dorrington
Narrow Roadway	Community	Pin on Avery Sheep Ranch Road
Narrow Roadway	Community	Pin on Moran Road
Narrow Roadway	Community	Pin on Moran Road
Narrow Roadway	Community	Pin on Hwy 4 through Dorrington
Narrow Roadway	Community	Pin on Hwy 4 through Dorrington
Other	Community	Pin dropped near Harmony Lane: comment, “emergency notification when power is out - back up power at towers.”
Other	Community	Pin dropped near Mokelumne Dr E: comment, “access to emergency medical care.”
Other	Community	Pin dropped on Sierra Pkwy: comment,” access to emergency medical care.”
Other	Community	Pin dropped near Oak Hollow Campground: comment, “emergency notifications when power is out-back up power at towers.”
Other	Community	Pin dropped near Candy Rock Quarry: comment, “Wildfire. Large property live and downed tree overgrowth compaction.”

Appendix H

Comments Received During Public Comment

Calaveras Access Needs Assessment and Preparedness Plan Community Comments and Responses

	Comment	Response
1	page 75 Disagree "Greenhorn Road", if the referring to Grennhorn Resort, Angels Camp. Generally flat wide roadways build based on the most current requirements. The highest income, highest home value resort also has additional exit roadway via Finnegan Lane.	Thank you for your comment. At this time, the public does not have a legal right to access Finnegan Lane from Greenhorn Creek Road. The informal access crosses a privately held parcel, and access can be legally blocked at any time by the property owner.
2	I was evacuated three (3) times from Arnold & Murphys during 1991 to 2007. never suffered property damage but the exit routes were Highway 4 ONLY, either up or down the mountain - no other way! The main problem, I think, is the lack of access roads. In addition, the lack of fire safe engfrocement by authorities abd negligence by property owners creates the dangers. Forest acccess roads that exist are not cleared on either side so become unusable when needed. Having dry underbrush anywhere is invitation to fires. Removal of the underbrush and dead trees should be a year-around job for the entire forest, State and Federal. Fire PREVENTION should be emphasized instead Fire FIGHTING!	Thank you for providing feedback on the Draft Evacuation and Access Needs Assessment and Preparedness Plan. In the plan, a lack of access roads, especially for the vulnerable communities located in dense vegetation areas, such as the central and more eastern zones were identified, as you said. As a result, Routine defensible space clearing was chosen as a priority project to help better prepare the county for future events. Continuous funding opportunities are being sought out. Ideally, annual defensible space clearing and clean-up maintenance programs will be in place. In the meantime, please stay on the lookout for the Evacuation Plan project updates, as community feedback will be an important part in developing an effective plan.
3	Thank you for doing this. Please keep me informed.	Thank you for providing feedback on the Draft Evacuation and Access Needs Assessment and Preparedness Plan. Please stay on the lookout for project updates, as community feedback will be important in developing future plans and projects.
4	Excellent, detailed Evacuation and Access Needs & Assessment Preparedness Plan! Thank you for your public outreach meetings and fact-gathering, maps and data needs assessment. Calaveras County needs road and bridge improvements, a countywide Evacuation Plan, education, and a Unified Notification system, Thank you very much!	Thank you for providing feedback on the Draft Evacuation and Access Needs Assessment and Preparedness Plan. Please stay on the lookout for project updates, as community feedback will be important in developing future plans and projects.
5	Will the stop light on Hwy 4 in Murphys be disabled? This needs to NOT be working in order to facilitate traffic moving continuously through Murphys. CHP/Sheriff needs to direct traffic at that intersection rather than the stop light working. When we evacuated for the Camp Fire it took hours to get down the hill from Arnold due to that light working as usual. A flashing yellow would be fine, but no red light whatsoever.	Thank you for providing feedback on the Draft Evacuation and Access Needs Assessment and Preparedness Plan. At this time, no precise procedures have been developed but will be during the making of the county-wide Evacuation Plan. During the design of the Evacuation Plan, various traffic analyses will be looked at for all possible evacuation scenarios. One of the evacuation techniques we've discovered to be successful through research is just what you described, allowing traffic to flow freely and relieving congestion. It is input like yours that will help us implement an effective Evacuation Plan. Please stay on the lookout for project updates, as community feedback will be an important part.
6	I would like to bring the following to your attention: Important as it is to make sure escape routes on the larger highways in this county are ready for an emergency, I would like to point out that it is equally important for citizens of this county to reach these major roads. I live in a small Homeowners Association (Murray Creek ranch HOA, 23 parcels) off Gold Strike Rd just outside of San Andreas. Wr has had a recent arrival in this HOA, who went to the County Building Department resenting falsified surveyor documents, that allowed for building on an HOA easement of a fire escape route. The Building Department could not be bothered to check the actual records and gave permits for a well and the building to this property owner to build and block the escape route. At this point, the HOA cannot use this escape route, because we have a well and building foundations obstructing our emergency route. The owner of this property has also living for months now in a trailer parked on this easement. The HOA has tried several times to rectify this situation, but the County's Building Department is uncooperative. The point I am making here is, that if the county does not do its due diligence when it comes to building on a "so-called" abandoned easement, then what are we to expect from this county in terms of emergency response? Never mind that they will not enforce their rules about living in a trailer without any toilet facilities right next to a creek. I believe that a large part of the emergency response in this county should be placed on smaller roads as well, How many of us live right next to Hwys 4,12,49 and 26? What is the distance most of us have to travel to reach those big roads? I think that there us a big piece missing in this emergency escape plan and it is called small access roads. Enforcing existing emergency response escape easements seems so basic. But this county will not even do that.	Thank you for your comment.

7	We can't afford the cost of doing nothing." This statement sums up the totality of this report and plan….and also what needs to be done to finalize and implement a Greenhouse Gas Reduction Plan and implement the new General Plan. This county has avoided spending and planning for as long as I have lived here. It will take years and years to catch up and the county needs to make all of these things a priority NOW.	Thank you for providing feedback on the Draft Evacuation and Access Needs Assessment and Preparedness Plan. Please stay on the lookout for project updates, as community feedback will be important in developing the next phase of this initiative, the County Wide Evacuation Plan.
8	My current concerns are regarding the proposed roundabouts in Angels Camp. I see those as being a liability in any evacuation emergency. The amount of traffic will also make it difficult and confusing for some of us who are senior citizens as well as people who need to cross at that point. For instance, my son is in a wheelchair and a roundabout can be extremely dangerous.	Thank you for your comment.
9	Only today did I come across the Plan Draft quite by accident. In general, I think all public agencies in Calaveras need a better way(s) to notify public about projects and specifically when ' community input' is being sought. And we as community members, of course, need to figure out how to keep a finger on pulse of the myriad projects, development plans, etc. going on in our county. That being said, I think the "Priority Corridors and Key Considerations" Dewberry Report was well documented and captured the gist of the community concerns. I pray it doesn't take years for county agencies to take action to address the highest concerns. I skimmed a couple of the other appendices, it should be noted THERE IS NO "Copper Cove High School" and it should be removed from your list as a "Potential Shelter" location! Thank you for the opportunity to participate.	We appreciate your feedback and apologize that you only came across the plan, accidentally. We're always looking for suggestions from residents regarding where they get their information and specific channels they may use. One of our main priorities for this initiative is figuring out what works best for people; it's crucial to hear back from residents, like you! Is there a specific platform you use to receive information? We're always open to posting more places. Regarding Copper Cove High School, you are right! The school apparently closed in 2006. In the final plan, Copper Cove High School is removed as a potential shelter location.
10	Please consider Little John Rd in Copperopolis as a vital evacuation route. This road is now at emergency evacuation capacity with the release of the new Copper Valley (CV) neighborhood two years ago. Former Planning Director Peter Mauer said this additional new neighborhood will put Litttle John Rd at its maximum capacity for emergency evacuations. Copperopolis fire district and CalFire need to be more liligent when reviwing these plans. In the case of the new CV neighborhood, Copperopolis Fire didn't address emergency evacuation on Little John Rd. CalFire didn't respond at all! Any new development in this area should be severly restricted until more viable emergency evacuation routes are developed.	Thank you for providing feedback on the Draft Evacuation and Access Needs Assessment and Preparedness Plan. Please stay on the lookout for project updates, as community feedback will be important in developing the next phase of this initiative, the County Wide Evacuation Plan.
11	The letter by Megan Fiske in the West Point News reached me after August 31. I'm currently chairing the recently reconstituted Blue Mountain Emergency Preparedness Committee (BMEPC) in the West Point / Wilseyville area. The two main types of scenarios that concern us here are (1) wildfire and evacuation and (2) extreme winter storm impacts that disable the road network, grid, and other lifeline services. Soon I will take the time to look carefully at your online materials. Meanwhile, I want to reach out, make contact, and ask that you loop us into your communications, expecially regarding activities and events. At some point we could talk, and our committee could enjoy a conversation. So far we've organized one town hall with the county, on wildfire; more are possible, and workshops are planned. Good wishes -- Rick	Thank you for your comment. Now that the needs assessment is complete, the next step will be to develop a County Wide Evacuation Plan. This next step will not be possible without the input and collaboration with community organizations such as your group. We look forward to the next phase of this important work.

12	Flooding hazards in lower sections of Calaveras County (La Contenta and Rancho Calaveras saw flooding) need to be reflected in Report.	All of the locations where the 100 year flood plain crossed a road, are included in the report (page 92) which is included as a larger attachment and full project list in Appendix B. Additionally the local flooding problem locations are called out on the MetroQuest Pins slide on pages 38 and 40 Also detailed in Appendix G. and Finally, we added additional projects to the Zone D (Valley Springs area) project list included in Appendix B.
13	People were going down Burson Rd and cutting across Olive Orchard Rd because they were cut-off on Hwy 12 and at Gold Course and on Cosgrove Creek by the Zippy Mart due to flooding.	These locations have been identified as recommended Zone D projects. This information will be used to develop evacuation zones in the next phase of this initiative, the formal evacuation plan.
14	2 Seperate emergency evacuations at Mobile Home Park (Winter of 2023/23) and Valley Springs Proper was on Notice.	Yes, the flooding issues in 22/23 and 23/24 were identified in the report.
15	Include local roads because this is what locals will use when evacuation because they know them.	Agreed.
16	Widening is a good consideration	Agreed.
17	Highlight the fire hazards, lots of dry brush will result from heavy rains throughout lower sections of the County.	Potential project added for Zone D: Roadside grass mowing
18	Need to identify best evacuation routes (including local roads) and make the information readiliy and easily accessible to public to utilize in emergency.	Thank you for your comment. Specific evacuation routes will be further identified in the next phase and during the development of the County WIde Evacuation Plan.
19	The metroquest pin graphic is too small to read, please increase the size.	This consideration will be part of the next phase of this initiative, the County Wide Evacuation Plan.