

# Hazus-MH: Earthquake Event Report

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**Region Name:** Denver County Walnut Creek fault 2010Census

**Earthquake Scenario:** Walnut Creek fault 6.5

**Print Date:** March 11, 2013

*Totals only reflect data for those census tracts/blocks included in the user's study region.*

**DOI:** <https://doi.org/10.58783/cgs.ha17.qnpf1949>

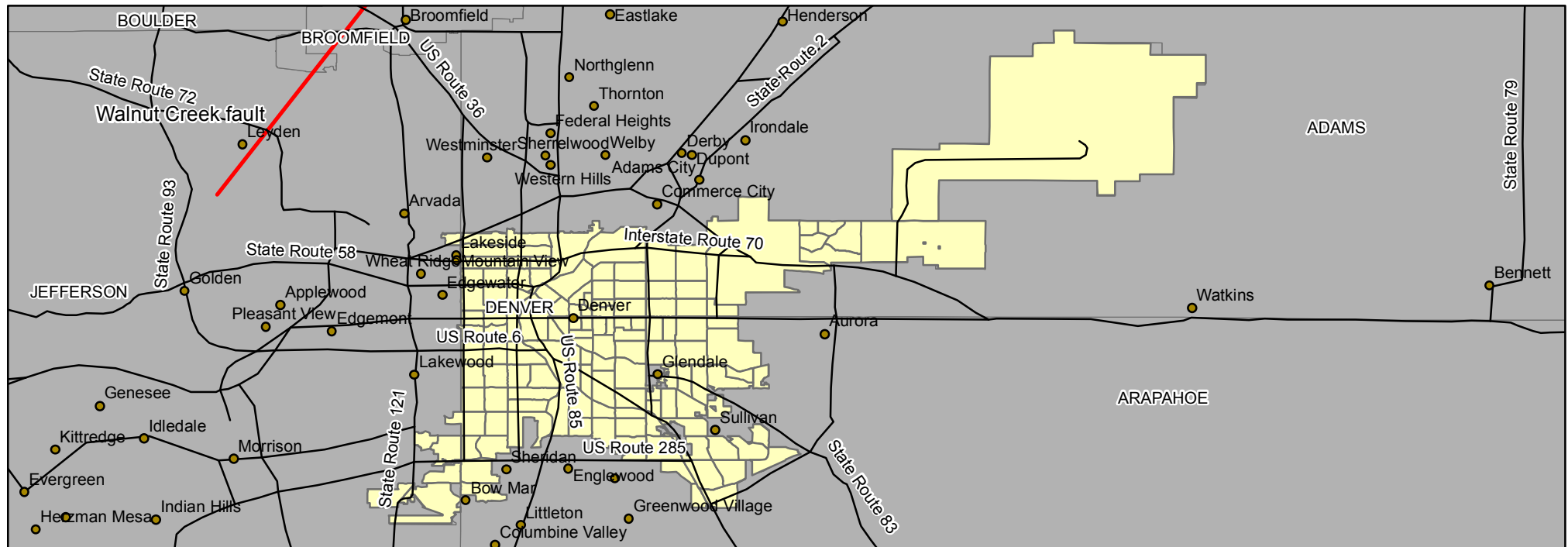
**Disclaimer:**

*The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.*

## Study Region: Denver County

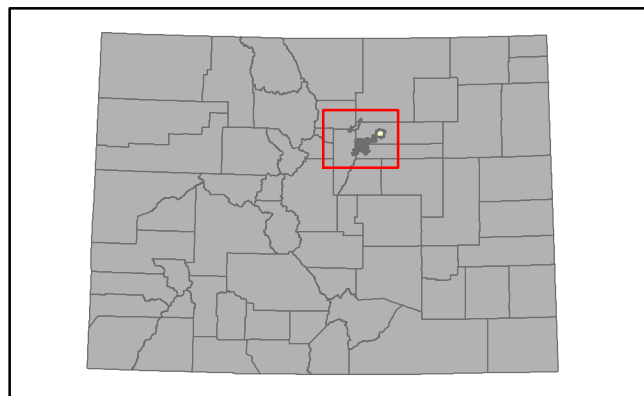
### Hazard Scenario: Walnut Creek Fault 6.5

## Overview Map



### Legend

- Cities
- Roads
- Fault
- Study Region Tract



Created by: Colorado Geological Survey

Team: Matt Morgan and Scot Fitzgerald

Date Created: March 2013

Location: Denver County Colorado

Fault Parameters: arbitrary, magnitude 6.5, depth 10km

Data: Changed to CGS Landslides and CGS/FEMA Soils data

Projection: GCS North American 1983

0 5 10 20 Miles



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EARTHQUAKE • WIND • FLOOD

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## General Description of the Region

Hazus is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop earthquake losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from earthquakes and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Colorado

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 154.74 square miles and contains 136 census tracts. There are over 262 thousand households in the region which has a total population of 599,931 people (2002 Census Bureau data). The distribution of population by State and County is provided in Appendix B.

There are an estimated 301 thousand buildings in the region with a total building replacement value (excluding contents) of 61,419 (millions of dollars). Approximately 93.00 % of the buildings (and 68.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 4,203 and 52 (millions of dollars) , respectively.

## Building and Lifeline Inventory

### **Building Inventory**

Hazus estimates that there are 301 thousand buildings in the region which have an aggregate total replacement value of 61,419 (millions of dollars) . Appendix B provides a general distribution of the building value by State and County.

In terms of building construction types found in the region, wood frame construction makes up 71% of the building inventory. The remaining percentage is distributed between the other general building types.

### **Critical Facility Inventory**

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 13 hospitals in the region with a total bed capacity of 0 beds. There are 215 schools, 33 fire stations, 15 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are 8 dams identified within the region. Of these, 5 of the dams are classified as 'high hazard'. The inventory also includes 74 hazardous material sites, 0 military installations and 0 nuclear power plants.

### **Transportation and Utility Lifeline Inventory**

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 4,255.00 (millions of dollars). This inventory includes over 292 kilometers of highways, 426 bridges, 5,376 kilometers of pipes.

**Table 1: Transportation System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations/ # Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Highway</b>	Bridges	426	1,461.00
	Segments	357	2,265.10
	Tunnels	0	0.00
	Subtotal		<b>3,726.10</b>
<b>Railways</b>	Bridges	25	2.00
	Facilities	10	26.60
	Segments	208	120.00
	Tunnels	0	0.00
	Subtotal		<b>148.70</b>
<b>Light Rail</b>	Bridges	1	0.30
	Facilities	26	69.20
	Segments	28	14.30
	Tunnels	0	0.00
	Subtotal		<b>83.80</b>
<b>Bus</b>	Facilities	6	6.30
	Subtotal		<b>6.30</b>
<b>Ferry</b>	Facilities	0	0.00
	Subtotal		<b>0.00</b>
<b>Port</b>	Facilities	0	0.00
	Subtotal		<b>0.00</b>
<b>Airport</b>	Facilities	1	10.70
	Runways	6	227.80
	Subtotal		<b>238.40</b>
		Total	<b>4,203.40</b>

**Table 2: Utility System Lifeline Inventory**

<b>System</b>	<b>Component</b>	<b># Locations / Segments</b>	<b>Replacement value (millions of dollars)</b>
<b>Potable Water</b>	Distribution Lines	NA	65.10
	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		<b>65.10</b>
<b>Waste Water</b>	Distribution Lines	NA	39.10
	Facilities	0	0.00
	Pipelines	0	0.00
	Subtotal		<b>39.10</b>
<b>Natural Gas</b>	Distribution Lines	NA	26.00
	Facilities	1	0.00
	Pipelines	99	33.40
	Subtotal		<b>59.50</b>
<b>Oil Systems</b>	Facilities	2	0.00
	Pipelines	47	18.60
	Subtotal		<b>18.60</b>
<b>Electrical Power</b>	Facilities	25	0.00
	Subtotal		<b>0.00</b>
<b>Communication</b>	Facilities	2	0.20
	Subtotal		<b>0.20</b>
		<b>Total</b>	<b>182.40</b>

## Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.

<b>Scenario Name</b>	Walnut Creek fault 6.5
<b>Type of Earthquake</b>	Arbitrary
<b>Fault Name</b>	NA
<b>Historical Epicenter ID #</b>	NA
<b>Probabilistic Return Period</b>	NA
<b>Longitude of Epicenter</b>	-105.15
<b>Latitude of Epicenter</b>	39.88
<b>Earthquake Magnitude</b>	6.50
<b>Depth (Km)</b>	10.00
<b>Rupture Length (Km)</b>	17.18
<b>Rupture Orientation (degrees)</b>	31.00
<b>Attenuation Function</b>	Central & East US (CEUS 2008)



## Building Damage

### Building Damage

Hazus estimates that about 135,648 buildings will be at least moderately damaged. This is over 45.00 % of the buildings in the region. There are an estimated 38,554 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

**Table 3: Expected Building Damage by Occupancy**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Agriculture</b>	88	0.10	82	0.10	87	0.14	90	0.26	145	0.38
<b>Commercial</b>	658	0.76	822	1.04	2,693	4.36	3,887	11.01	5,931	15.38
<b>Education</b>	33	0.04	29	0.04	43	0.07	53	0.15	75	0.20
<b>Government</b>	26	0.03	22	0.03	67	0.11	130	0.37	248	0.64
<b>Industrial</b>	168	0.19	208	0.26	666	1.08	996	2.82	1,614	4.19
<b>Other Residential</b>	36,234	41.65	34,560	43.71	26,324	42.61	14,194	40.20	17,057	44.24
<b>Religion</b>	143	0.16	134	0.17	195	0.32	256	0.73	410	1.06
<b>Single Family</b>	49,654	57.07	43,214	54.65	31,708	51.32	15,703	44.47	13,075	33.91
<b>Total</b>	<b>87,003</b>		<b>79,069</b>		<b>61,784</b>		<b>35,310</b>		<b>38,555</b>	

**Table 4: Expected Building Damage by Building Type (All Design Levels)**

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
<b>Wood</b>	81,483	93.65	74,241	93.89	46,030	74.50	9,984	28.28	1,768	4.59
<b>Steel</b>	260	0.30	222	0.28	1,040	1.68	2,529	7.16	6,085	15.78
<b>Concrete</b>	549	0.63	668	0.84	2,201	3.56	3,546	10.04	5,438	14.10
<b>Precast</b>	156	0.18	141	0.18	595	0.96	1,131	3.20	2,453	6.36
<b>RM</b>	3,728	4.29	2,492	3.15	8,676	14.04	13,550	38.37	15,774	40.91
<b>URM</b>	612	0.70	869	1.10	1,805	2.92	2,104	5.96	3,719	9.65
<b>MH</b>	214	0.25	437	0.55	1,437	2.33	2,465	6.98	3,318	8.61
<b>Total</b>	<b>87,003</b>		<b>79,069</b>		<b>61,784</b>		<b>35,310</b>		<b>38,555</b>	

\*Note:

RM      Reinforced Masonry  
URM     Unreinforced Masonry  
MH      Manufactured Housing

## **Essential Facility Damage**

Before the earthquake, the region had 0 hospital beds available for use. On the day of the earthquake, the model estimates that only 0 hospital beds (2.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 9.00% of the beds will be back in service. By 30 days, 37.00% will be operational.

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	13	13	0	0
Schools	215	211	109	2
EOCs	1	0	0	0
PoliceStations	15	0	0	2
FireStations	33	0	0	6

## Transportation and Utility Lifeline Damage

Table 6 provides damage estimates for the transportation system.

**Table 6: Expected Damage to the Transportation Systems**

System	Component	Locations/ Segments	Number of Locations_			
			With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	357	0	0	357	357
	Bridges	426	63	20	358	384
	Tunnels	0	0	0	0	0
Railways	Segments	208	0	0	208	208
	Bridges	25	0	0	25	25
	Tunnels	0	0	0	0	0
	Facilities	10	0	0	10	10
Light Rail	Segments	28	0	0	28	28
	Bridges	1	0	0	1	1
	Tunnels	0	0	0	0	0
	Facilities	26	10	0	26	26
Bus	Facilities	6	3	0	6	6
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	0	0	1	1
	Runways	6	0	0	6	6

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : Expected Utility System Facility Damage

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	0	0	0	0	0
Natural Gas	1	0	0	0	1
Oil Systems	2	2	0	0	2
Electrical Power	25	23	0	7	25
Communication	2	2	0	2	2

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (kms)	Number of Leaks	Number of Breaks
Potable Water	3,254	2217	554
Waste Water	1,953	1114	278
Natural Gas	99	6	2
Oil	71	13	3

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	262,995	188,419	177,695	150,323	0	0
Electric Power		192,039	102,857	30,665	4,024	263

## Induced Earthquake Damage

### **Fire Following Earthquake**

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 9 ignitions that will burn about 0.14 sq. mi 0.09 % of the region's total area.) The model also estimates that the fires will displace about 1,370 people and burn about 132 (millions of dollars) of building value.

### **Debris Generation**

Hazus estimates the amount of debris that will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 11.17 million tons of debris will be generated. Of the total amount, Brick/Wood comprises 23.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 446,640 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.

**Shelter Requirement**

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 38,966 households to be displaced due to the earthquake. Of these, 21,941 people (out of a total population of 599,931) will seek temporary shelter in public shelters.

**Casualties**

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
<b>2 AM</b>	Commercial	232	76	13	26
	Commuting	0	0	1	0
	Educational	0	0	0	0
	Hotels	117	38	7	13
	Industrial	213	70	12	24
	Other-Residential	2,433	734	115	225
	Single Family	3,598	1,117	194	384
	<b>Total</b>	<b>6,592</b>	<b>2,034</b>	<b>341</b>	<b>672</b>
<b>2 PM</b>	Commercial	12,556	4,096	713	1,407
	Commuting	2	3	5	1
	Educational	5,610	1,829	324	634
	Hotels	22	7	1	2
	Industrial	1,570	513	88	173
	Other-Residential	443	132	21	40
	Single Family	700	214	37	71
	<b>Total</b>	<b>20,905</b>	<b>6,794</b>	<b>1,190</b>	<b>2,328</b>
<b>5 PM</b>	Commercial	8,098	2,621	457	890
	Commuting	114	146	253	49
	Educational	1,250	412	73	144
	Hotels	35	11	2	4
	Industrial	981	321	55	108
	Other-Residential	932	279	44	84
	Single Family	1,401	429	75	143
	<b>Total</b>	<b>12,811</b>	<b>4,219</b>	<b>960</b>	<b>1,422</b>

## Economic Loss

The total economic loss estimated for the earthquake is 28,894.05 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

### **Building-Related Losses**

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 28,661.67 (millions of dollars); 20 % of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 35 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

**Table 11: Building-Related Economic Loss Estimates**

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
<b>Income Losses</b>							
	Wage	0.00	48.96	1,114.45	34.92	177.11	1,375.44
	Capital-Related	0.00	20.86	1,016.20	23.56	61.99	1,122.61
	Rental	135.81	301.57	486.66	14.47	96.49	1,035.01
	Relocation	473.19	181.05	804.49	58.33	787.81	2,304.86
	<b>Subtotal</b>	<b>609.00</b>	<b>552.44</b>	<b>3,421.80</b>	<b>131.28</b>	<b>1,123.41</b>	<b>5,837.93</b>
<b>Capital Stock Losses</b>							
	Structural	1,050.59	488.23	1,314.88	250.51	505.18	3,609.39
	Non_Structural	3,346.88	2,652.97	4,289.67	988.36	2,502.15	13,780.03
	Content	838.64	574.17	1,962.66	635.90	1,258.62	5,269.99
	Inventory	0.00	0.00	48.62	113.72	1.99	164.33
	<b>Subtotal</b>	<b>5,236.11</b>	<b>3,715.37</b>	<b>7,615.82</b>	<b>1,988.50</b>	<b>4,267.94</b>	<b>22,823.74</b>
	<b>Total</b>	<b>5,845.11</b>	<b>4,267.81</b>	<b>11,037.63</b>	<b>2,119.78</b>	<b>5,391.34</b>	<b>28,661.67</b>



## Transportation and Utility Lifeline Losses

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Hazus estimates the long-term economic impacts to the region for 15 years after the earthquake. The model quantifies this information in terms of income and employment changes within the region. Table 14 presents the results of the region for the given earthquake.

**Table 12: Transportation System Economic Losses**  
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2,265.14	\$0.00	0.00
	Bridges	1,460.99	\$181.50	12.42
	Tunnels	0.00	\$0.00	0.00
	Subtotal	<b>3726.10</b>	<b>181.50</b>	
Railways	Segments	120.03	\$0.00	0.00
	Bridges	2.03	\$0.23	11.23
	Tunnels	0.00	\$0.00	0.00
	Facilities	26.63	\$8.32	31.24
	Subtotal	<b>148.70</b>	<b>8.50</b>	
Light Rail	Segments	14.27	\$0.00	0.00
	Bridges	0.32	\$0.02	5.58
	Tunnels	0.00	\$0.00	0.00
	Facilities	69.24	\$22.57	32.60
	Subtotal	<b>83.80</b>	<b>22.60</b>	
Bus	Facilities	6.34	\$2.10	33.09
	Subtotal	<b>6.30</b>	<b>2.10</b>	
Ferry	Facilities	0.00	\$0.00	0.00
	Subtotal	<b>0.00</b>	<b>0.00</b>	
Port	Facilities	0.00	\$0.00	0.00
	Subtotal	<b>0.00</b>	<b>0.00</b>	
Airport	Facilities	10.65	\$0.87	8.14
	Runways	227.78	\$0.00	0.00
	Subtotal	<b>238.40</b>	<b>0.90</b>	
	<b>Total</b>	<b>4203.40</b>	<b>215.60</b>	

Table 13: Utility System Economic Losses

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Lines	65.10	\$9.98	15.33
	Subtotal	65.08	\$9.98	
Waste Water	Pipelines	0.00	\$0.00	0.00
	Facilities	0.00	\$0.00	0.00
	Distribution Lines	39.10	\$5.01	12.84
	Subtotal	39.05	\$5.01	
Natural Gas	Pipelines	33.40	\$0.02	0.04
	Facilities	0.00	\$0.00	0.00
	Distribution Lines	26.00	\$1.72	6.60
	Subtotal	59.47	\$1.73	
Oil Systems	Pipelines	18.60	\$0.02	0.13
	Facilities	0.00	\$0.00	0.00
	Subtotal	18.64	\$0.02	
Electrical Power	Facilities	0.00	\$0.00	0.00
	Subtotal	0.00	\$0.00	
Communication	Facilities	0.20	\$0.03	15.67
	Subtotal	0.19	\$0.03	
	Total	182.44	\$16.78	

Table 14. Indirect Economic Impact with outside aid

(Employment as # of people and Income in millions of \$)

LOSS	Total	%

## **Appendix A: County Listing for the Region**

Denver,CO

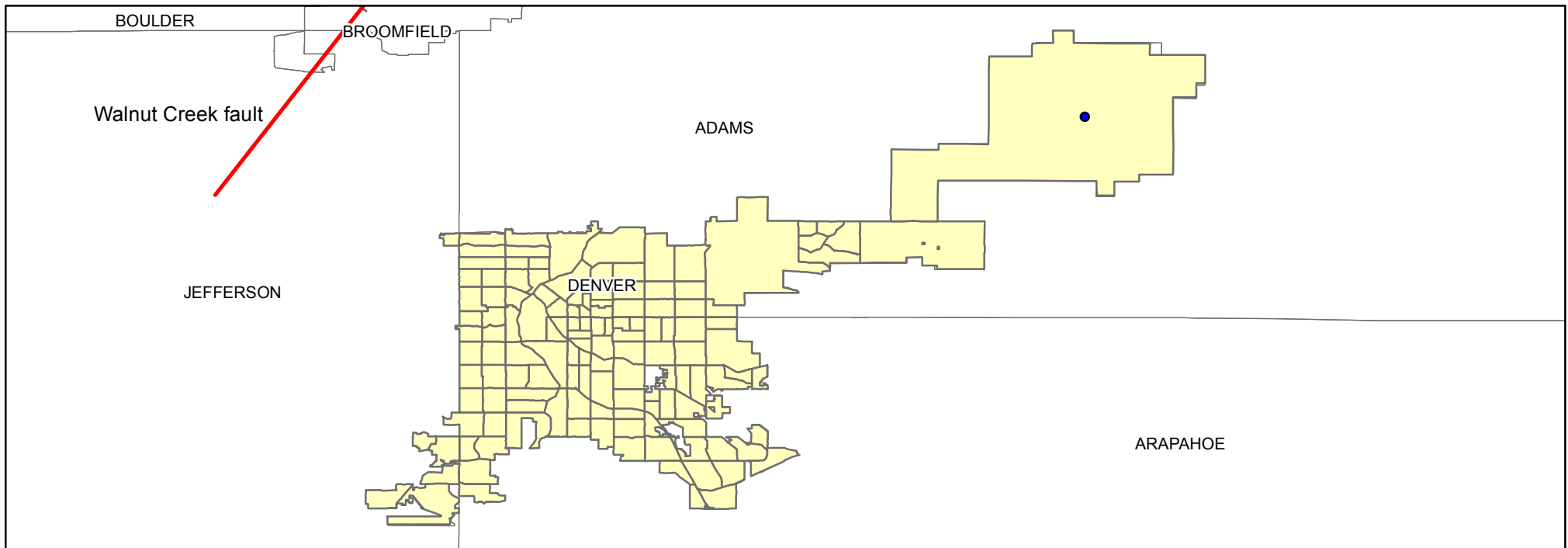
**Appendix B: Regional Population and Building Value Data**

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Colorado	Denver	599,931	42,070	19,348	61,419
Total State		599,931	42,070	19,348	61,419
Total Region		599,931	42,070	19,348	61,419

# Study Region: Denver County

## Hazard Scenario: Walnut Creek Fault 6.5

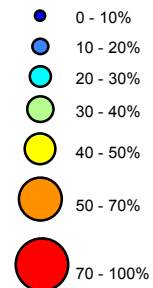
### Airports Map



#### Legend

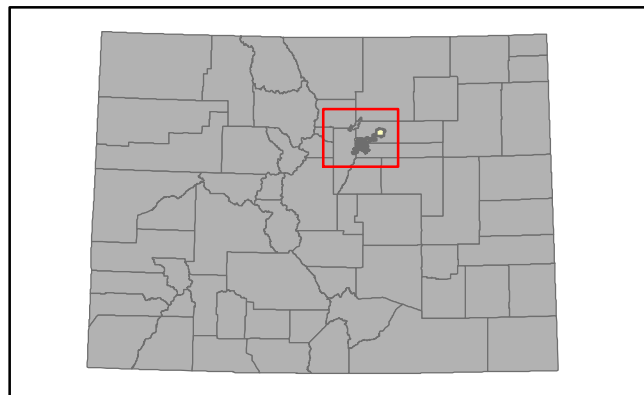
##### Airports

##### Probability Damage > Extensive



— Fault

■ Study Region Tract



Created by: Colorado Geological Survey

Team: Matt Morgan and Scot Fitzgerald

Date Created: March 2013

Location: Denver County Colorado

Fault Parameters: arbitrary, magnitude 6.5, depth 10km

Data: Changed to CGS Landslides and CGS/FEMA Soils data

Projection: GCS North American 1983

0 5 10 20 Miles

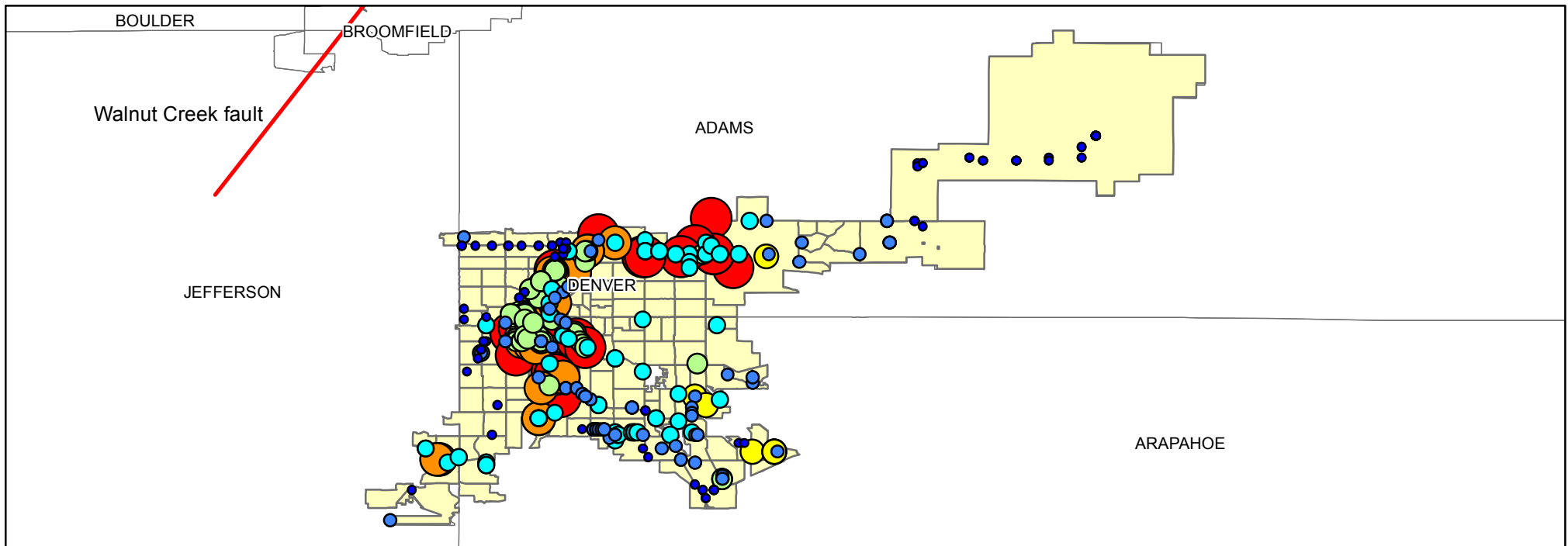


**HAZUS**  
EARTHQUAKE • WIND • FLOOD **MH**

# Study Region: Denver County

## Bridges Map

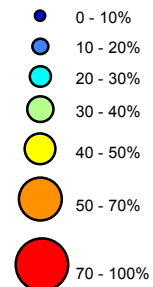
### Hazard Scenario: Walnut Creek Fault 6.5



#### Legend

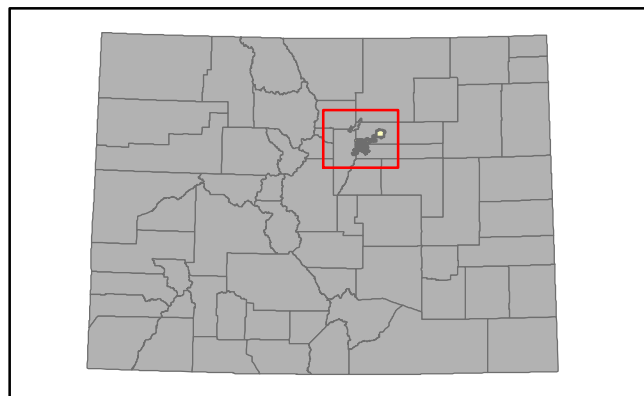
##### Bridges

##### Probability Damage > Extensive



— Fault

— Study Region Tract



Created by: Colorado Geological Survey

Team: Matt Morgan and Scot Fitzgerald

Date Created: March 2013

Location: Denver County Colorado

Fault Parameters: arbitrary, magnitude 6.5, depth 10km

Data: Changed to CGS Landslides and CGS/FEMA Soils data

Projection: GCS North American 1983

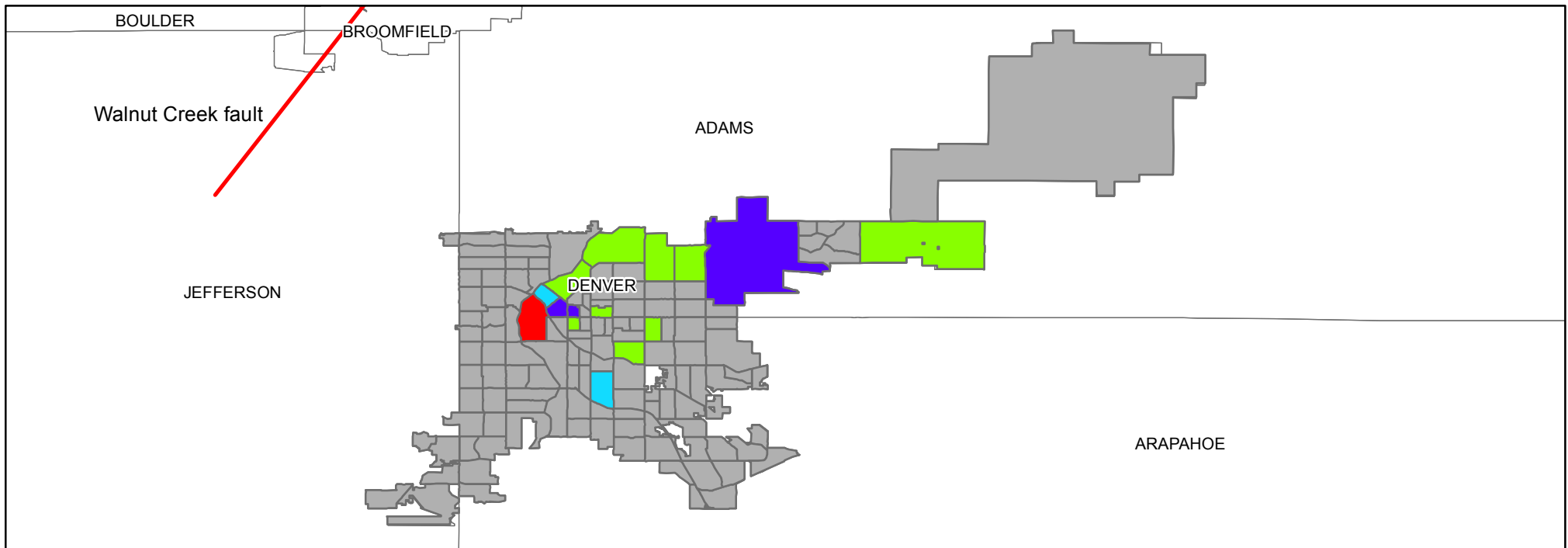
0 5 10 20 Miles



Study Region: Denver County

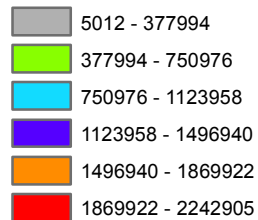
Building Economic Loss Map

Hazard Scenario: Walnut Creek Fault 6.5

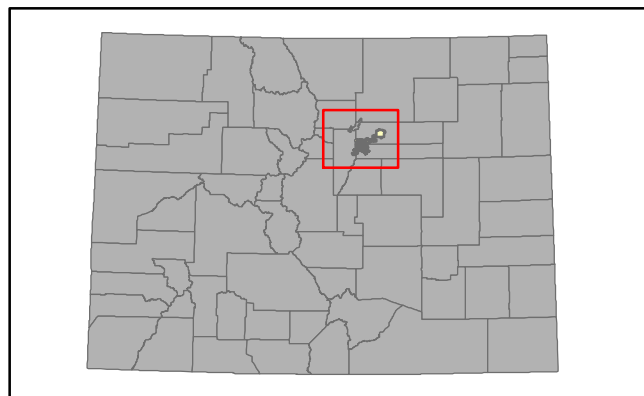


### Legend

#### Building Economic Loss in Thousands of Dollars



— Fault  
— Study Region Tract



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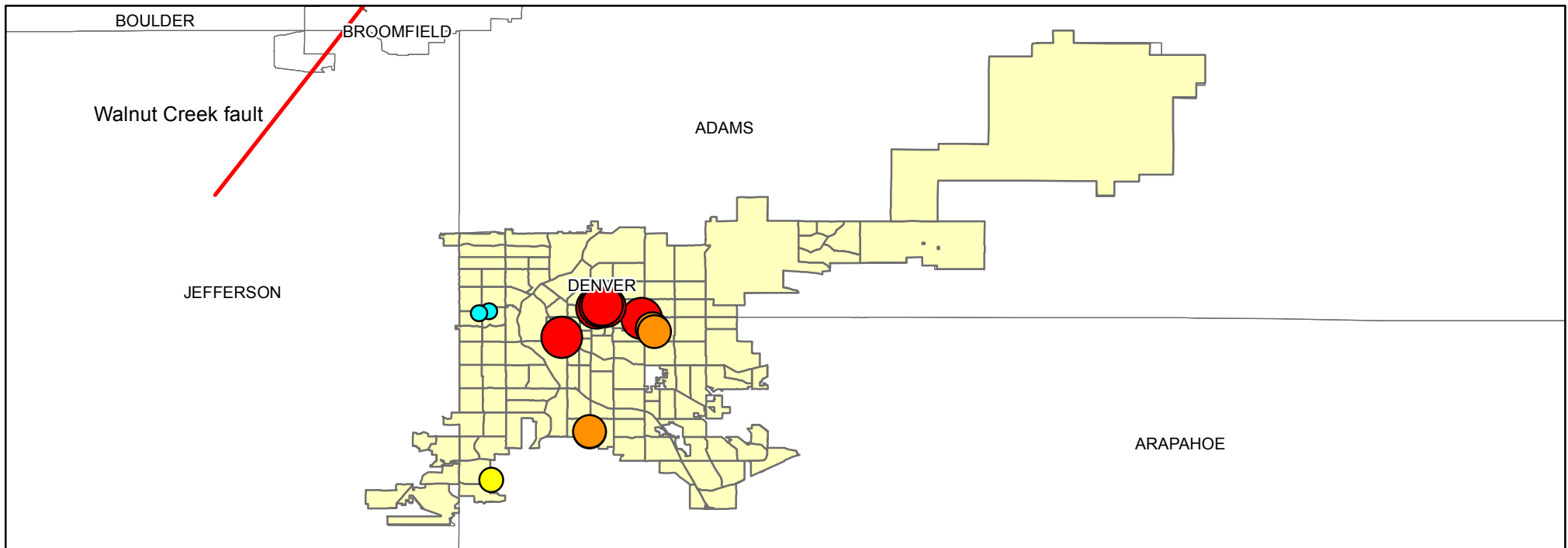


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# Study Region: Denver County

## Hazard Scenario: Walnut Creek Fault 6.5

## Care Facilities Map



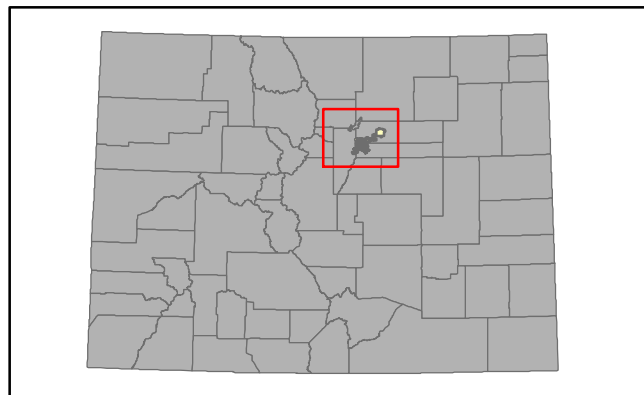
### Legend

#### Care Facilities

##### Probability Damage > Extensive

- 0 - 10%
- 10 - 20%
- 20 - 30%
- 30 - 40%
- 40 - 50%
- 50 - 70%
- 70 - 100%

— Fault  
— Study Region Tract



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Team: Matt Morgan and Scot Fitzgerald

Date Created: March 2013

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0 5 10 20 Miles



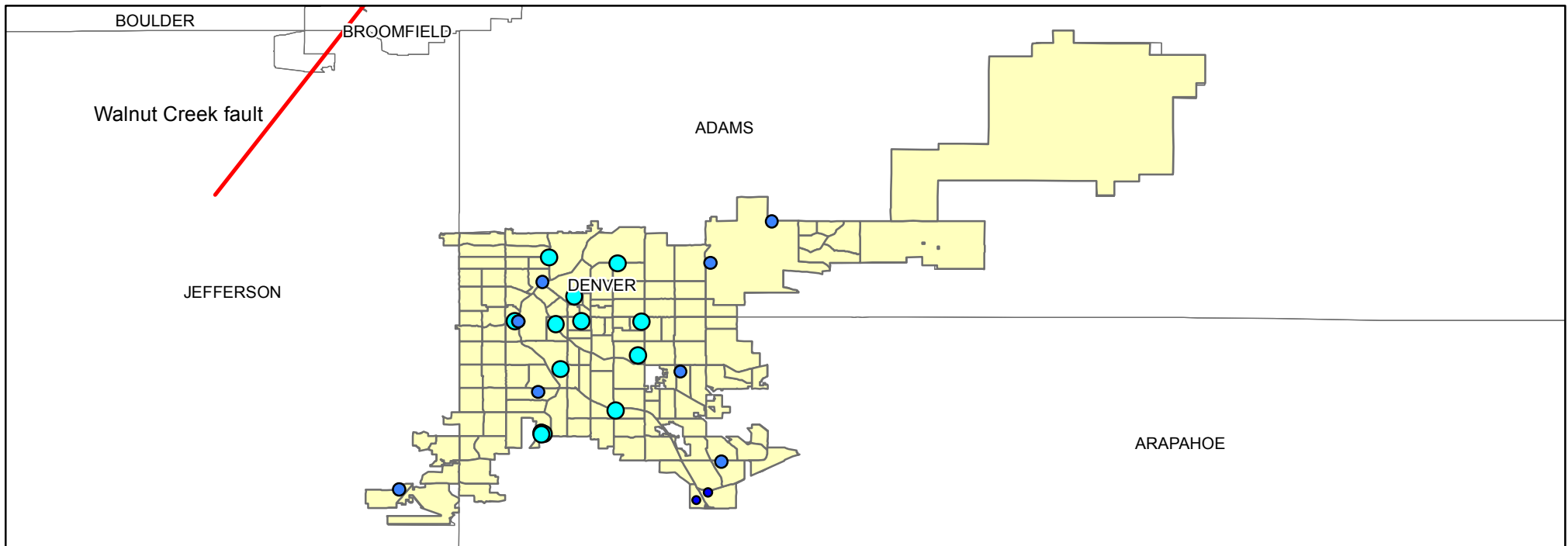
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# Study Region: Denver County

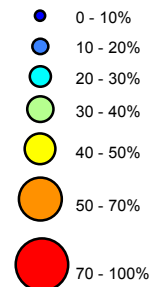
## Hazard Scenario: Walnut Creek Fault 6.5

## Electrical Facilities Map

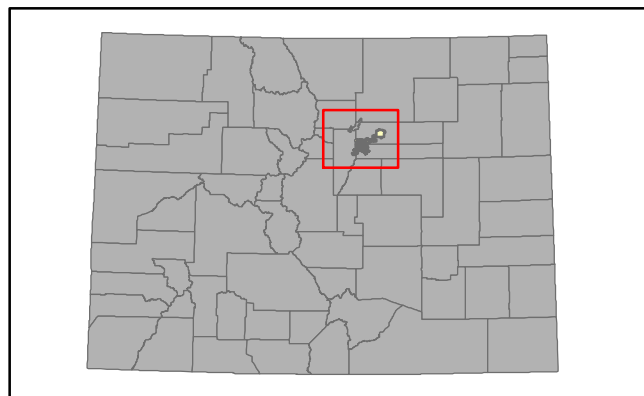


### Legend

#### Electrical Power Facilities Probability Damage > Extensive



— Fault  
Study Region Tract



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Location: Denver County Colorado

Fault Parameters: arbitrary, magnitude 6.5, depth 10km

Data: Changed to CGS Landslides and CGS/FEMA Soils data

Projection: GCS North American 1983

0 5 10 20 Miles

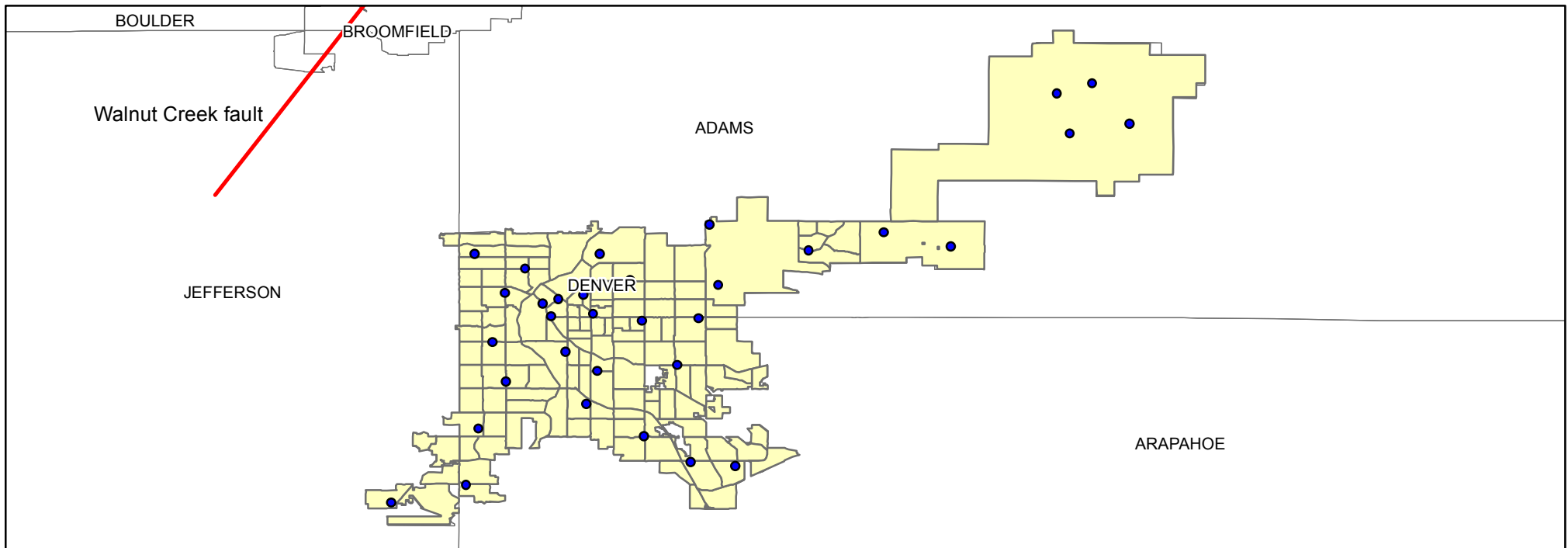


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# Study Region: Denver County

## Hazard Scenario: Walnut Creek Fault 6.5

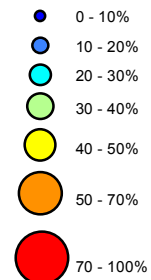
## Fire Stations Map



### Legend

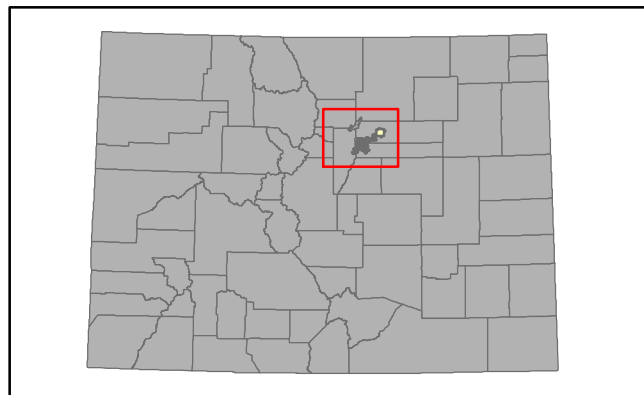
#### Fire Stations

#### Probability Damage > Extensive



— Fault

— Study Region Tract



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Team: Matt Morgan and Scot Fitzgerald

Date Created: March 2013

Location: Denver County Colorado

Fault Parameters: arbitrary, magnitude 6.5, depth 10km

Data: Changed to CGS Landslides and CGS/FEMA Soils data

Projection: GCS North American 1983

0 5 10 20 Miles

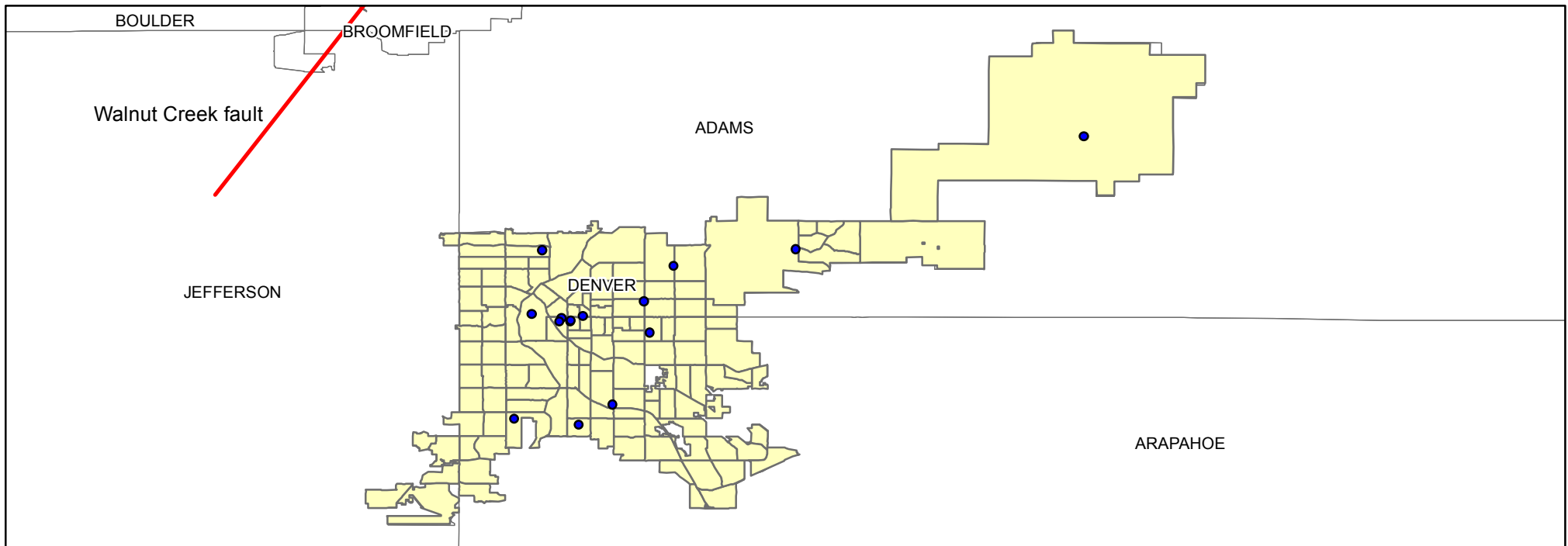


**HAZUS**  
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# Study Region: Denver County

## Hazard Scenario: Walnut Creek Fault 6.5

## Police Stations Map



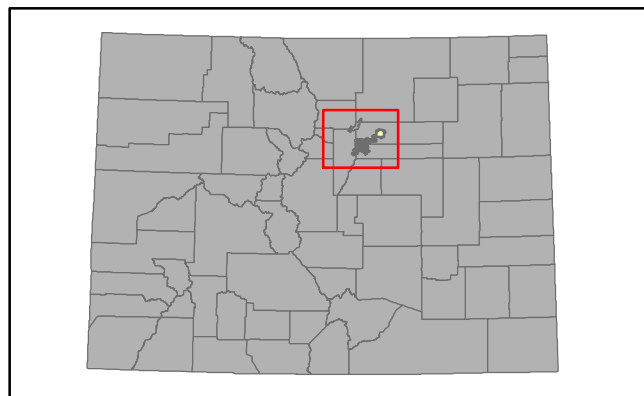
### Legend

#### Police Stations

#### Probability Damage > Extensive



— Fault  
— Study Region Tract



Created by: Colorado Geological Survey

Team: Matt Morgan and Scot Fitzgerald

Date Created: March 2013

Location: Denver County Colorado

Fault Parameters: arbitrary, magnitude 6.5, depth 10km

Data: Changed to CGS Landslides and CGS/FEMA Soils data

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0 5 10 20 Miles

