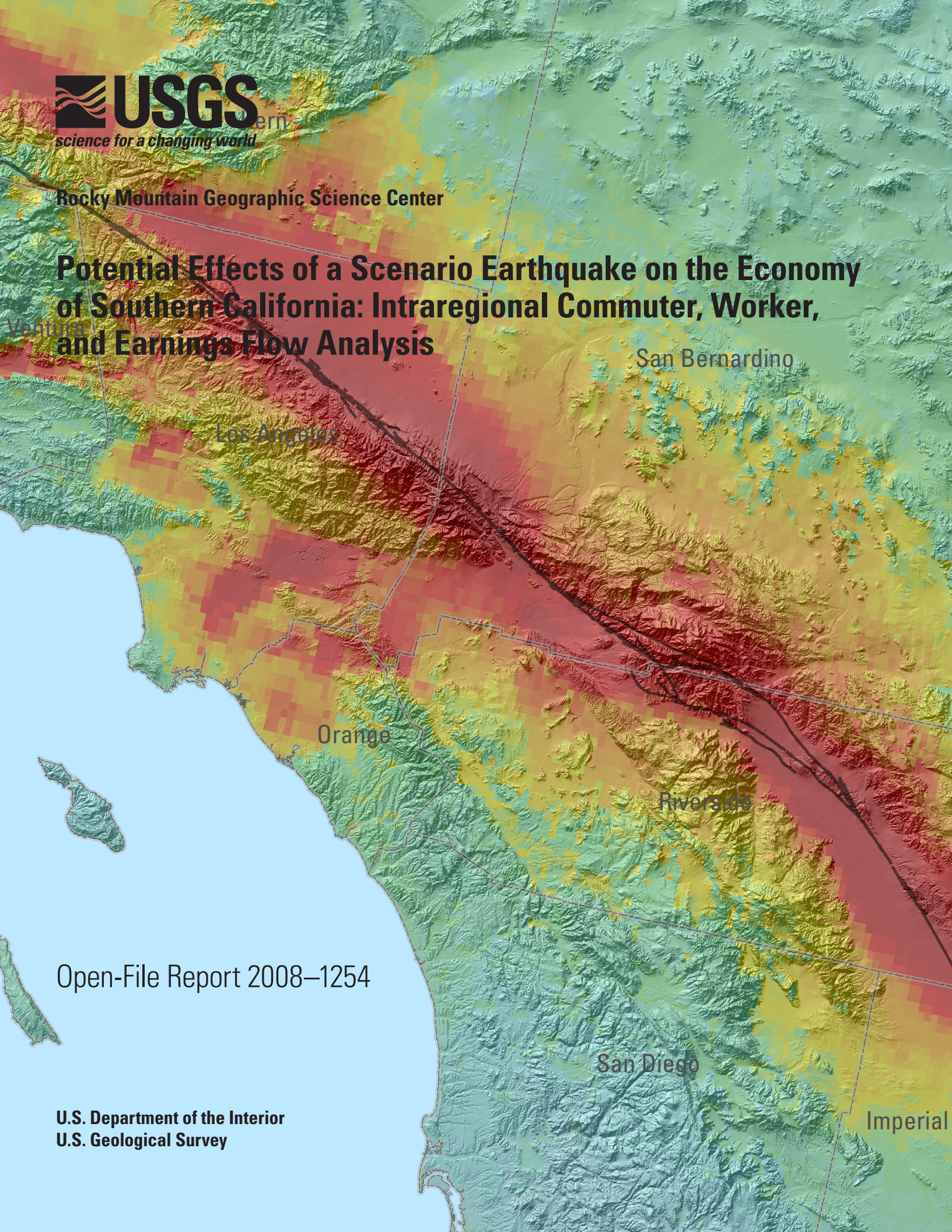




Rocky Mountain Geographic Science Center

Potential Effects of a Scenario Earthquake on the Economy of Southern California: Intraregional Commuter, Worker, and Earnings Flow Analysis



Open-File Report 2008-1254

U.S. Department of the Interior
U.S. Geological Survey

FRONT COVER—Instrumental Intensity for the simulated magnitude 7.8 ShakeOut Scenario earthquake overlaying a shaded-relief terrain map for a portion of the eight-county Southern California regional study area. Lowest intensities are in blue while highest intensities are in red. A portion of the San Andreas Fault is symbolized in black. California county boundaries are illustrated using a dashed-line symbology and county names are annotated in gray.

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Introduction

The Multi-Hazards Demonstration Project (MHDP) is a collaboration between the U.S. Geological Survey (USGS) and various partners from the public and private sectors and academia, meant to improve Southern California's resiliency to natural hazards (Jones and others, 2007). In support of the MHDP objectives, the ShakeOut Scenario was developed. It describes a magnitude 7.8 (M7.8) earthquake along the southernmost 300 kilometers (200 miles) of the San Andreas Fault, identified by geoscientists as a plausible event that will cause moderate to strong shaking over much of the eight-county (Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura) Southern California region (Jones and others, 2008). This report uses selected datasets from the U.S. Census Bureau and the State of California's Employment Development Department to develop preliminary estimates of the number and spatial distribution of commuters who cross the San Andreas Fault and to characterize these commuters by the industries in which they work and their total earnings. The analysis concerns the relative exposure of the region's economy to the effects of the earthquake as described by the location, volume, and earnings of those commuters who work in each of the region's economic sectors. It is anticipated that damage to transportation corridors traversing the fault would lead to at least short-term disruptions in the ability of commuters to travel between their places of residence and work.

Data Sources

Two datasets providing national coverage of journey-to-work information from Census 2000 were obtained from the U.S. Census Bureau. Special Tabulation Product (STP) 64 (U.S. Census Bureau, 2004a) includes estimates of worker flows between their census tract of residence and their census tract of work. County-level estimates of worker flows and their mean earnings in 1999 classified by Bureau of Economic

Analysis (BEA) industrial codes are included in STP 86 (U.S. Census Bureau, 2004b).

Worker and earnings data covering the years 2000 to 2006 were obtained from the State of California's Employment Development Department. These data include total wages by county and North American Industry Classification System (NAICS) code (State of California, 2007a), total industry employment by county and NAICS code (State of California, 2007b), and total civilian employment by county (State of California, 2007c). The total industry employment (or total wage and salary employment) by county is a count of jobs by work location while total civilian employment is a count of working people by residence location. Additionally, the total industry employment dataset does not include business owners, self-employed persons, unpaid volunteers, or family workers and private household workers, while the total civilian employment dataset does include them (State of California, 2006).

Methodology

To estimate the potential disruption of the normal commuter flows across the San Andreas Fault, some simplifying assumptions were made. Only commuters both living and working in the eight-county Southern California region were considered; in-commuters and out-commuters were not included. Also, while the region has an extensive network of faults, only the southern extent of the San Andreas Fault, which almost completely bisects the region, was treated as an obstacle to commuting. It should be noted that while using the full southern extent of the fault served as a convenient means of defining regional commuting patterns relative to the fault, extending the analysis to the northern boundary of the region exceeds the 300-km extent defined by the ShakeOut Scenario's slip distribution model output. This model describes the amount and distribution of ground movement patterns associated with the earthquake. Future refinements to this analysis would replace this simplified linear obstacle with more specific surface rupture segments identified from the slip distribution model output.

Finally, it was assumed that all practical commuting routes were completely contained within the region and that all transportation corridors crossing the southern segment of the San Andreas Fault were equally affected by the simulated M7.8 earthquake.

A shapefile depicting the San Andreas Fault was derived from a spatial data layer of faults (U.S. Geological Survey, 2004) through selection of the fault name attribute. It was then used to select all census tracts from a HAZUS boundary file (U.S. Department of Homeland Security, 2006) which were intersected by the fault. Three resulting subsets of census tracts were then distinguished as being either to the west or east of the fault or as lying on the fault. By associating the unique census tract identifiers with the census tract-level data of STP 64, each individual commuter flow was classified as crossing the fault (residence and work tracts on opposite sides of the fault), not crossing the fault (residence and work tracts on the same side of the fault), or possibly crossing the fault (any combination involving tracts on the fault with others on the fault or tracts on either side). From these classified flows, the spatial distribution of the combined volume of the sources and destinations of commuter flows by census tract were mapped. County-level flows and flow directions relative to the fault were also cross-tabulated to produce regional flow matrices. Given the irregularity of the size and shape of census tracts, the mapped commuter flow volumes were normalized by census tract area.

The STP 86 worker and earnings data were cross-tabulated by county and industry to produce a regional flow matrix. Due to differences in methodologies between the two data sources, the county-level worker flows do differ somewhat between the STP 86 and STP 64 data. However, the difference in each county-to-county flow as a proportion of each county's total flow amounts to 0.5 percent at most and 0.1 percent on average. The mean earnings reported for each worker flow in STP 86 were multiplied by the total workers in each flow to obtain the total earnings for each flow.

Because the data from the two U.S. Census Bureau products were based on results from the 2000 Census, additional data were obtained from the State of California Employment Development Department as a means to estimate how growth in the region since 2000 might have affected commuting patterns and exposure of the region's economy to the effects of the earthquake in the interim. The percent change in total civilian employment and total industry employment by county were calculated for the period from 2000 to 2006. This was also done for total industry wages by county for the period from 1999 to 2005. These percentages were then applied to the Census data to obtain a rough approximation of exposure in a time period closer to the current date. It should be noted that changes to the methodologies and procedures associated with estimating industry wages do hinder the comparability of wage data between time periods (State of California, 2007d).

Commuter Fault-Crossing Estimates

The spatial distribution of total commuting volume (whether crossing the fault or not) is concentrated, as anticipated, in areas of high population density (fig. 1). In 2000, of over 8 million Southern California intraregional commuters, more than 3.5 million of them commuted within Los Angeles County (table 1). San Diego and Orange Counties each had internal commuting levels of over 1 million each. The greatest intercounty flows were between Los Angeles and Orange Counties in both directions and from San Bernardino County to Los Angeles County. Each of these flows was in excess of 100,000. The breakout of flows by their directionality also indicates the predominance of commuter flows west of the fault (table 2).

The spatial distribution of commuters who cross or possibly cross the fault is, as anticipated, a function of proximity to the fault as well as population density (fig. 2). Of these approximately 250,000 commuters, over 78,000 of them commuted within San Bernardino County (table 3). An additional 67,000 commuted within Los Angeles County, with Riverside County rounding out the highest intracounty flows at over 33,000. The highest intercounty flows were from San Bernardino County to Riverside County (nearly 15,000) and from San Bernardino County to Los Angeles County (approximately 11,000). These highest flows are summarized in figure 3. The estimates reported for Imperial County were particularly adversely affected by the methodology used. A single census tract covering most of the eastern half of the county is only marginally intersected by the San Andreas Fault. It is unlikely that many commuters to, from, or within the county would find it necessary to take a route leading them over the fault. This runs counter to the results that suggest nearly 40 percent of these commuters crossed or possibly crossed the fault.

Appendix 1 provides an industry-level breakdown of county-to-county worker and earnings flows derived from STP 86 data in tabular format. These data describe all workers as opposed to only those who commute across the fault. While the distribution of total workers across industries does not directly translate to the industry distribution of the subset of workers who cross the fault, some general characterizations can be made about the structure of the economies where these commuters live and work and might provide at least some insight into what the composition of this subset of commuters might be. Focusing on the largest fault-crossing flows summarized in figure 3, the Service sector is consistently the largest component of the total flows of which the subset of fault-crossing flows are a part. This holds true in terms of workers and earnings. As a percentage of the five total flows that include the top five fault-crossing flows, the Service sector accounts for 23 to 31 percent of worker flows and 20 to 30 percent of earnings flows. Without additional data describing the distribution of the fault-crossing commuters and their earnings across industries, it can not be concluded that the

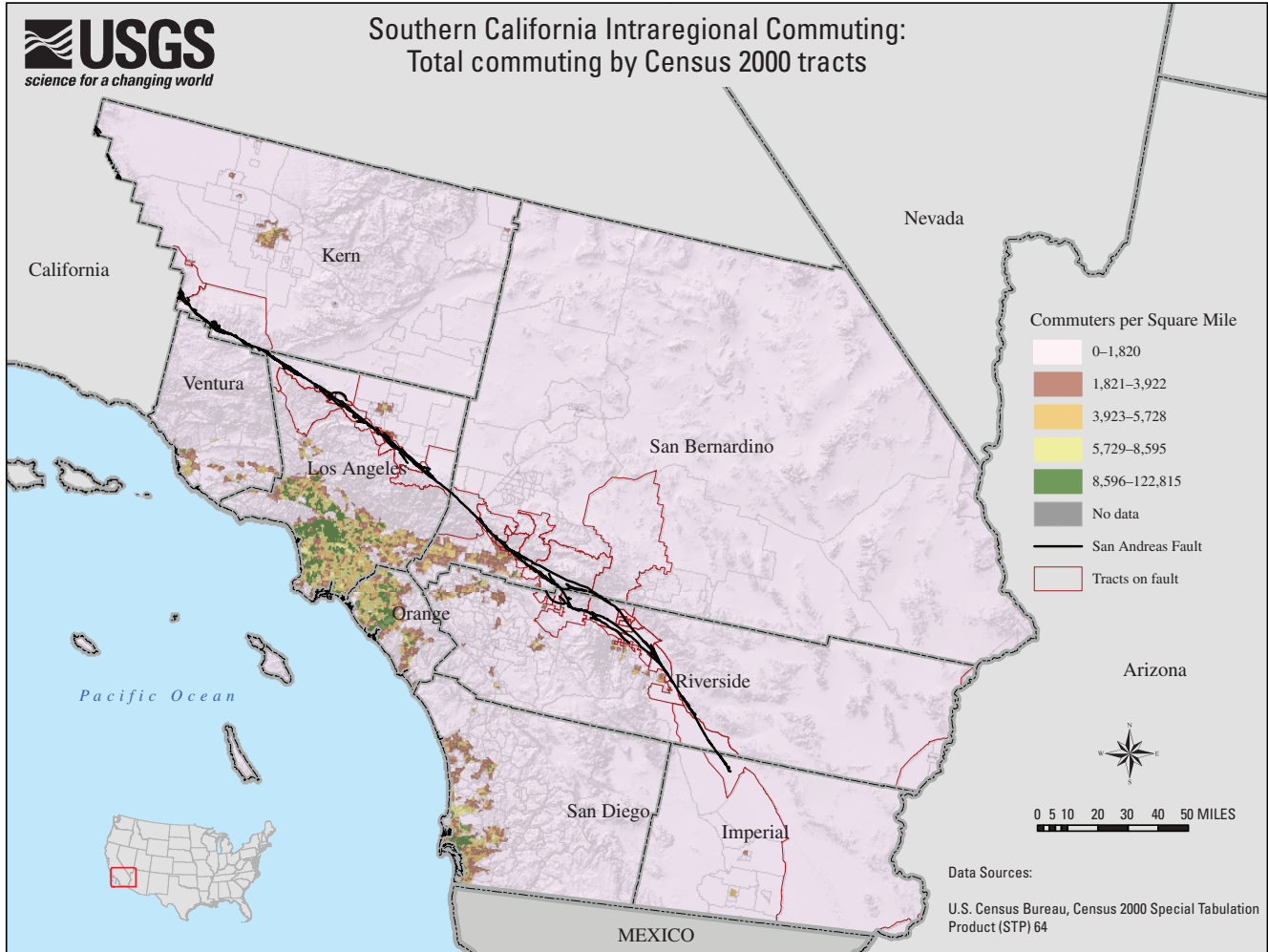


Figure 1. Total intraregional commuters per square mile in 2000. The values reflect the total volume of both the incoming and outgoing commuters for each census tract. As would be expected, the highest volumes are in the areas with the highest population density (for example, the cities of Los Angeles, San Diego).

Table 1. The county-to-county flow matrix of intraregional commuters for the year 2000. The county of residence is read down the left side and the workplace county is read across the top. Intracounty flows are indicated by italics.

Total Commuters in 2000								
County of Residence	County of Workplace							
	Imperial	Kern	Los Angeles	Orange	Riverside	San Bernardino	San Diego	Ventura
Imperial	39,989	49	69	22	678	56	411	0
Kern	0	213,206	7,053	295	53	1,002	137	431
Los Angeles	375	5,959	<i>3,478,056</i>	152,350	8,695	39,552	4,409	30,395
Orange	148	233	174,949	<i>1,067,139</i>	10,774	8,887	6,448	664
Riverside	413	229	35,579	50,205	<i>412,591</i>	58,919	18,345	215
San Bernardino	179	1,038	108,457	28,203	50,401	<i>452,561</i>	1,760	580
San Diego	746	165	7,423	11,811	5,674	2,323	<i>1,234,612</i>	444
Ventura	0	244	66,018	744	150	296	276	260,783

Table 2. The general directionality of commuter flows. The vast majority are to, from, or among tracts lying west of the fault.

Commute Direction Relative to Fault in 2000			
Residence	Workplace		
	East	On	West
East	368,234	7,435	77,039
On	12,838	16,682	64,268
West	34,898	24,056	7,443,048

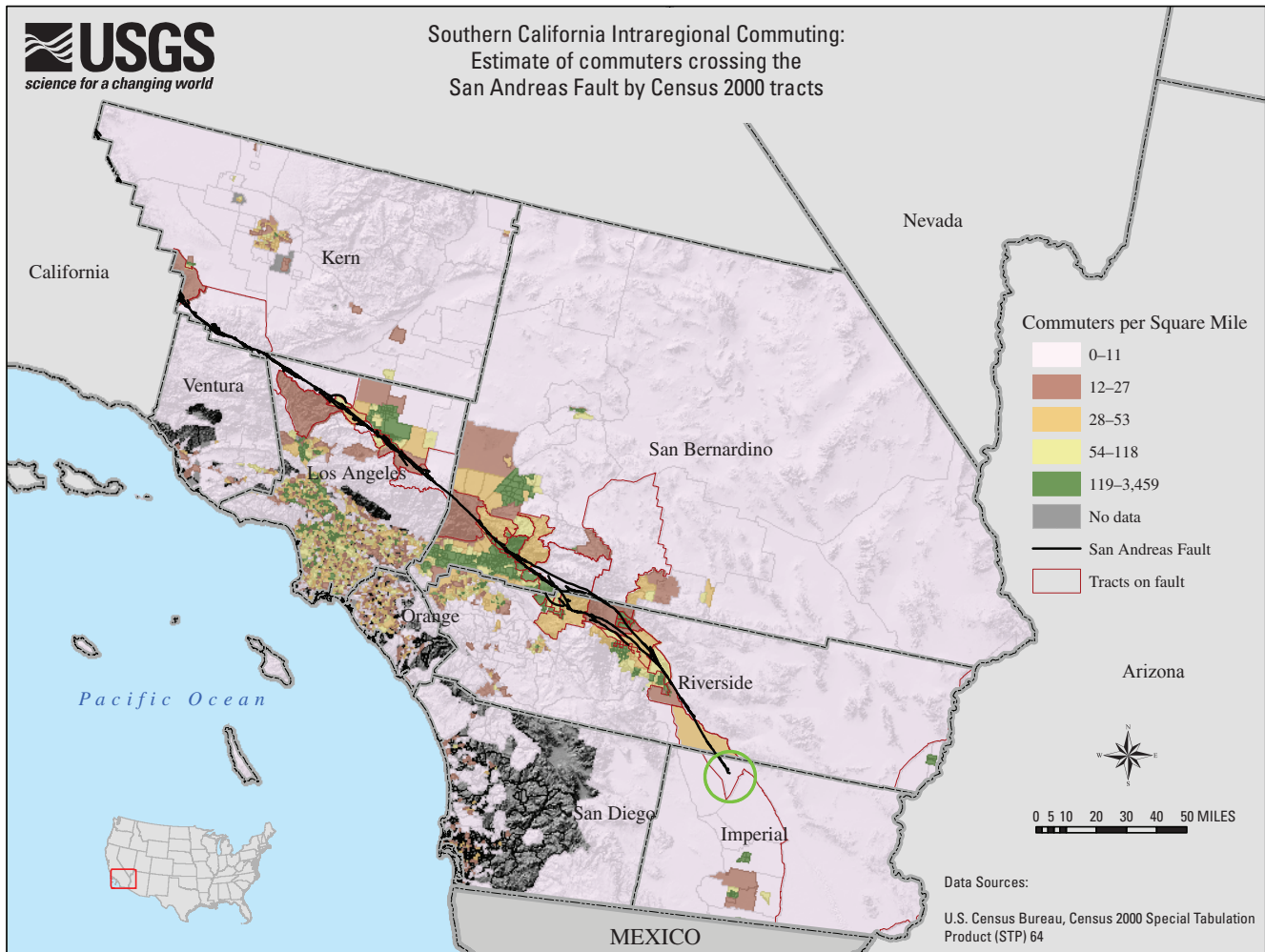


Figure 2. The distribution of commuters who crossed or possibly crossed the fault in 2000. The values reflect the total volume of both the incoming and outgoing commuters for each census tract. Concentrations are highest along the fault and in high population density areas. The estimated distribution for Imperial County is adversely affected by the limited intersection of the San Andreas Fault with a single, large census tract (circled in green).

Table 3. The county-to-county flow matrix of intraregional commuters who crossed or possibly crossed the fault in 2000. The numbers for Imperial County should be considered only as an artifact of the methodology and not as an estimate comparable to the other counties. Intracounty flows are indicated by italics.

Fault Crossing and Possible Fault Crossing Commuters in 2000								
County of Residence	County of Workplace							
	Imperial	Kern	Los Angeles	Orange	Riverside	San Bernardino	San Diego	Ventura
Imperial	<i>14,644</i>	49	8	0	126	16	12	0
Kern	0	2,975	4,250	295	53	196	137	431
Los Angeles	295	1,536	<i>67,462</i>	485	358	2,838	88	1,351
Orange	60	233	1,132	<i>0</i>	157	781	0	0
Riverside	216	229	746	190	33,279	5,954	128	10
San Bernardino	141	242	11,046	3,205	14,969	<i>78,359</i>	571	114
San Diego	400	165	240	0	114	1,366	<i>0</i>	0
Ventura	0	244	637	0	14	39	0	<i>0</i>

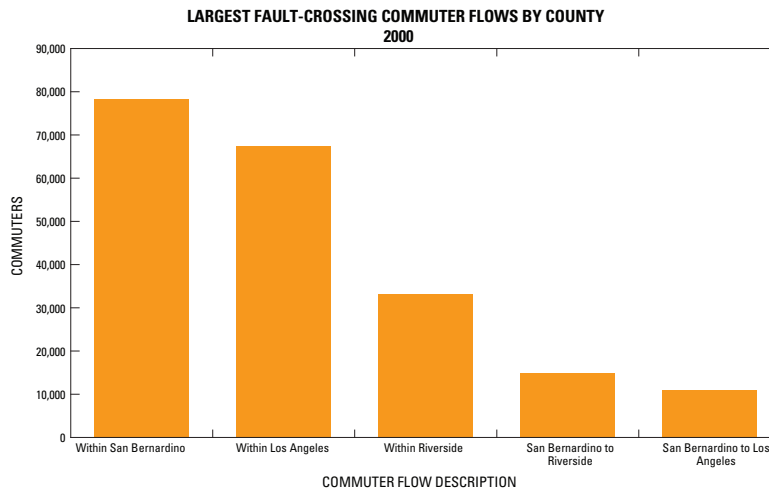


Figure 3. Flows with the highest number of commuters crossing the San Andreas Fault in 2000.

predominance of the Service sector similarly characterizes this subset of commuters. The composition of the total flows, however, does suggest the potential exposure of the Service sector to the disruptions of commuting attributable to the simulated earthquake.

Using available State of California Employment Development Department data, the growth of the regional economy between 2000 and 2006 in terms of employment and wages can be estimated to get a better sense of commuting patterns and exposure in a more recent time period. Since total civilian employment counts workers by their county of residence and total industry employment by their county of workplace, the differential in the rate of change of each might be an indicator of how the sources and destinations of worker flows and thus commuting patterns and associated

earnings are changing over time. Taking two opposing examples, Kern County experienced 17 percent growth in total civilian employment (those residing in Kern County) and an approximate 15 percent increase in total industry employment (those working in Kern County) while San Bernardino County experienced 18 percent growth in employment for those living in the county and a 22 percent increase in those working in the county (table 4). The initial indication is that Kern County is growing faster as a source of employees while San Bernardino is growing faster as a source of jobs. By extension, this could suggest that Kern County is experiencing an increase in commuter outflows and San Bernardino County is experiencing an increase in commuter inflows.

Table 4. Employment and earnings growth rates by county.

Employment and Earnings Growth Rates			
County	County of Residence	County of Workplace	
	Percent change in total civilian employment 2000–2006	Percent change in total industry employment 2000–2006	Percent change in private industry wages 1999–2005
Imperial	4.2%	11.5%	29.4%
Kern	17.2%	14.9%	48.6%
Los Angeles	4.4%	0.5%	22.6%
Orange	9.8%	9.2%	39.4%
Riverside	32.1%	33.9%	69.8%
San Bernardino	18.2%	22.1%	56.3%
San Diego	10.5%	8.9%	41.1%
Ventura	8.9%	9.0%	52.5%

Discussion

The analysis provides preliminary estimates of total and fault-crossing commuting flows. The inclusion of industry and earnings data helped to generally characterize these flows and to establish a basis from which more detailed numerical and spatial estimates could be produced. Additional industry-level commuter and earnings data along with geocoded business establishment by industry data could provide an opportunity to more directly relate the characteristics of total flows to the fault-crossing flows and to disaggregate the census tract-level flows by industry and associated earnings. Future research refinements to the fault-crossing commuting flow estimates could include the addition of a transportation network layer as well as traffic count data and modeled road damage estimates. These additional data would assist in validating commuter flow volumes and more precisely identifying critical crossing points along the southern San Andreas Fault. Commuting routes disrupted by the surface ruptures modeled in the Shake-Out Scenario, along with alternative commuting routes could, in turn, be identified and applied when developing estimates.

The current analysis did not take into account the full fault network within the region. In the event of a M7.8 earthquake, it is anticipated that other faults in the network would cause additional damage to transportation networks and further disrupt commuting. Also, the analysis focuses on the travel between the origin and destination without considering the impact on the economy of the damage at either endpoint. Particularly for those closest to the fault, these damages would likely be a more immediate concern and be of more lasting impact than the disruption of the commute.

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Appendix 1. Total County-to-County Worker and Earnings Flows by Bureau of Economic Analysis Industrial Codes

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[From U.S. Census Bureau, Census 2000 Special Tabulation Product 86, 2004. Because of rounding, total amounts may not be exact]

County of Residence	County of Workplace Industry	Imperial		Kern		Los Angeles		Orange		Riverside		San Bernardino		San Diego		Ventura		
		Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	
Imperial	Agriculture, forestry, fishing and hunting, and mining	3,870	\$74.98	15	-	4	-			240	\$2.73			10	-			
	Construction	1,425	\$46.17			20	\$0.57			75	\$1.83	15	-	75	\$2.76			
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers	3,100	\$104.80			4	-	4	-	30	\$0.60			15	\$0.13			
	Federal government, civilian and military	2,145	\$87.10											100	\$3.21			
	Information and finance, insurance, real estate, and rental and leasing	1,740	\$44.79							4	-			15	-			
	Manufacturing	1,610	\$47.20						10	-	4	-	4	-	25	\$1.14		
	Private households	340	\$2.34			4	-											
	Services (except private households)	8,045	\$187.55	10	-	25	\$0.27	10	-	95	\$1.56	10	\$0.17	95	\$1.35			
	State or local government	9,795	\$322.41	4	-	4	-			50	\$1.17	4	-	15	\$0.72			
	Transportation and warehousing, and utilities	1,710	\$57.26	20	\$0.19	4	-			15	-	25	\$1.08	4	-			
Wholesale trade and retail trade	6,400	\$160.71	4	-	4	-			170	\$2.86			65	\$1.58				
TOTAL	40,180	\$1,135.31	53	\$0.19	69	\$0.84	24	\$0.00	683	\$10.75	58	\$1.25	419	\$10.88	0	\$0.00		
Kern	Agriculture, forestry, fishing and hunting, and mining			23,270	\$661.33	110	\$4.10	20	\$0.59	10	-	115	\$5.01	10	-	25	\$1.04	
	Construction			11,110	\$362.33	575	\$22.05	30	\$1.13	10	-	115	\$4.38	20	\$0.86	105	\$5.04	
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers			18,300	\$595.99	450	\$16.62	15	-	15	-	50	\$3.67			70	\$2.52	
	Federal government, civilian and military			11,985	\$488.47	500	\$24.80	30	\$1.51			70	\$2.44	40	\$1.82	10	-	
	Information and finance, insurance, real estate, and rental and leasing			12,200	\$371.42	520	\$23.47	35	\$0.28			15	-	20	-	15	-	
	Manufacturing			11,020	\$376.13	910	\$42.84	30	\$1.63			355	\$19.49	10	-	40	\$1.90	
	Private households			550	\$5.01													
	Services (except private households)			52,725	\$1,346.49	1,820	\$49.04	40	\$2.39	4	-	110	\$2.33	10	-	70	\$2.95	
	State or local government			35,505	\$1,237.99	1,025	\$51.12	25	\$1.15			45	\$2.40	4	-	35	\$0.93	
	Transportation and warehousing, and utilities			7,745	\$282.92	295	\$13.52			4	-	135	\$7.13					
Wholesale trade and retail trade			30,555	\$772.06	1,005	\$33.07	75	\$3.25	10	-	35	\$0.69	15	-	45	\$2.24		
TOTAL	0	\$0.00	214,965	\$6,500.14	7,210	\$280.63	300	\$11.93	53	\$0.00	1,045	\$47.54	129	\$2.68	415	\$16.62		

Appendix 1. Total County-to-County Worker and Earnings Flows by Bureau of Economic Analysis Industrial Codes.—Continued

[From U.S. Census Bureau, Census 2000 Special Tabulation Product 86, 2004. Because of rounding, total amounts may not be exact]

County of Residence	County of Workplace Industry	Imperial		Kern		Los Angeles		Orange		Riverside		San Bernardino		San Diego		Ventura	
		Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)
Los Angeles	Agriculture, forestry, fishing and hunting, and mining			195	\$9.04	6,155	\$225.51	350	\$11.65	50	\$0.84	185	\$5.00	30	\$0.79	250	\$5.77
	Construction	85	\$1.80	310	\$16.60	127,175	\$4,276.39	11,935	\$425.77	1,650	\$49.42	3,540	\$122.63	675	\$22.89	3,250	\$105.66
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers	40	\$0.89	275	\$11.72	331,215	\$12,625.92	7,750	\$280.64	800	\$33.08	2,495	\$91.92	405	\$17.99	2,275	\$83.51
	Federal government, civilian and military	4	-	2,125	\$107.87	63,090	\$2,621.64	2,645	\$100.84	170	\$6.54	500	\$16.87	745	\$17.51	385	\$18.28
	Information and finance, insurance, real estate, and rental and leasing	10	-	130	\$7.04	392,845	\$21,377.05	19,795	\$873.85	655	\$34.36	2,645	\$119.21	350	\$18.75	5,315	\$281.57
	Manufacturing	40	\$0.64	860	\$43.64	501,210	\$17,350.39	30,255	\$1,232.26	1,625	\$59.43	9,035	\$304.15	420	\$28.38	6,385	\$286.30
	Private households	10	-	10	-	26,885	\$358.43	390	\$4.04	10	-	160	\$4.13	15	-	215	\$2.64
	Services (except private households)	50	\$1.51	1,160	\$47.34	1,109,485	\$39,412.24	45,935	\$1,610.39	1,915	\$65.41	8,940	\$276.42	1,030	\$39.93	7,575	\$305.26
	State or local government	30	\$0.88	460	\$21.36	401,955	\$14,978.45	10,010	\$374.64	685	\$27.33	3,305	\$155.00	320	\$10.50	1,565	\$66.24
	Transportation and warehousing, and utilities	10	-	190	\$9.57	125,770	\$4,476.28	4,330	\$166.71	610	\$22.80	2,840	\$101.34	170	\$17.42	545	\$21.57
Wholesale trade and retail trade	130	\$2.51	360	\$12.95	490,620	\$14,999.23	26,880	\$954.21	1,120	\$40.91	7,515	\$216.10	475	\$17.45	4,110	\$177.70	
TOTAL	409	\$8.23	6,075	\$287.13	3,576,405	\$132,701.53	160,275	\$6,035.00	9,290	\$340.12	41,160	\$1,412.77	4,635	\$191.61	31,870	\$1,354.50	
Orange	Agriculture, forestry, fishing and hunting, and mining			30	\$0.96	440	\$24.97	3,485	\$81.47	65	\$3.41	15	-			15	-
	Construction			30	\$1.49	9,880	\$507.07	51,110	\$2,291.72	2,030	\$87.69	1,130	\$42.21	870	\$43.81	130	\$6.01
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers	40	\$0.48	50	\$1.31	10,340	\$486.88	98,380	\$4,095.17	990	\$48.37	685	\$34.91	430	\$17.92	30	\$3.18
	Federal government, civilian and military					4,410	\$226.61	12,270	\$486.70	135	\$6.68	125	\$6.81	1,270	\$51.63	40	\$0.86
	Information and finance, insurance, real estate, and rental and leasing			45	\$2.03	16,125	\$968.31	117,110	\$6,243.49	620	\$38.45	625	\$36.78	615	\$41.48	35	\$1.61
	Manufacturing			35	\$2.42	36,865	\$2,274.64	172,750	\$7,654.73	2,625	\$148.84	1,870	\$111.50	770	\$50.89	160	\$12.64
	Private households					170	\$3.05	4,315	\$50.39	15	-	4	-	30	\$0.52	30	\$0.27
	Services (except private households)	20	-	30	\$0.86	42,430	\$2,051.58	345,680	\$12,554.41	2,050	\$86.85	1,825	\$95.29	1,455	\$81.00	185	\$6.83
	State or local government	30	\$1.79	4	-	24,335	\$1,261.21	101,530	\$3,842.30	1,235	\$58.61	945	\$49.04	445	\$19.40	25	\$2.28
	Transportation and warehousing, and utilities			4	-	11,305	\$651.80	20,265	\$839.23	355	\$15.06	520	\$28.05	155	\$14.51	15	\$0.86
Wholesale trade and retail trade	70	\$1.01	15	-	28,855	\$1,534.36	163,805	\$6,013.45	1,330	\$55.67	1,740	\$94.09	760	\$42.06	65	\$2.96	
TOTAL	160	\$3.28	243	\$9.07	185,155	\$9,990.48	1,090,700	\$44,153.06	11,450	\$549.63	9,484	\$498.68	6,800	\$363.22	730	\$37.50	

Appendix 1. Total County-to-County Worker and Earnings Flows by Bureau of Economic Analysis Industrial Codes.—Continued

[From U.S. Census Bureau, Census 2000 Special Tabulation Product 86, 2004. Because of rounding, total amounts may not be exact]

County of Residence	County of Workplace Industry	Imperial		Kern		Los Angeles		Orange		Riverside		San Bernardino		San Diego		Ventura	
		Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)
Riverside	Agriculture, forestry, fishing and hunting, and mining	35	\$0.87	10	-	135	\$4.69	115	\$4.97	9,365	\$170.81	435	\$9.52	80	\$3.93		
	Construction	90	\$3.42	80	\$2.49	3,510	\$157.14	5,570	\$237.53	29,015	\$948.88	4,585	\$175.69	2,055	\$88.27	85	\$4.23
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers	45	\$1.78	4	-	2,130	\$82.26	2,440	\$88.34	43,345	\$1,397.36	2,750	\$92.27	995	\$37.59	10	-
	Federal government, civilian and military	4	-	55	\$1.74	1,205	\$52.75	1,140	\$48.55	7,025	\$254.13	1,850	\$76.51	2,885	\$114.47	30	\$0.83
	Information and finance, insurance, real estate, and rental and leasing	4	-	10	-	2,755	\$132.58	5,635	\$250.94	26,170	\$968.79	4,380	\$169.46	1,445	\$63.13	4	-
	Manufacturing					7,415	\$389.06	10,400	\$492.33	39,230	\$1,278.03	8,115	\$305.52	2,505	\$120.87	40	\$2.66
	Private households					35	\$0.54	35	\$0.12	1,660	\$20.82	55	\$1.28	4	-		
	Services (except private households)	70	\$1.98	35	\$1.40	6,750	\$294.21	11,850	\$431.47	130,085	\$3,340.97	14,800	\$468.98	3,900	\$149.18	15	\$0.10
	State or local government	140	\$6.79	10	-	5,400	\$288.32	4,895	\$223.35	59,340	\$2,088.71	7,690	\$327.12	1,655	\$73.06	10	-
	Transportation and warehousing, and utilities			35	\$1.26	2,990	\$139.81	1,985	\$97.04	9,065	\$309.28	5,320	\$209.40	655	\$26.53		
Wholesale trade and retail trade	30	\$0.88			4,475	\$219.63	7,545	\$313.31	62,835	\$1,600.91	10,435	\$349.17	2,455	\$102.72	30	-	
TOTAL		418	\$15.72	239	\$6.89	36,800	\$1,760.99	51,610	\$2,187.95	417,135	\$12,378.69	60,415	\$2,184.92	18,634	\$779.75	224	\$7.82
San Bernardino	Agriculture, forestry, fishing and hunting, and mining			175	\$8.47	265	\$10.53	80	\$2.87	425	\$9.18	2,900	\$68.29	10	-	40	\$1.67
	Construction	25	\$0.75	160	\$6.25	6,625	\$291.27	3,805	\$164.54	6,130	\$212.12	21,320	\$745.92	670	\$23.43	235	\$8.91
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers	15	-	35	\$1.41	4,745	\$173.35	1,250	\$36.46	2,460	\$82.60	38,830	\$1,187.77	115	\$3.85	20	-
	Federal government, civilian and military			215	\$10.41	3,350	\$139.98	345	\$13.87	1,460	\$60.87	25,015	\$704.20	175	\$4.00	25	\$1.34
	Information and finance, insurance, real estate, and rental and leasing	10	-	20	\$0.28	9,535	\$433.76	3,655	\$148.19	3,215	\$112.19	27,450	\$867.34	70	\$2.70	60	\$2.93
	Manufacturing	10	-	65	\$2.82	19,455	\$863.43	5,325	\$251.88	7,185	\$246.19	46,480	\$1,494.38	140	\$8.85	55	\$2.09
	Private households			4	-	285	\$4.17			60	\$1.08	1,520	\$17.79				
	Services (except private households)	55	\$1.77	155	\$6.23	27,150	\$925.16	6,530	\$241.43	12,100	\$373.18	128,075	\$3,241.19	330	\$13.83	75	\$2.20
	State or local government	50	\$2.08	100	\$3.25	18,330	\$869.48	2,065	\$97.38	6,970	\$285.11	70,270	\$2,410.89	100	\$4.11	25	\$1.40
	Transportation and warehousing, and utilities	10	-	85	\$3.46	6,640	\$304.67	1,225	\$47.97	3,405	\$128.28	22,345	\$778.54	20	-	20	-
Wholesale trade and retail trade			70	\$1.90	15,060	\$575.04	4,635	\$181.98	8,605	\$266.88	72,350	\$1,832.26	165	\$7.72	60	\$1.33	
TOTAL		175	\$4.60	1,084	\$44.48	111,440	\$4,590.84	28,915	\$1,186.57	52,015	\$1,777.68	456,555	\$13,348.57	1,795	\$68.49	615	\$21.87

Appendix 1. Total County-to-County Worker and Earnings Flows by Bureau of Economic Analysis Industrial Codes.—Continued

[From U.S. Census Bureau, Census 2000 Special Tabulation Product 86, 2004. Because of rounding, total amounts may not be exact]

County of Residence	County of Workplace Industry	Imperial		Kern		Los Angeles		Orange		Riverside		San Bernardino		San Diego		Ventura	
		Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)	Workers	Earnings (\$ millions)
San Diego	Agriculture, forestry, fishing and hunting, and mining	15	\$0.40			10	-	115	\$3.88	130	\$2.40	10	-	5,575	\$141.95		
	Construction	85	\$3.70	25	\$0.93	640	\$26.83	1,005	\$50.53	790	\$35.15	150	\$7.15	61,565	\$2,297.17	35	\$1.80
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers	95	\$4.16	15	-	565	\$29.28	785	\$40.52	580	\$22.24	75	\$3.45	106,435	\$3,738.74	15	-
	Federal government, civilian and military	130	\$3.94	30	\$1.31	285	\$12.75	720	\$39.53	320	\$11.66	1,110	\$18.12	135,015	\$4,252.03	210	\$7.60
	Information and finance, insurance, real estate, and rental and leasing	15	-			690	\$55.64	1,435	\$97.64	355	\$19.97	55	\$2.47	109,985	\$5,163.69	45	\$1.62
	Manufacturing	10	-	4	-	815	\$47.85	1,235	\$78.42	830	\$51.72	135	\$7.26	123,270	\$5,538.52	35	\$2.01
	Private households							25	\$0.44	10	-			4,425	\$68.04		
	Services (except private households)	175	\$10.96	65	\$0.94	1,635	\$81.66	3,165	\$168.31	1,430	\$55.14	355	\$17.40	390,930	\$12,731.81	70	\$3.38
	State or local government	195	\$8.19	15	-	840	\$45.01	940	\$44.04	740	\$29.91	135	\$7.03	133,895	\$4,753.54	10	-
	Transportation and warehousing, and utilities	20	\$0.69			1,410	\$75.46	1,140	\$68.94	100	\$4.55	190	\$8.85	26,350	\$986.75	30	\$1.82
	Wholesale trade and retail trade	50	\$2.68	10	-	880	\$46.80	1,715	\$90.87	590	\$22.80	160	\$5.24	156,190	\$4,896.87	10	-
TOTAL	790	\$34.72	164	\$3.18	7,770	\$421.28	12,280	\$683.13	5,875	\$255.54	2,375	\$76.97	1,253,635	\$44,569.11	460	\$18.23	
Ventura	Agriculture, forestry, fishing and hunting, and mining			25	\$2.49	260	\$10.83	15	-	10	-					11,545	\$220.36
	Construction			40	\$1.32	3,545	\$177.28	110	\$3.22	10	-	35	\$0.94	25	\$1.56	10,590	\$414.09
	Farm, self-employed incorporated, self-employed unincorporated, and unpaid family workers			10	\$0.41	5,065	\$277.85	45	\$3.44	15	\$0.91	35	\$1.27	20	\$0.32	26,825	\$1,010.20
	Federal government, civilian and military			30	\$1.97	1,250	\$64.86	35	\$1.49	4	-	10	-	65	\$2.28	12,820	\$533.21
	Information and finance, insurance, real estate, and rental and leasing			10	-	13,075	\$953.04	75	\$7.07			30	\$0.76	30	\$1.21	23,100	\$1,065.03
	Manufacturing			35	\$1.52	10,545	\$682.76	110	\$6.83	40	\$1.40	65	\$4.46	10	-	32,985	\$1,434.19
	Private households					70	\$1.88							10	-	855	\$13.26
	Services (except private households)			35	\$0.60	17,415	\$955.42	190	\$11.89	45	\$1.58	40	\$0.99	85	\$3.53	71,965	\$2,249.48
	State or local government			30	\$0.78	7,615	\$426.89	55	\$1.53	20	\$1.68	40	\$2.20	25	\$1.13	30,010	\$1,144.55
	Transportation and warehousing, and utilities			15	\$0.43	1,900	\$100.75	20	-	4	-	20	\$1.37			4,860	\$186.12
	Wholesale trade and retail trade			35	\$1.87	7,760	\$424.78	165	\$11.17	20	\$0.95	45	\$3.83	15	-	37,905	\$1,116.23
TOTAL	0	\$0.00	265	\$11.39	68,500	\$4,076.34	820	\$46.64	168	\$6.52	320	\$15.82	285	\$10.03	263,460	\$9,386.72	

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