The California Desert Conservation and Recreation Act of 2015: Impacts on Mining and the Regional Economy

Report Prepared by

The Sonoran Institute

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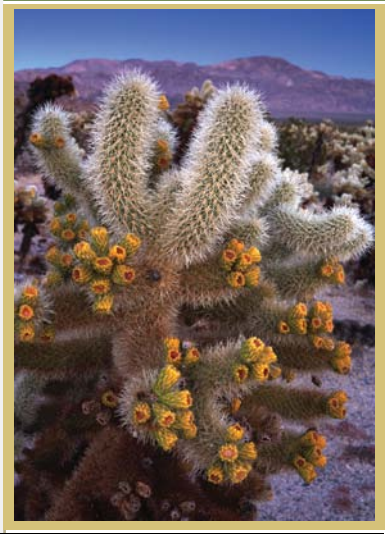

About the Sonoran Institute

Founded in 1999, the Sonoran Institute's mission is to connect people and communities with the natural resources that nourish and sustain them. We work at the nexus of commerce, community, and conservation to help people in the North American West build the communities they want to live in while preserving the values which brought them here. We envision a West where civil dialogue and collaboration are hallmarks of decision making, where people and wildlife live in harmony, and where clean water, air, and energy are assured.

Acknowledgements

The report was co-authored by Joe Marlow, Resource Economist at the Sonoran Institute; John Shepard, Senior Director of Programs at the Sonoran Institute; and Stephanie Weigel, Principal Consultant at Weigel Research and Planning. Cameron Ellis, GIS and Creative Project Manager at the Sonoran Institute, conducted GIS analysis related to the mineral resource assessment.

This report and associated summaries can be found at www.sonoraninstitute.org.

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Executive Summary

This report explores the economic contribution of mining in the California Desert and assesses the impact of the proposed California Desert Conservation and Recreation Act (CDCRA) of 2015 on mining activities in the region. The report concludes that the legislation will have minimal impact on mining and builds on the natural and cultural attractions that have been significant drivers of the regional economy for the past four decades. Among the report's findings:

- Over the past four decades, the California Desert has experienced steady growth in population, employment, and personal income. This growth is significantly driven by businesses and demographic changes that benefit directly from preserving the desert.
- Since 1970, mining has played a small role in total private employment. In the last 25 years, mining has contributed no more than 0.25% of the region's overall employment. Within the California Desert, only 5 mining operations employ more than 100 employees.
- Current mining operations, existing mining claims, and future mineral development in areas of high potential are all preserved and excluded from the conservation areas within the legislation.

The California Desert as a whole has experienced consistent population growth over the past four decades, at times outpacing the national average. This growth trend is also true of the desert portions of the 7 counties that, in part, comprise the California Desert (Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino, and San Diego counties).

Despite the region's growth, mining's contributions to the desert economy have been modest, with jobs in mining playing a small role in total private employment. In the last 25 years, mining's contribution to total private employment in the 7 desert counties has not exceeded 0.25%. Most recent total regional employment estimates (2013) range between 3,000 and 5,600 direct employees. At a local level, mining does provide a more significant contribution. In Kern and Inyo counties in 2013, employment in all mining (including oil and gas) represented 5.5% and 4.4% of total private employment; San Bernardino County had 0.2% of employment in mining for the same time period. For small communities, such as Lucerne Valley or Borrego Springs, mining operations that employ 25, 50, or 100 persons are considered major employers.

A reflection of its modest contribution to regional employment, in 2013, mining's contribution (including oil and gas) to overall labor-related income is small, approximately 0.8%. Between 1970-2013, that contribution has fluctuated between 0.3% and 1.0%, with no defined trend, while overall labor-related earnings between 1970 and 2013 increased by 132%. Non-labor income increased by 287% in that time period.

Even when direct, indirect, and induced impacts on Gross Domestic Product (GDP) are considered, the contribution to nominal GDP in 2014 is estimated between 0.04% and 4.12%. When only the desert portions of these counties are considered, the contribution of direct, indirect, and induced impacts on GDP due to mining activities were highest in Kern (25%), Inyo (8%), and San Bernardino (5%) counties.

These impacts likely represent upper limits to impacts, as the multipliers used were developed for use at the state level and likely overestimate impacts at the county and sub-county levels.

Mining's contribution to the California Desert's economy is overshadowed by growth in other economic sectors that track closely with economic trends throughout the interior West. These trends reflect the increasing importance of regional amenities, notably natural and cultural attractions, and are defined by growth in services, professional, and government sectors, and non-labor income. These sectors and income sources have grown over the past 4 decades—serving as the key economic drivers throughout the region.

These trends also have profound implications for the economic role of public lands, where protected public lands become an important economic asset. Tourism and recreation remains one of the bright spots of the region's economy, having rebounded to pre-recession levels: total direct travel spending in the desert region in 2013 reached $6.2 billion.

Mining activity is influenced by many factors, depending on the specific commodity. Industrial minerals currently being mined in the California Desert, such as construction aggregate and cement inputs, are influenced by local and regional demand and supply. Mining for most metals such as gold, base metals, and rare earth elements is affected by global supply/demand factors. The availability of public lands for mineral exploration and mining has a much smaller influence on mining activity than regional and global economic forces have on mining activity.

Through its extensive conservation designations, the CDCRA seeks to preserve the region's natural and cultural attractions, which have fueled much of the region's growth and prosperity. Protected public lands such as designated wilderness, national parks, national preserves, and national monuments protect key amenities that serve as the foundation for the region's tourism and recreation businesses, military operations, real estate development, and other economic sectors.

As currently drafted, the proposed CDCRA recognizes and protects existing mining claims and minimizes impacts on current mining operations. A careful screening of the location of current activities and operations indicates few impacts. Any effort to address these impacts would need to take into consideration the broad range of resource values in these areas.

The CDCRA will have minimal impacts on future mining activities in the California Desert due to the existence of extensive mineral potential outside of the proposed boundaries and the act's preservation of existing valid mineral rights (many coinciding with high mineral potential zones). Given the uncertainty regarding additional mineral potential in the proposed CDCRA on the one hand, and the clearly identified environmental and cultural values of these lands on the other, it would appear that favoring conservation is a wise societal choice.

As a result, the study concludes that the proposed legislation is compatible with ongoing mining activities and allows for future development of critical and competitive mineral resources.

Consequently, the protective designations proposed under the legislation likely represent the highest and best economic use of those public lands.

Background

The California Desert region covers approximately 20 million acres of southeastern California. While the California Desert is sparsely populated relative to other areas of the state, it is becoming increasingly urbanized. Both the large cities that ring the region and smaller cities and towns within the region have experienced significant population growth. The desert also attracts millions of visitors annually, with desert region direct travel total spending and direct travel total employment up since 1992.[1] Local economies benefit from visitation to the area that welcomed over 3.2 million visitors to the 3 desert national parks in 2014[2] and almost 4.2 million visitors in 2013 to areas managed by BLM California Desert District Offices.[3]

The desert's wildness and remoteness are among its biggest assets, offering significant recreational opportunities, including camping, hiking, rock climbing, hunting, horseback riding, exploring historical sites, and wildlife watching. These activities contribute hundreds of millions of dollars to local communities and the regional economy. The desert's natural splendor has also spurred development, as homes located near open spaces enjoy premium real estate values. The military makes use of the desert's vast undeveloped terrain to test new equipment and train combat forces. Hollywood similarly takes advantage of the landscape to shoot movies, television shows, and advertisements.

Increased degradation of the California Desert may be attributed to growth and development as well as to tourism and recreation impacts. Concerns about these impacts have led to proposals to protect the region's remaining pristine landscapes and proactively identify areas that are suitable for certain types of development. Most notable in this regard are (1) the California Desert Conservation and Recreation Act of 2015 (CDCRA), which seeks to protect up to 1.6 million acres of federal lands; and (2)the Desert Renewable Energy Conservation Plan (DRECP), which seeks to guide renewable energy development, protect resources, and manage recreation across a 22.5-million-acre planning area, which includes many areas of current and former mining activities.

[1] California Travel Impacts, 1992-2014p. April 2015, Dean Runyan and Associates, prepared for Visit California. http://industry.visitcalifornia.com/media/uploads/files/editor/CAImp14p.pdf. The report summarizes 2014 regional direct travel impacts for the desert region (as defined by Runyan) as $6.3 billion in total spending, $1.7 billion in earnings, 64,900 jobs and local and state tax revenues totaling $485 million (page 24).

[2] National Park Service visitation numbers for Death Valley National Park, Joshua Tree National Park and Mojave National Preserve were accessed from the NPS Visitor Use Statistics website at https://irma.nps.gov/Stats/.

[3] Bureau of Land Management 2013 RMIS 23c visitation report, personal communication.

This report looks at the economic contribution of mining in the California Desert region and the potential impact of the CDCRA on current and future mining activities. It is intended to inform ongoing general public discussions about the CDCRA and public lands conservation in the California Desert. It focuses on the 7 desert counties that are part of the California Desert Conservation Area (CDCA):[4] Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino and San Diego (Figure 1).[5]

Figure 1. California desert counties showing modern (2014) and historic (1970) census tracts approximating California Desert Conservation Area planning boundary, with boundaries of proposed components of the California Desert Conservation and Recreation Act legislation.

For this report, socioeconomic trend data were examined to provide insights on the contributions of the mining sector to the region's economic development over time. Initially, the county is used as the unit of analysis for this exploration. Since the CDCRA and the current mining activities are primarily located in the desert portions of the counties, where possible, additional analyses were performed using census tract boundaries for a finer scale analysis that considers the desert portions of the counties as a subarea for study (Figure 1). The census tract is a spatial unit used by the US Census Bureau for reporting socioeconomic data. The US Census Bureau defines these tracts as "relatively homogeneous

[4] The CDCA was designated by Congress in 1976 through the Federal Land Policy and Management Act. The Bureau of Land Management developed a plan for the CDCA that was approved as the California Desert Conservation Area Plan in 1980, which has subsequently been amended. Lands in the proposed CDCRA lie within the CDCA boundary, except for the western portion of the proposed Sand to Snow National Monument in the area of the San Gorgonio Wilderness and San Bernardino National Forest.

[5] Areas of the CDCA planning area have been proposed for protection as part of the CDCRA. Not included in the CDCA planning area is the western portion of the proposed Sand to Snow National Monument (CDCRA) in the area of the San Gorgonio Wilderness and San Bernardino National Forest.

units with respect to population characteristics, economic status, and living conditions." Tracts are designed to average around 4,000 inhabitants. This desert subarea was designated using the boundary of the CDCA to select census tracts from the 1980, 2000, and 2014 TIGER/Line GIS shapefiles.

While the economies of the desert and non-desert portions of counties are linked due to their common governance and revenue streams, the desert portions have different economic structures which, like many rural areas in the western US, are more tightly coupled with the unique values that derive from the resources present in those areas. For example, 72% of mining employment reported to the Mine Safety and Health Administration (MSHA)[6] in the 7 desert counties occurred in the desert portions of the counties, while only 9% of the populations of those counties resided in the desert portions in 2013.[7]

Population

The California Desert as a whole has experienced consistent population growth over the past decades, at times outpacing the national average. This growth trend is also true of the desert portions of the 7 desert counties.

Population, the total number of people by place of residence, is a key economic indicator. Long-term, steady population growth is an indicator of a prosperous, healthy economy, since it generally provides additional employment opportunities and an increase in total wages.

Since 1970, population has grown in all the desert counties, with rates of increase in the desert portions of the counties keeping pace with increases in non-desert portions. In the 7 desert counties, combined population rose at a rate higher than that of the US over the period 1970-2013 (87% increase vs. 55% increase, Figure 2). However, in the more recent period 2000-2013, the rate of change was essentially the same for the 7 desert counties combined and the US (13% increase vs. 12% increase, Figure 2).

While absolute population numbers are lower in desert portions of the 7 counties, in 5 of the 7 counties the rate of population growth from 1970 - 2013 kept pace with the 87% overall rate of population increase for the 7 counties combined (Figure 3). Kern County was close, with an 81% percent increase in population. This indicates that in all of the counties except Inyo County, an influx of population was occurring in desert portions of these counties comparable to the region as a whole, providing growth to support ongoing desert economic activities.

[6] The MSHA is the US Department of Labor branch tasked with protecting miners' safety and health.

[7] US Census Bureau, American Community Survey, 2013 data.

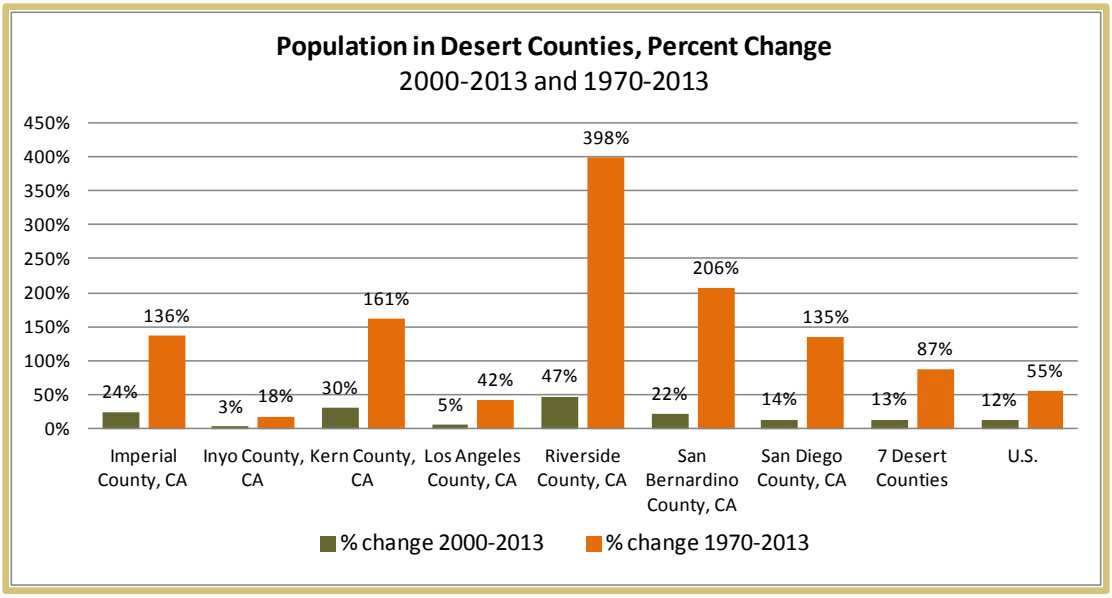


Figure 2. Percent change in desert counties' population, 1970-2013 and, 2000-2013, Table CA30. *Source:* Bureau of Economic Analysis, US Department of Commerce, Regional Economic Accounts.

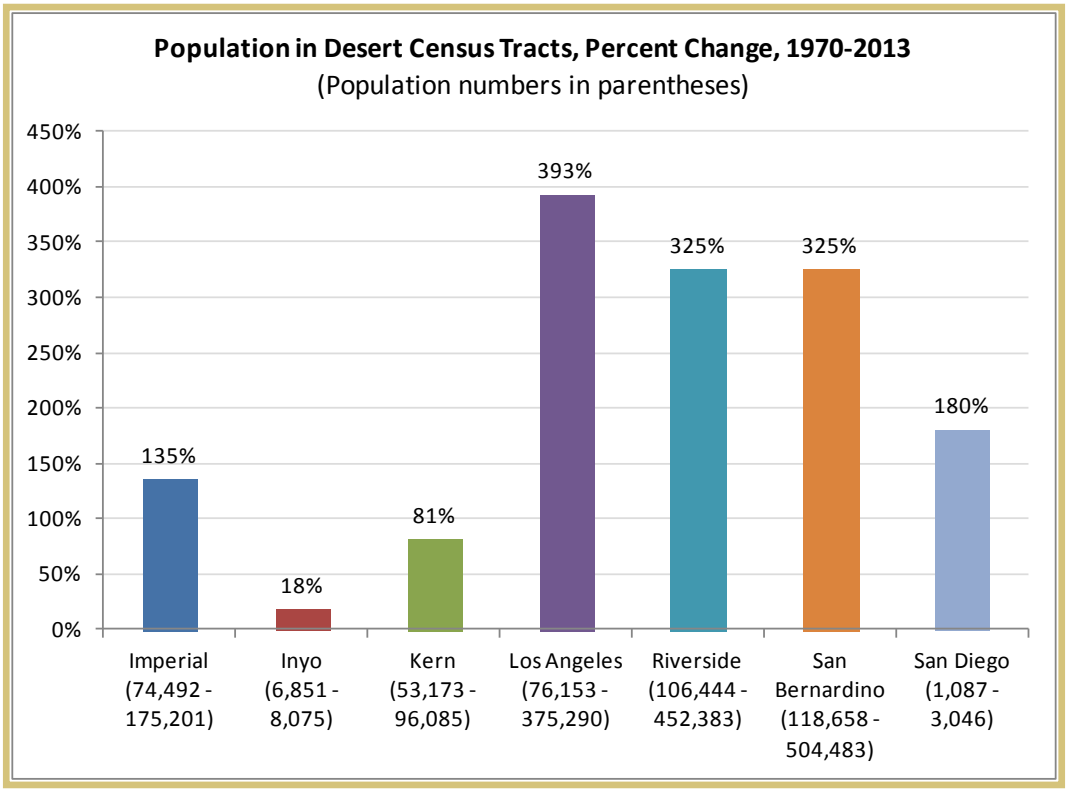


Figure 3. Percent change in population in desert census tract portions of desert counties, 1970-2013. *Sources:* 1970 data and census tract boundaries from Minnesota Population Center, National Historical Geographic Information System, V 2.0 and US Census Bureau. 2013 population from US Census Bureau, American Community Survey and TIGER/Line shapefiles for 2014.

Population Distribution

Recognizing how population is distributed across the landscapes of the 7 counties--particularly the current proportions of population and land area in the desert portions of the 7 counties--helps to truly understand the desert areas where conservation and energy development activities are focused for this examination. Therefore, where possible when data are available, analysis for this report has been performed at a finer scale of analysis, to best represent the areas of interest where the impact of the proposed California Desert Conservation and Recreation Act (CDCRA) of 2015 on mining activities in the region is being considered.[8]

Figures 4 and 5 illustrate the distributions of population and land area across desert and non-desert census tracts for each of the 7 counties. All of Imperial County is considered desert, but in the remaining 6 counties, less than half of the population resides in the desert portions of the counties. Except for the coastal and more urbanized counties of San Diego County and Los Angeles County, more than half of the land area of the counties is considered desert. In the cases of San Bernardino County and Inyo County, more than 90% of the land area is part of the desert. Not unexpectedly, population densities in desert portions are much lower than in the non-desert, more urbanized portions of the 7 county region--approximately 36 persons per square mile over the 7 county region in desert areas versus approximately 1,218 persons per square mile in non-desert areas.

[8] The multiple ways in which data may be grouped for analysis can impact the results of those analyses. A case in point is the familiar art of manipulating voting district boundaries for possible political gain, known as gerrymandering. Gerrymandering is just one example of a phenomenon known in geographical research and spatial analysis as the Modifiable Areal Unit Problem (MAUP). An awareness of MAUP can help reduce the bias or information loss that comes from any grouping of data; scale-related MAUP can be ameliorated by selection of a finer scale. See http://gispopsci.org/maup/ for a succinct discussion of the issues around MAUP and additional references.

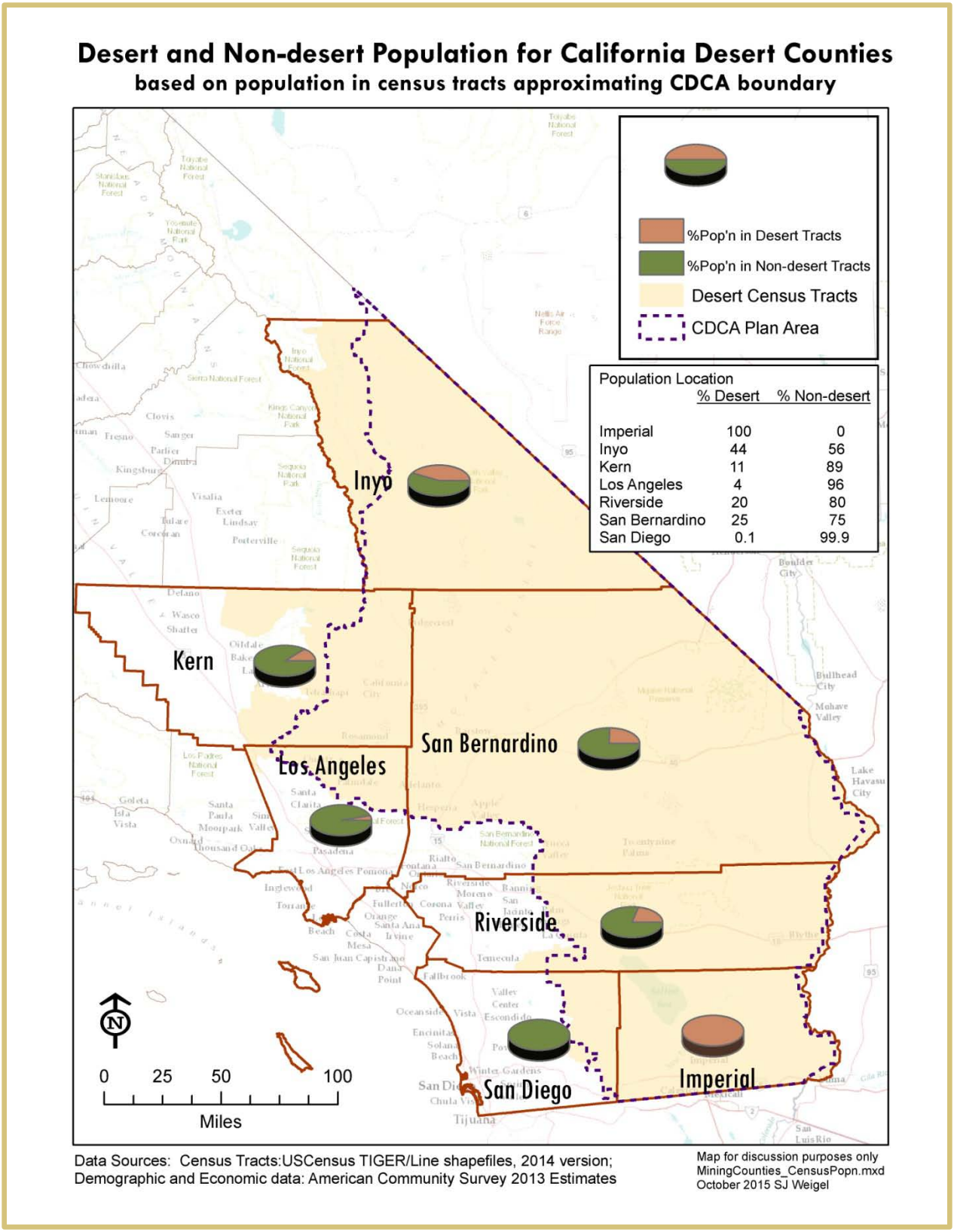


Figure 4. Percentages of 2013 population located in desert and non-desert census tracts.

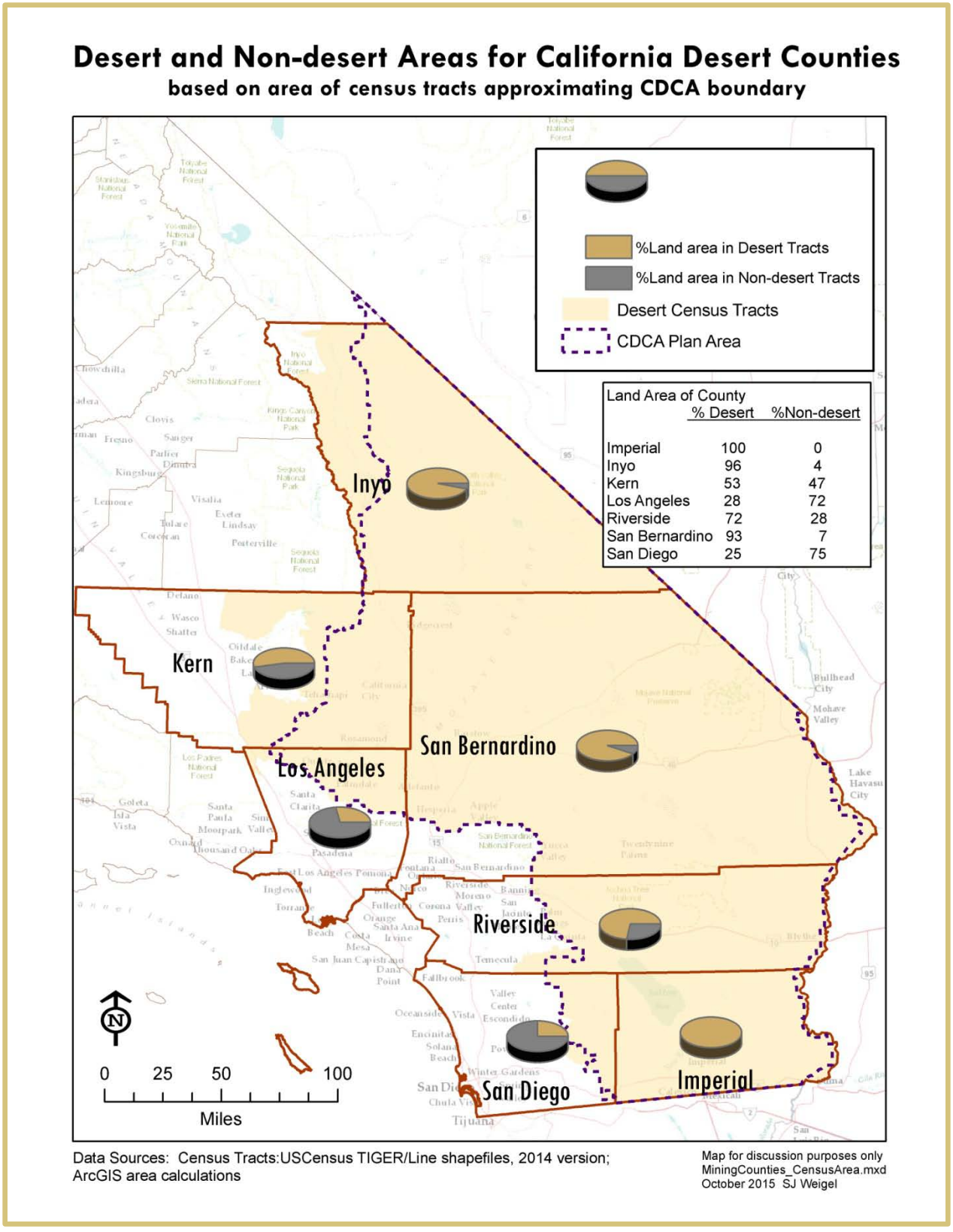


Figure 5. Percentages of land area of desert counties located in desert census tracts.

Contributions of Mining to the Regional Economy - Employment

Despite the region's growth, mining's contributions to the desert's economy have been modest, with jobs in mining playing a small role in total private employment. In the last 25 years, mining's contribution to total private employment in the 7 desert counties has not exceeded 0.25%. Most recent total regional employment estimates (2013) range between 3,000 and 5,600 direct employees. At a local level, mining does provide a more significant contribution. In Kern and Inyo counties in 2013, employment in all mining (including oil and gas) represented 5.5% and 4.4% of total private employment; San Bernardino County had 0.2% of employment in mining for the same time period. For small communities, such as Lucerne Valley or Borrego Springs, mining operations that employ 25, 50, or 100 persons are considered major employers.

Employment—another key economic indicator—generally refers to full- and part-time workers, including hourly and salaried employees and the self-employed.

Employment in the 7 desert counties can be examined by employment sector.[9] Between 2001 and 2013, jobs in service-related industries grew 24%, jobs in non-services-related industries shrank 18%, and government jobs remained relatively flat, with a 2% decrease in number of employees (Figure 6). Industry sectors with the largest numbers of jobs were government, health care/social assistance, and retail trade (Figure 7), which respectively employed approximately 12%, 11%, and 9% of persons employed in the region in 2013.

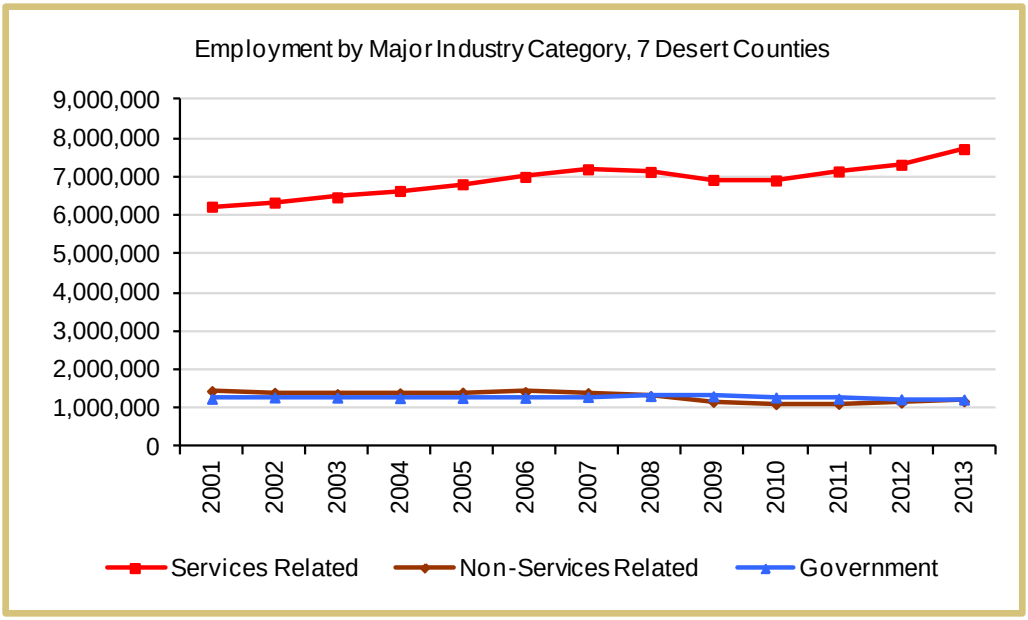


Figure 6. Employment by major industry category, 7-county desert region, 2001 – 2013. *Source:* US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, Table CA25N.

[9] Appendix A provides extensive detail on employment growth trends for the time periods 1970-2000 and 2001-2013 for each of the 7 desert counties. In 2001 the US Department of Commerce switched to organizing industry-level information using the newer North American Industrial Classification System (NAICS), from the previously used Standard Industrial Classification (SIC) system. Employment by industry and income source by industry is more readily classed using the designations from the system in place at the time the data were collected (1970-2000 and 2001-2013).

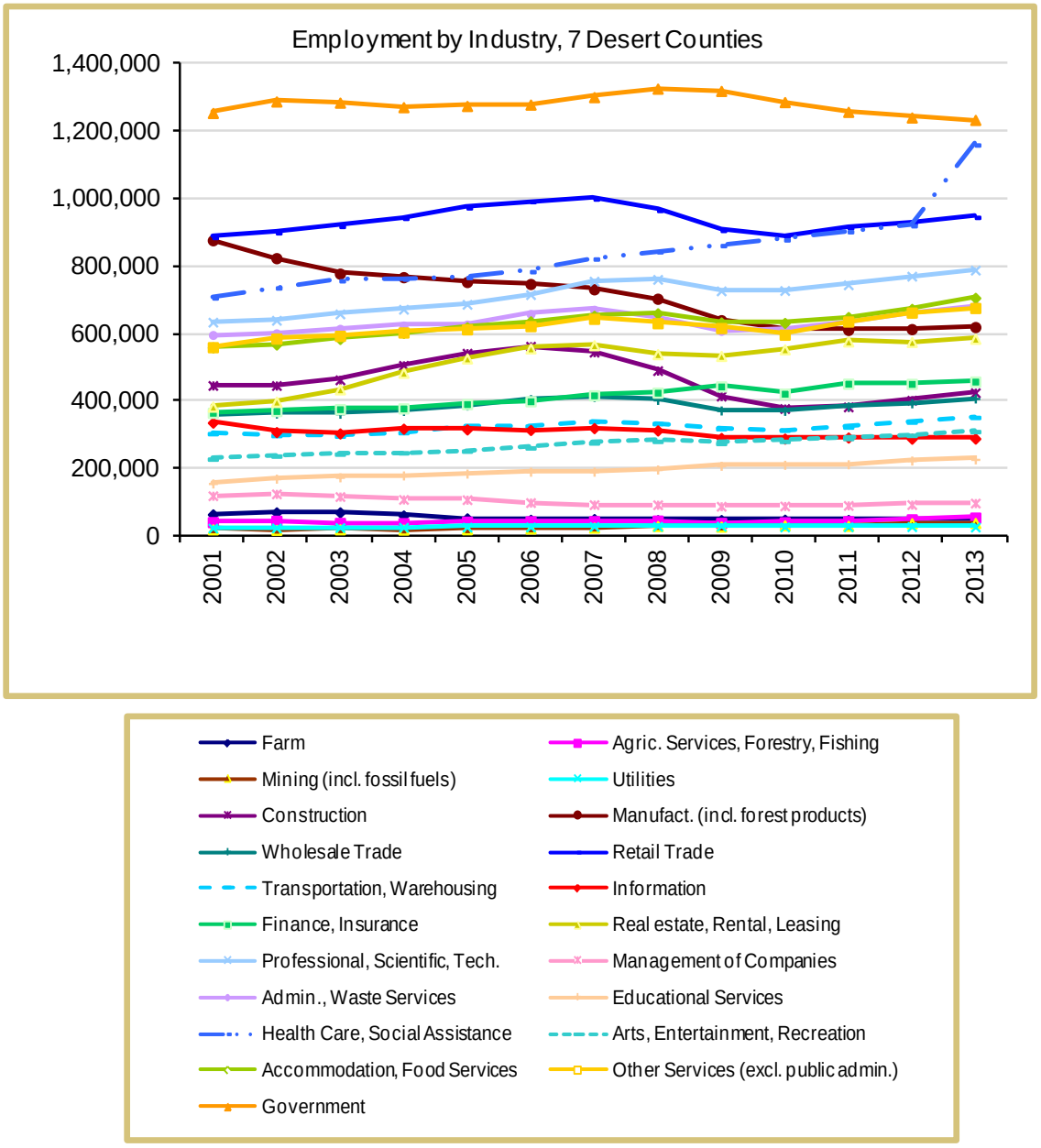


Figure 7. Employment by industry sector, 7-county desert region, 2001 – 2013. *Source:* US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, Table CA25N.

The mining sector component of the employment by industry graph is difficult to discern due to the relatively small number of mining jobs. A closer look at mining employment between 1998 and 2013 by county and in all counties combined (Figure 8) shows that the percent of total private employment in all mining in the 7 counties combined fluctuated between 0.1% and 0.25%; values for each of the 7 counties individually are shown in the graphs in Figure 8.

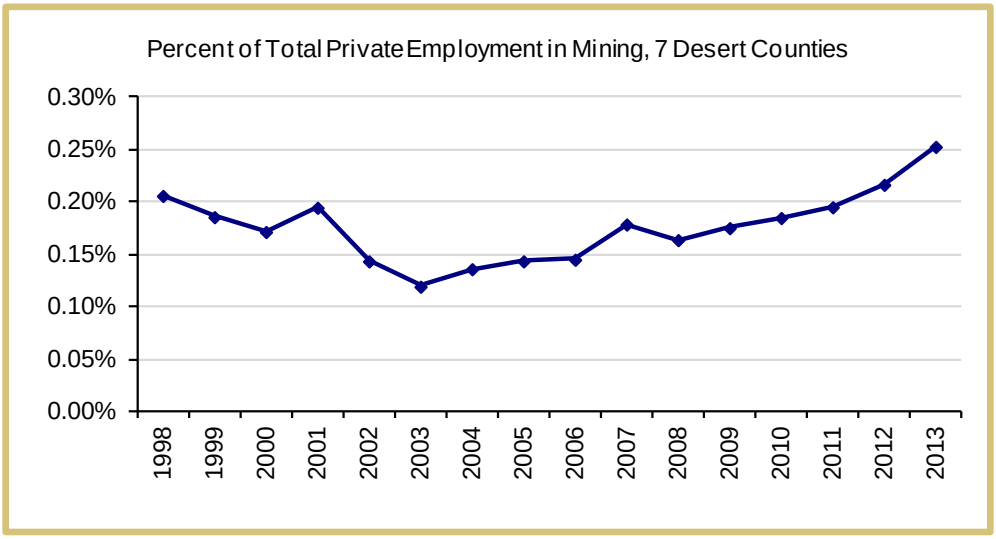


Figure 8a. 7 desert counties.

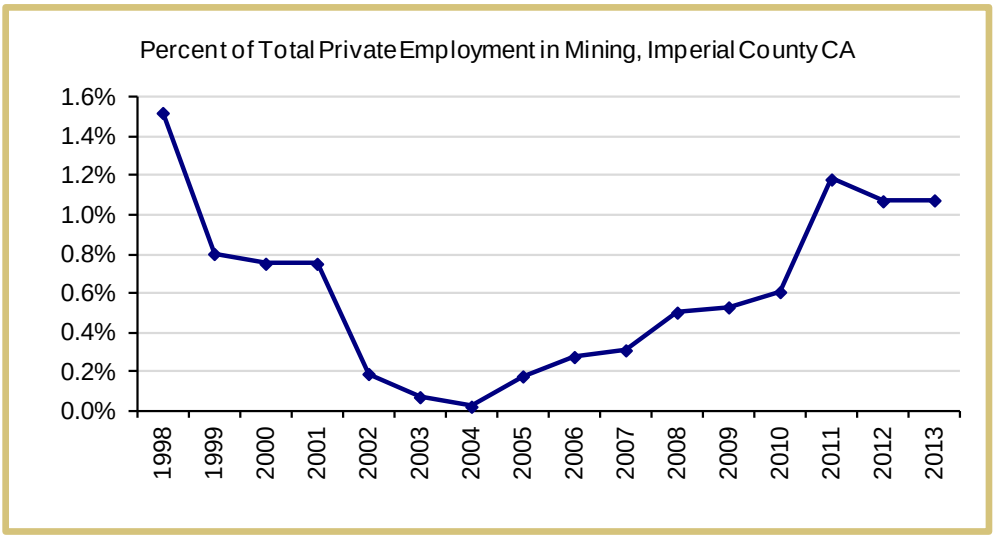


Figure 8b. Imperial County.

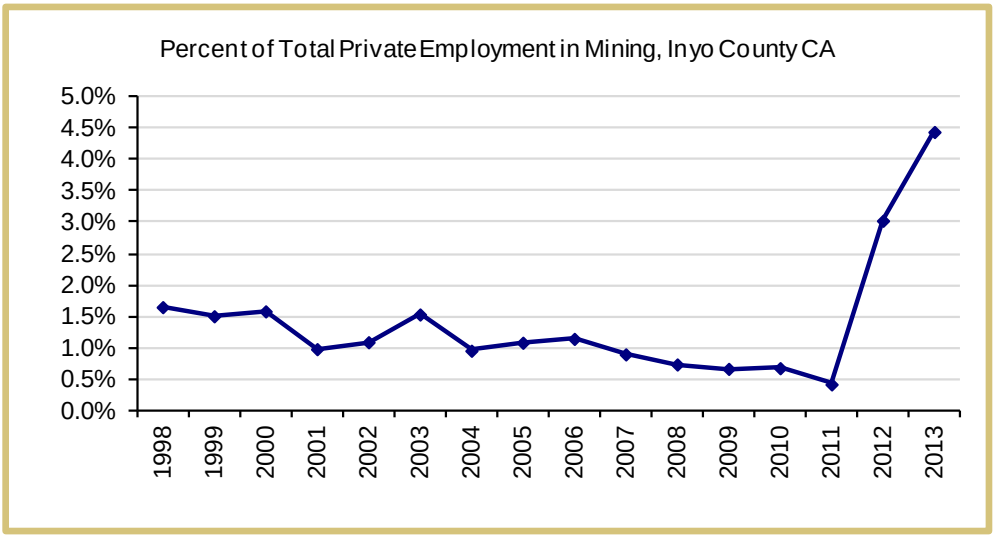


Figure 8c. Inyo County.

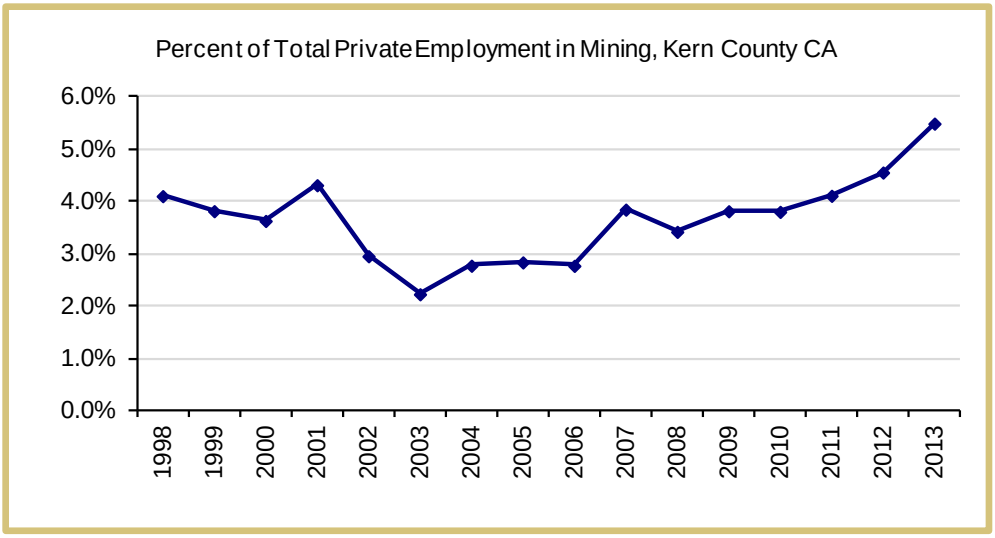


Figure 8d. Kern County.

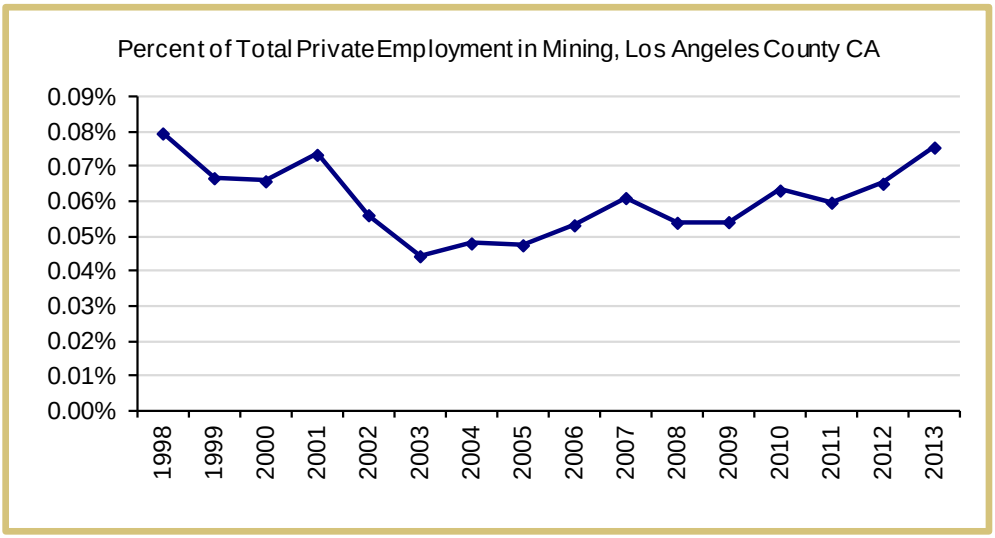


Figure 8e. Los Angeles County.

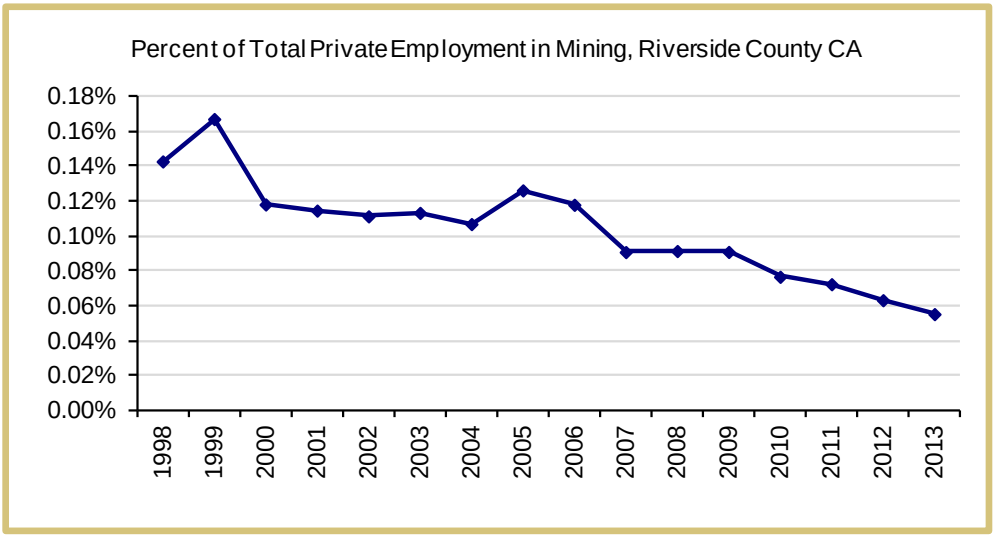


Figure 8f. Riverside County.

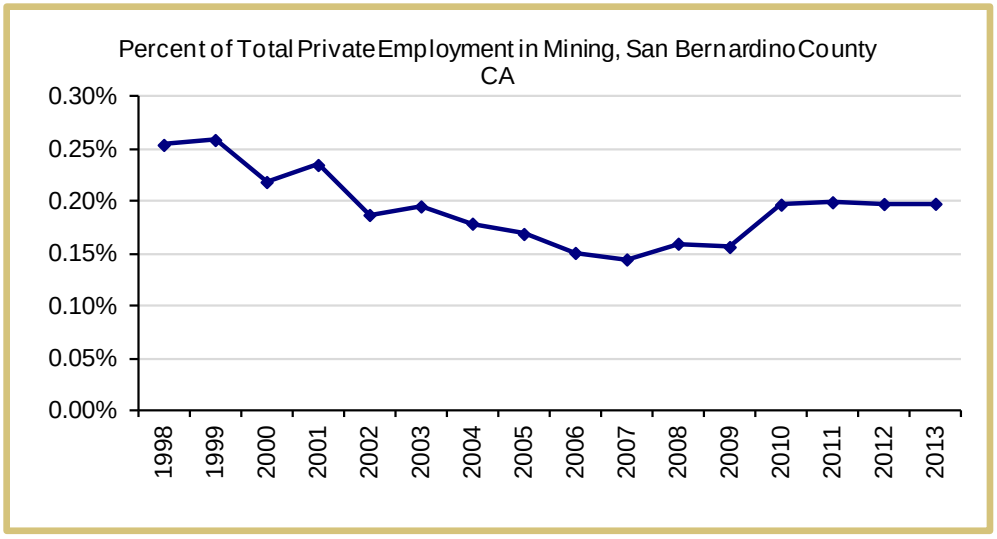


Figure 8g. San Bernardino County.

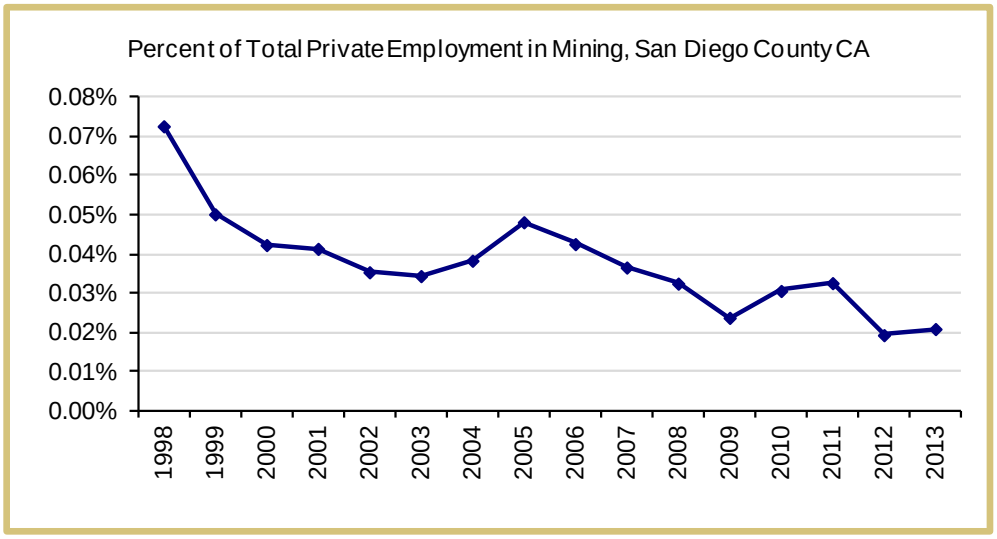


Figure 8h. San Diego County.

Figure 8. *a – h.* Percent of total private employment in all mining (includes oil and gas), in each of seven desert counties and all 7 desert counties combined, between 1998 and 2013. *Source:* US Census Bureau, County Business Patterns, 2015.

When mining sector jobs are broken down further, the oil and gas extraction portion of the mining economy appears to drive the majority of the observed fluctuations in mining sector employment between 1998 and 2013, while non-metallic and metallic ore mining jobs have been relatively flat. Figure 9 breaks down jobs in the mining sector for all of the 7 counties combined, by detail using the North American Industrial Classification System (NAICS),[10] for 1998 - 2013. Jobs in non-metallic minerals

[10] The mining sector reports economic measures based on NAICS classes for Mining (NAICS code 21) include: Oil and Gas Extraction (NAICS 211), Mining except Oil and Gas (NAICS 212) and Support Activities for Mining (NAICS 213). Mining except Oil and Gas can be further divided into Coal Mining, Metal Ore Mining and Non-Metallic Mineral Mining and Quarrying. Mining concerns in the California desert counties are focused in Metal Ore Mining (NAICS 2122) and Non-Metallic Mineral Mining and Quarrying (NAICS 2123).

mining for all 7 counties trended between 2,000 and 4,000 total jobs across the entire 7-county region. Even smaller numbers of jobs, less than 2,000 in each of the years 1998 – 2013, were attributed to metal ore mining.

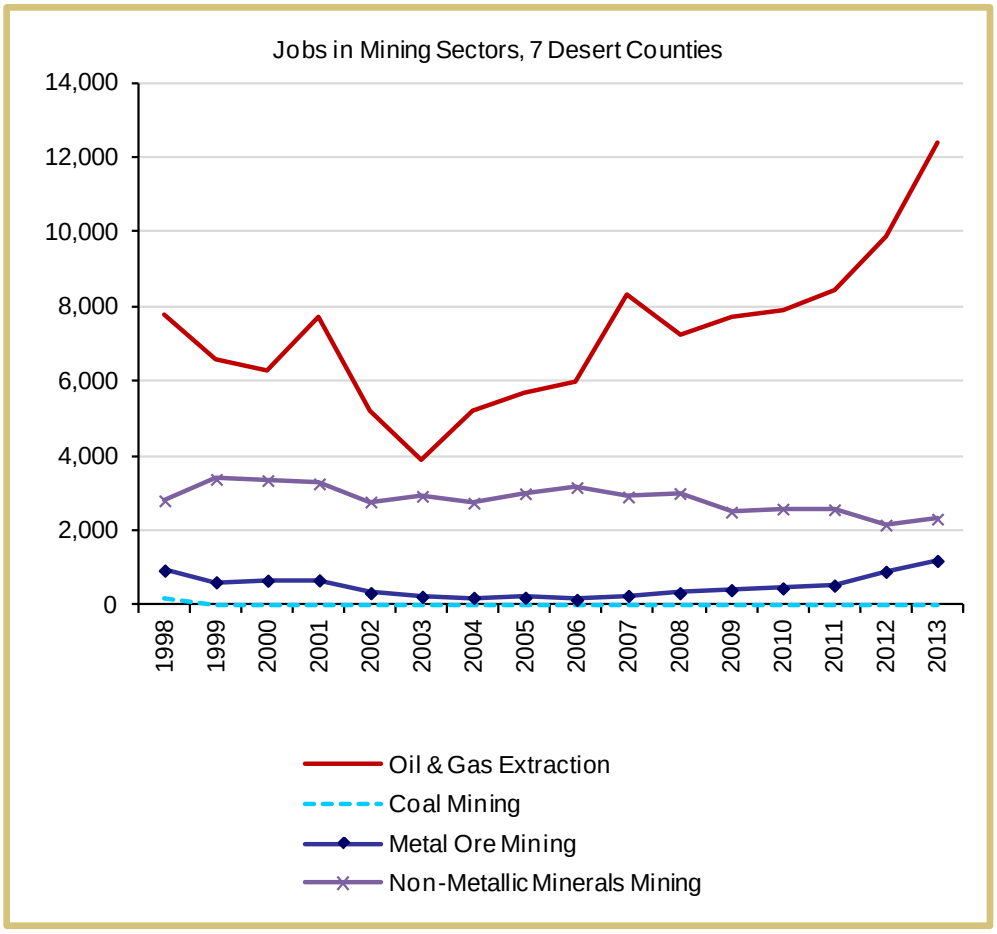


Figure 9a. 7 desert counties.

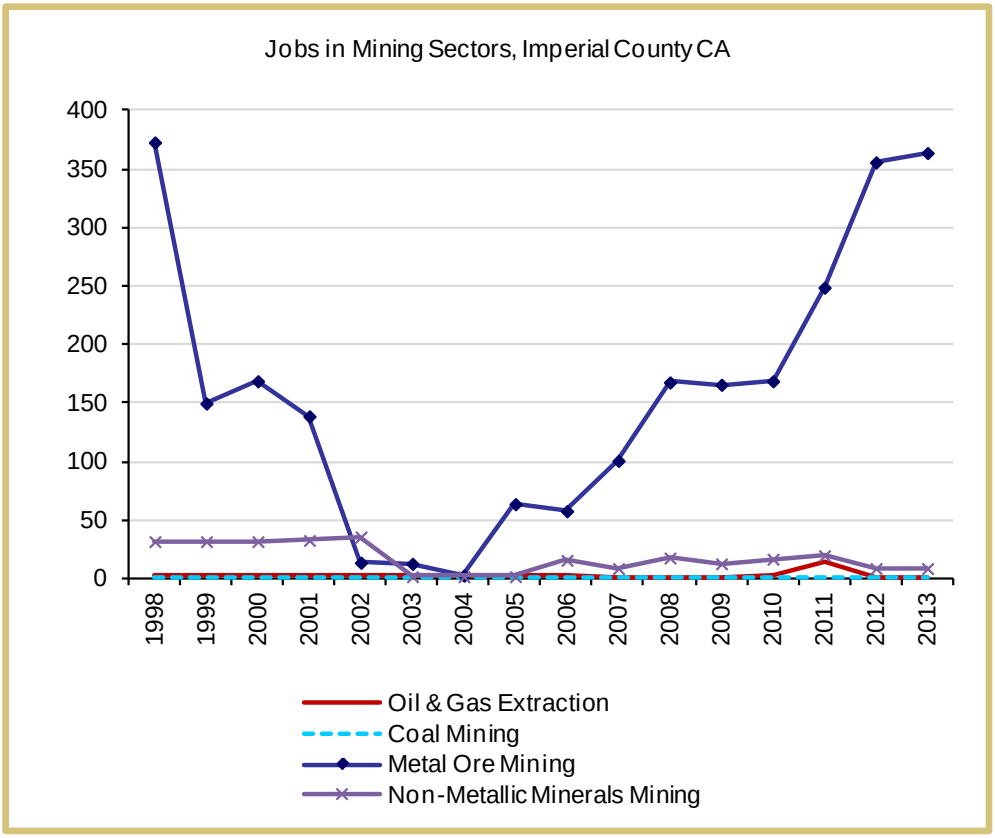


Figure 9b. Imperial County.

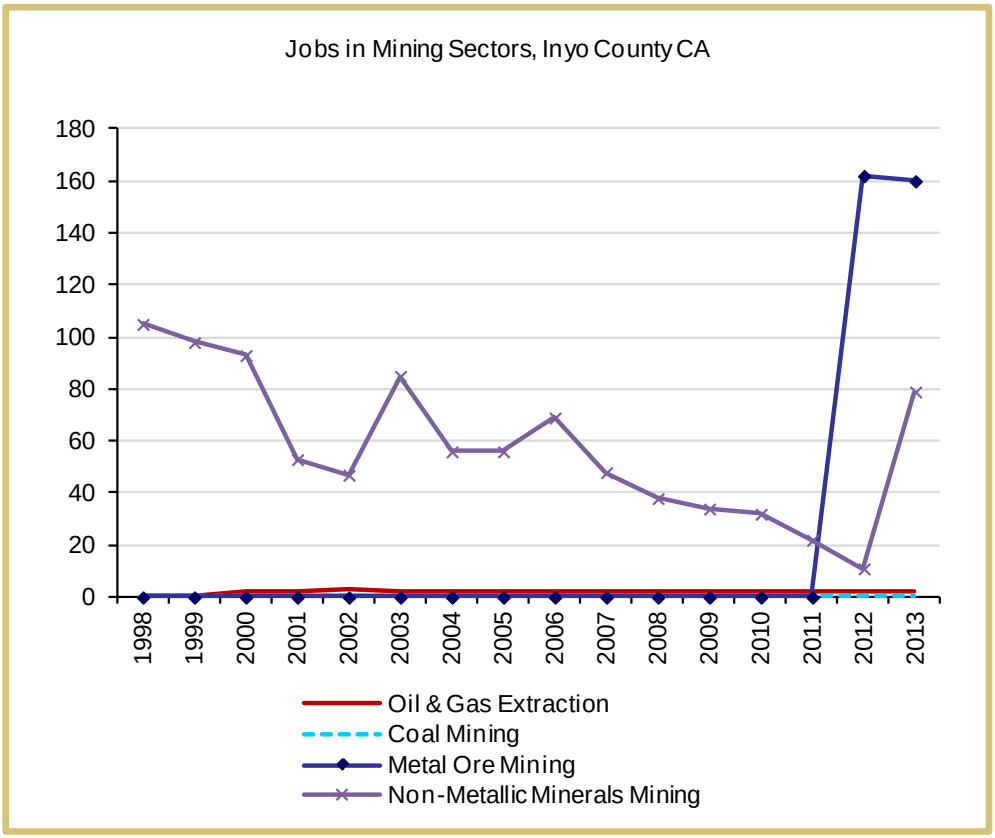


Figure 9c. Inyo County.

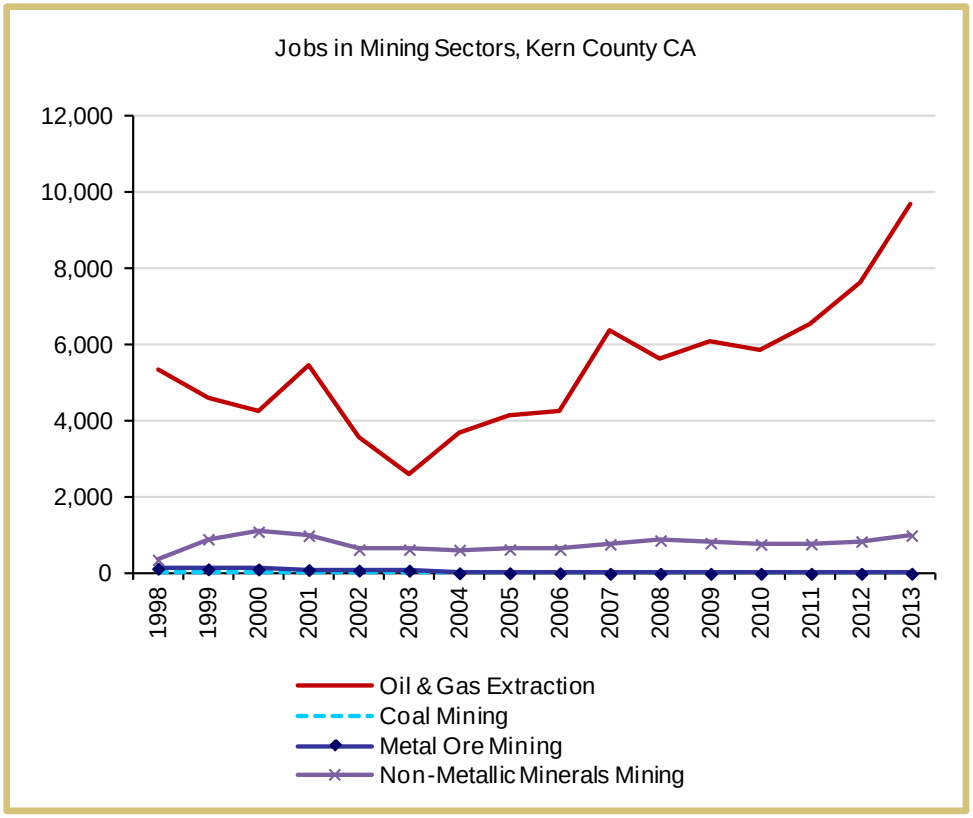


Figure 9d. Kern County.

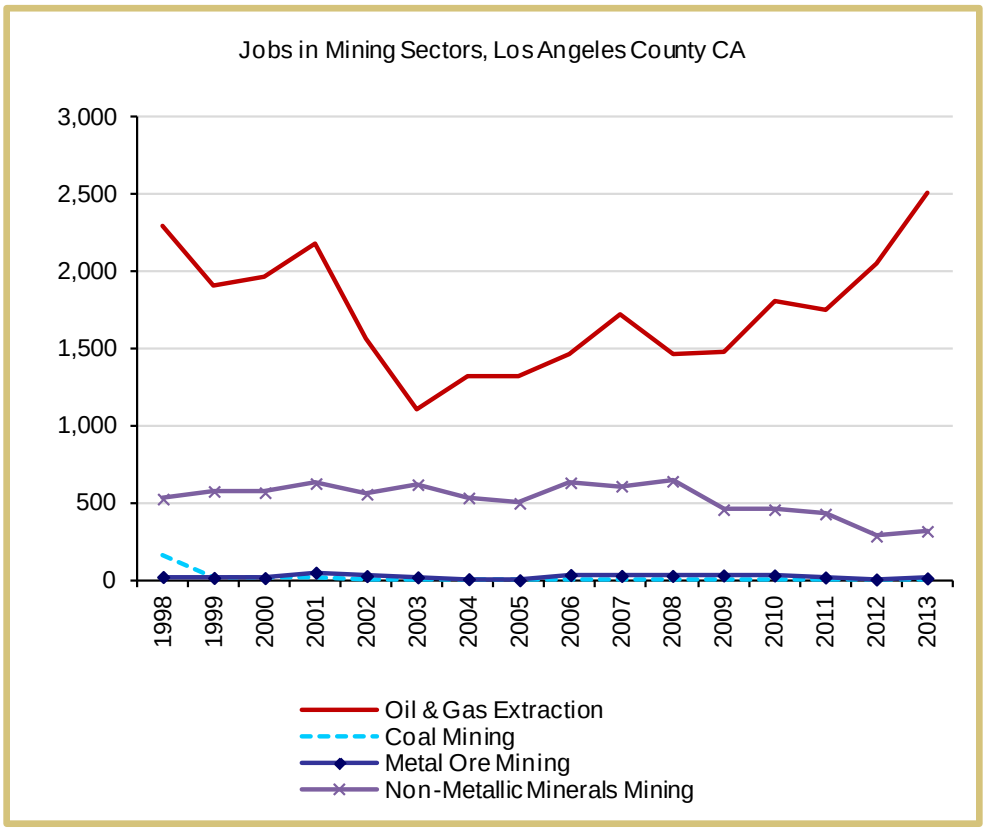


Figure 9e. Los Angeles County.

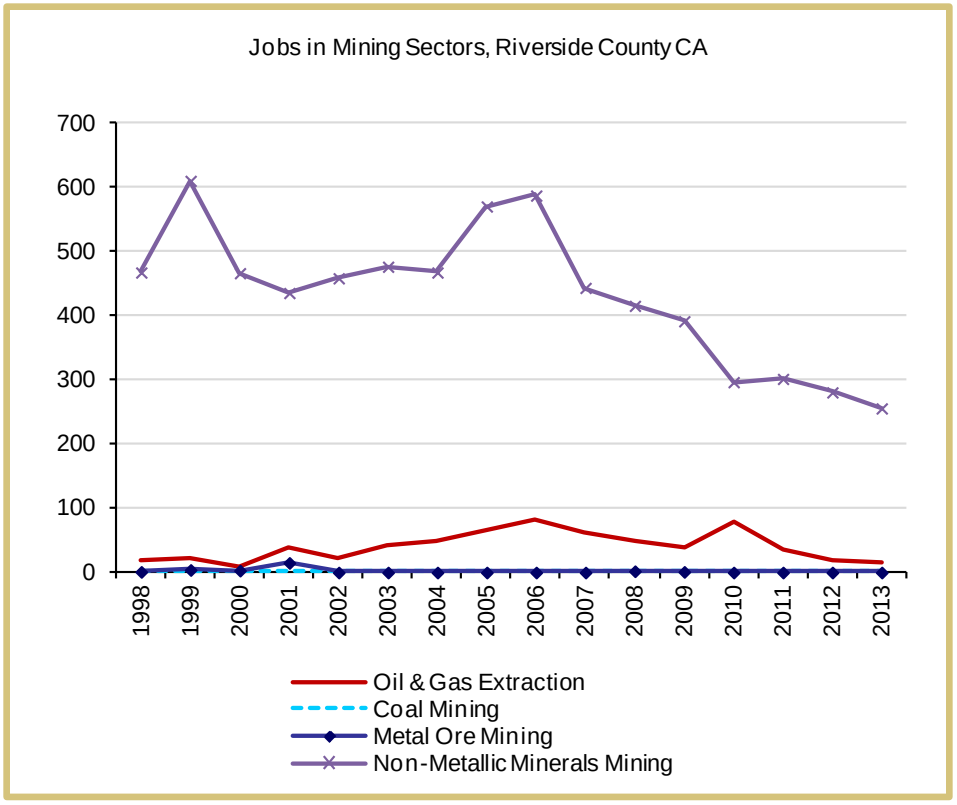


Figure 9f. Riverside County.

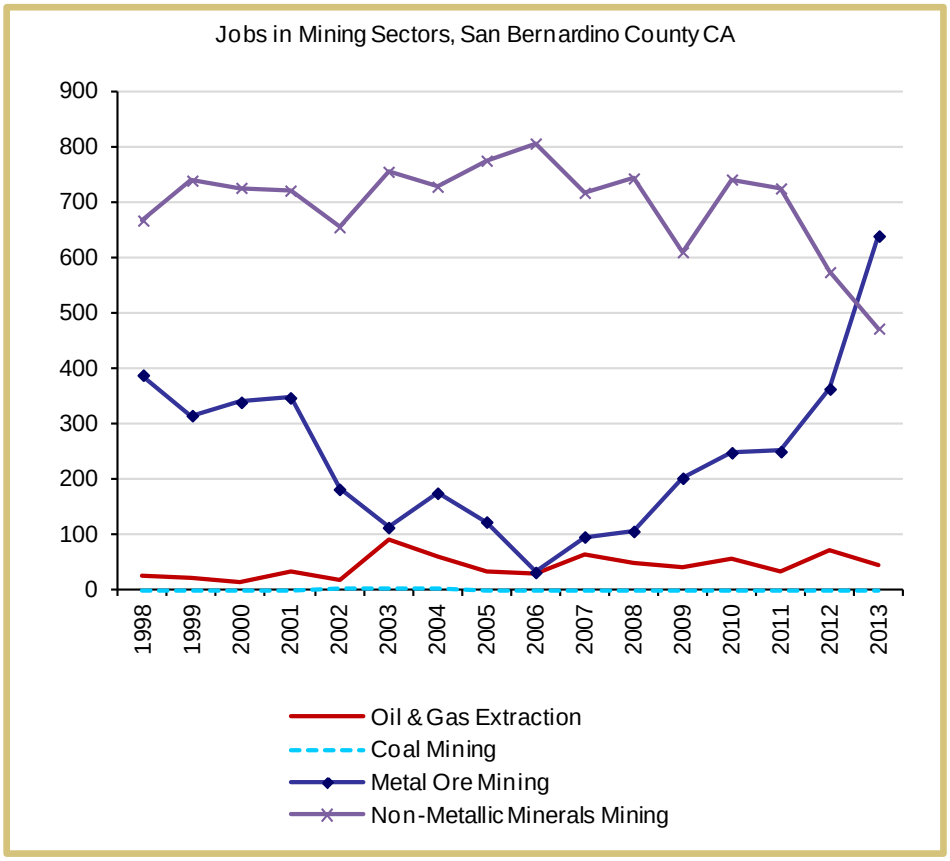


Figure 9g. San Bernardino County.

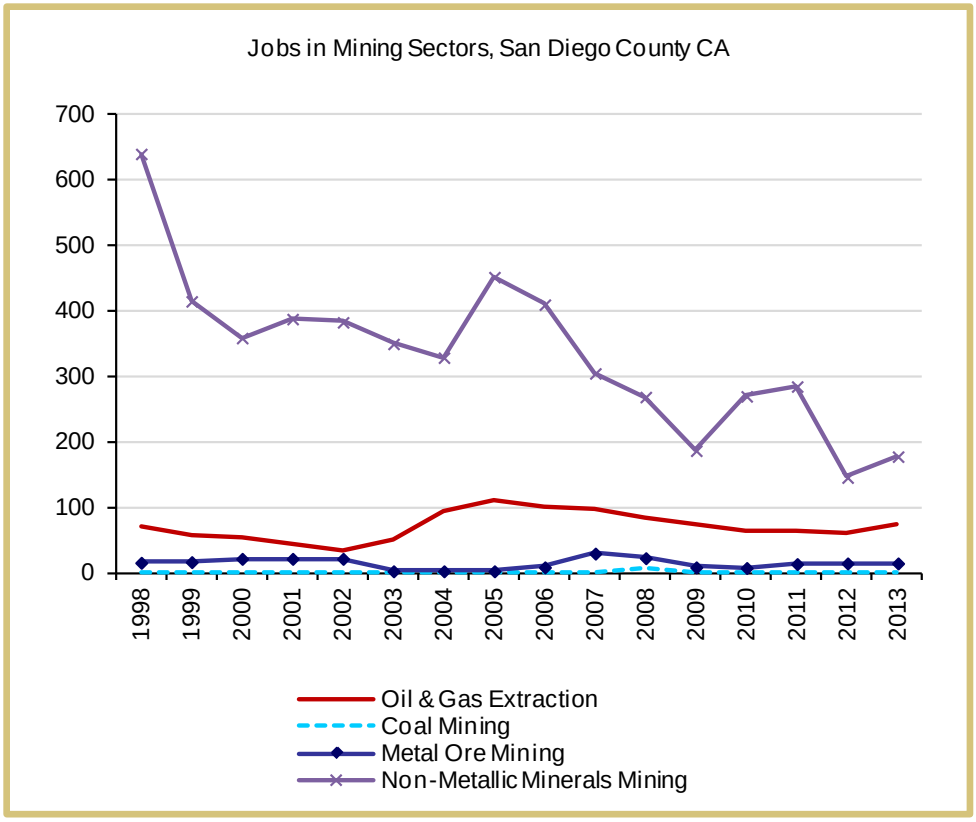


Figure 9h. San Diego County.

Figure 9. *a-h.* Jobs in mining sectors, all 7 desert counties combined and each of the 7 counties, 1998 – 2013. *Source*: US Census Bureau, County Business Patterns, 2015.

Figure 10 shows the percentage of employment in mining-related jobs across the 7-county region for the year 2013, the most recent year for which figures are available; mining, not including oil and gas, accounted for only 0.03% of all jobs; with 0.14% of jobs attributed to support activities for mining (including oil and gas).

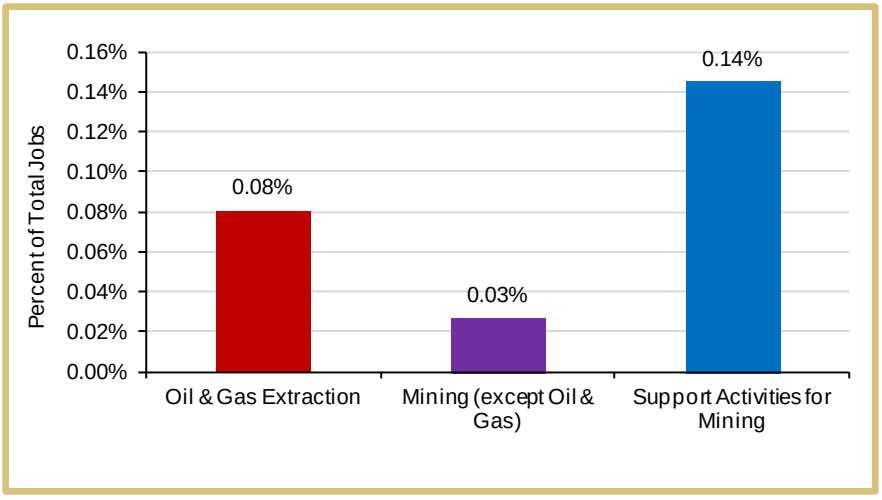


Figure 10. Percentage of total jobs in the 7 desert counties that is mining-related in 2013. *Source:* US Department of Labor, 2014, Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

County Business Patterns Reported Mining Employment

In 2013, according to US Census Bureau County Business Patterns (CBP), Kern County (5.5%) and Inyo County (4.4%) had the highest percentage of total private employment in mining. Imperial County had 1.1% total private employment in mining, and the next highest county was San Bernardino County with 0.2% of total private employment in mining (Figure 11).

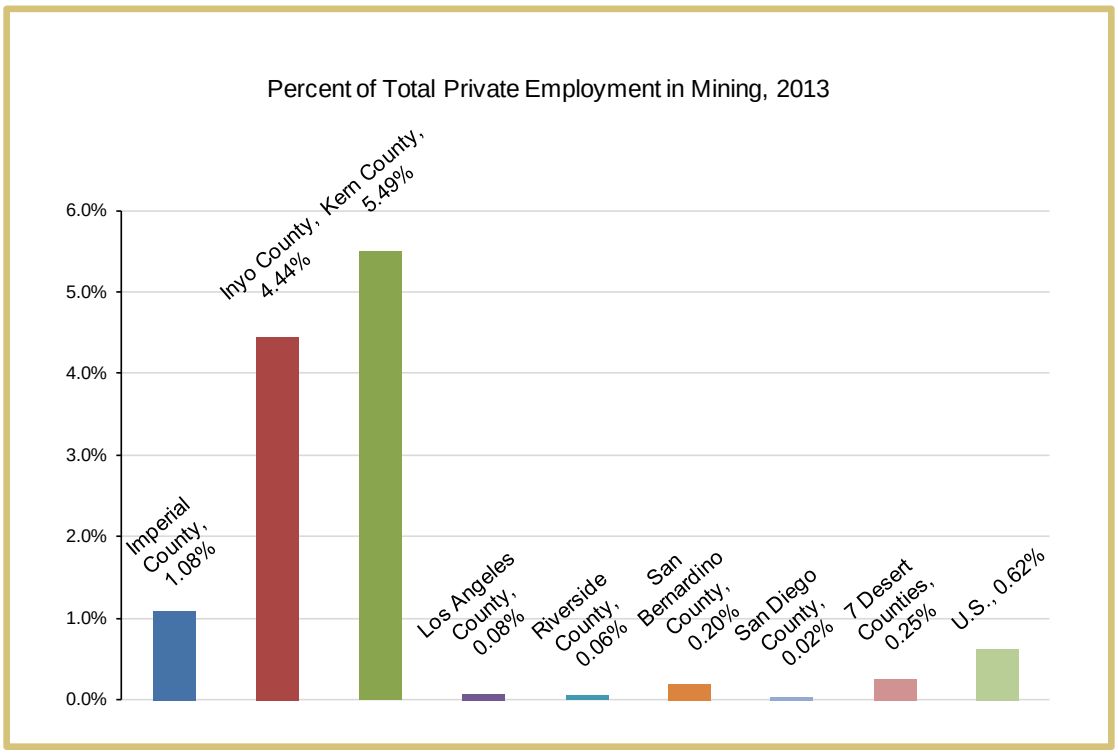


Figure 11. Percent of total private employment in all mining, 2013. *Source*: US Census Bureau, County Business Patterns, 2015.

Data collected during the week of March 12, 2013 were used to update the most recent CBP data set (made available in April 2015), and incorporated into Tables 1 and 2 below. These data demonstrate the modest contribution of mining to the *overall* economy of the seven counties in terms of employment, payroll, and number of mining establishments for this most recently available time period. The tables show employment in the NAICS categories Metal Ore Mining (2122) and Non-metallic Mineral Mining and Quarrying (2123).

METAL ORE MINING 2122							
County	***Imperial***	***Inyo***	***Kern***	***Los Angeles***	***Riverside***	***San Bernardino***	***San Diego***
Number of Paid Employees	E (250-499)	C (100-249)	A (0-19)	No Data	No Data	F (500-999)	A (0-19)
First-Quarter Payroll ($1,000)	D (withheld)	D (withheld)	D (withheld)			D (withheld)	D (withheld)
Annual Payroll ($1,000)	D (withheld)	D (withheld)	D (withheld)			D (withheld)	D (withheld)
Total Establishments	1	1	1			2	1
# Establishments by Employment-Size Class (Persons Employed)							
'1-4'	0	0	1			0	1
'5-9'	0	0	0			1	0
'10-19'	0	0	0			0	0
'20-49'	0	0	0			0	0
'50-99'	0	0	0			0	0
'100-249'	0	1	0			0	0
'250-499'	1	0	0			0	0
'500-999'	0	0	0			1	0
'1000 or more'	0	0	0			0	0

Table 1. California Desert Counties 2013. Employment in Metallic Ore Mining (NAICS 2122) by business size. *Source*: US Census Bureau, County Business Patterns, March 12, 2013. http://www.census.gov/econ/cbp/overview.htm.

NON-METALLIC MINERAL MINING AND QUARRYING 2123							
County	***Imperial***	***Inyo***	***Kern***	***Los Angeles***	***Riverside***	***San Bernardino***	***San Diego***
Paid Employees	A (0-19)	B (20-99)	G (1,000-2,499)	303	256	472	C (100-249)
First-Quarter Payroll ($1,000)	D (withheld)	D (withheld)	D (withheld)	5,752	3,863	7,248	S (withheld)
Annual Payroll ($1,000)	D (withheld)	D (withheld)	D (withheld)	26,869	17,048	28,596	10,516
Total Establishments	2	4	7	21	20	19	16
# Establishments by Employment-Size Class (Persons Employed)							
'1-4'	1	2	3	6	8	5	7
'5-9'	1	1	0	4	4	5	1
'10-19'	0	0	0	6	3	2	5
'20-49'	0	0	2	4	4	4	3
'50-99'	0	1	1	1	1	2	0
'100-249'	0	0	0	0	0	1	0
'250-499'	0	0	0	0	0	0	0
'500-999'	0	0	1	0	0	0	0
'1000 or more'	0	0	0	0	0	0	0

Table 2. California Desert Counties 2013. Employment in Non-Metallic Mining (NAICS 2123) by business size. *Source*: US Census Bureau, County Business Patterns, March 12, 2013. http://www.census.gov/econ/cbp/overview.htm.

Business Register data for metal ore mining (NAICS code 2122) economic activity in the 7 counties for 2013 revealed only 6 reported establishments engaged in the activity during that time period (Table 1). Using the lower and upper end of the range of employees who were employed,[11] this dataset indicates *between 850 and 1785 paid direct employees in this economic activity in 2013.* Metal ore mining operations tend to employ larger numbers of persons, but there are only a few of them operating in the desert area.

Numbers for employment in non-metallic mineral mining and quarrying (NAICS 2123) for the 2013 reporting cycle include mining of construction aggregate, which tends to be a localized economic activity. There are a relatively small number (89) of establishments reported to be engaged in this type of activity (Table 2). These activities tend to employ smaller numbers of persons per establishment, with the vast majority of operations employing fewer than 50 persons. Using the lowest and highest end of the paid employees' data categories, estimates indicate there were *between 2,151 and 3,897 employees* across the 7 counties reported as employed in non-metallic mineral mining and quarrying.

As demonstrated by the magnitude of these CBP numbers, the mining sector has not likely had a profound influence on other economic sectors or the combined economies of the desert counties. However, individual mining operations have economic impacts in the local communities in which they operate, which are often small communities where mining operations that employ 25, 50, or 100 persons are considered major employers.

Comparing CBP Employment Estimates to MSHA and ACS Data

In the interest of trying to better understand the contributions of mining employment to the economies of the 7 desert counties, estimates for mining employment from 3 different sources were compared:

1. Mine Safety and Health Administration (MSHA) employee numbers; and
2. County Business Patterns (CBP) NAICS employment numbers for metal ore mining and non-metallic mineral mining and quarrying (reported above in Tables 1 and 2).

The comparisons are not direct; i.e., each of the two different sources is reporting a somewhat different aspect of employment (see explanations in Table 3). However, these comparisons do serve as a benchmark for estimating likely employment numbers for the area of interest. The data were further disaggregated to examine employment in only the desert portions of the 7 counties for the MSHA;[12] these data are also presented in Table 3. The US Department of Labor's Mine Safety and Health Administration (MSHA) data have been referenced by the mining industry as a reliable source of data on mining employment, and those data were obtained for use in this report.[13] The most recent reported number of employees from MSHA

[11] Some CBP data are "withheld to avoid disclosing data for individual companies" due to the small numbers of establishments. Exact numbers of employees are not revealed, however the *data ranges* are indicated in Table 1.

[12] Since the CBP data is reported at the county level it was not possible to attribute employment to particular geographic portions of the county, as was possible with the MSHA data.

[13] MSHA data were downloaded from the Open Government Initiative Data Portal, mines.txt dataset, accessed June 2015, http://www.msha.gov/OpenGovernmentData/OGIMSHA.asp

mines that are active, temporarily idled, or intermittently operated in the 7 counties is 4,434. This number is bracketed nicely by the CBP estimated range of between 3,001 and 5,682 employees engaged in metal ore and non-metallic minerals mining in the 7 counties.

COMPARISON OF NUMBERS OF EMPLOYEES REPORTED IN MINING AND EXTRACTIVE INDUSTRIES, FOR ENTIRE COUNTY AND DESERT CENSUS TRACT PORTIONS				
	Entire County		***Desert Census Tracts portions of County***	
	MSHA mine employees	**CBP** metallic and non-metallic mining employees	**MSHA** mine employees	**CBP** metallic and non-metallic mining employees
Imperial	332	250-518	332	*Not available*
Inyo	47	120-348	45	*Not available*
Kern	1,661	1,000-2,518	1,424	*Not available*
Los Angeles	274	303*	66	*Not available*
Riverside	528	256*	57	*Not available*
San Bernardino	1,418	972-1,471	1,263	*Not available*
San Diego	174	100-268	0	*Not available*
Totals	*4,434*	*3,001-5,682*	*3,187*	*Not available*

Table 3. Comparison of numbers of employees involved in mining and extractive industries in desert counties and the desert census tract areas of the counties, as reported in two different sources.
Sources: Department of Labor, Mine Safety and Health Administration and US Census Bureau Community Business Patterns for March 12, 2013.

Contributions of Mining to the Regional Economy - Income

A reflection of its modest contribution to regional employment in the 7-county region in 2013, mining's contribution (including oil and gas) to overall labor-related income is small, approximately 0.8%. Between 1970-2013, that contribution has fluctuated between 0.3% and 1.0%, with no defined trend, while overall labor-related earnings between 1970 and 2013 increased by 132%. Non-labor income increased even more in that time period in the region, changing by 287%.

Another key economic indicator, total personal income, includes both labor (employment-related) and non-labor income (earned from investments or payments associated with retirement, disability, medical, or unemployment insurance). In examining trends in labor-related personal income, it is useful to assess total labor income (wages) per sector and average annual wages per sector (per capita) in order to understand

each sector's relative economic contribution. A review of non-labor personal income trends is valuable as growth in non-labor income is often an indication of a particular location's appeal as a place to live or retire.

Overall total personal income and per capita personal income rose in all 7 desert counties between 1970 and 2013. Both labor earnings and non-labor personal income grew, with labor income increasing 132% between 1970 and 2013, and non-labor income growing 287% in that time period (Figure 12). The proportion of total personal income represented by non-labor income also grew, from 26% in 1970 to 37% in 2013 (Figure 13).

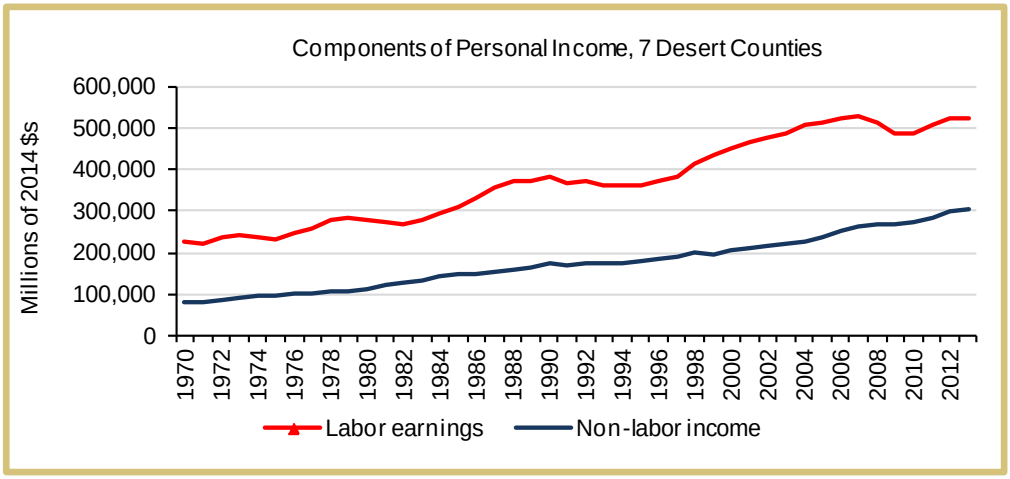


Figure 12. Labor and non-labor components of personal income for 7-county desert region, 1970 – 2013. *Source:* US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, Tables CA05 and CA05N.

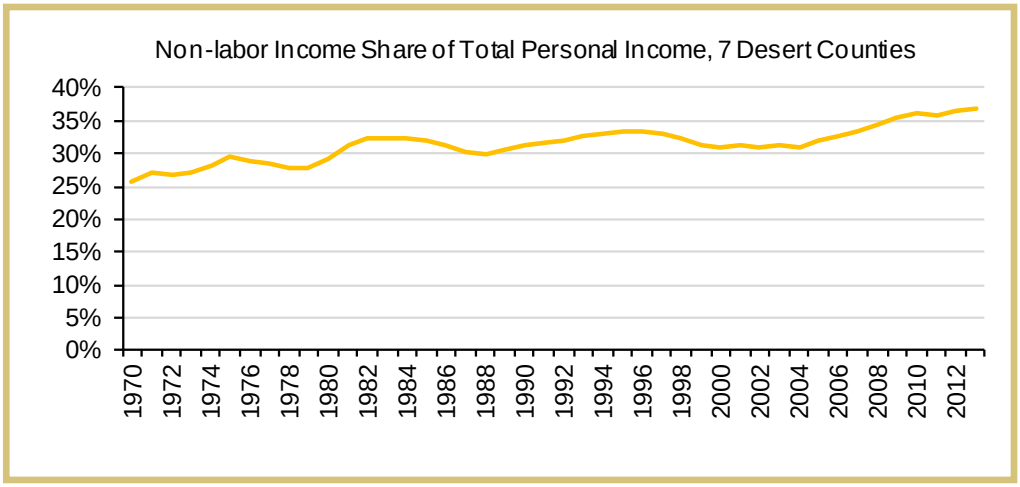


Figure 13. Non-labor share of total personal income for 7-county desert region, 1970-2103. *Source:* US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, Tables CA05 and CA05N.

Personal income in the 7 desert counties can be examined by industry sector, in a manner similar to the consideration of employment.[14] Between 2001 and 2013, the sectors adding the most new personal income were health care/social assistance, government, and professional/scientific/technical; mining (including fossil fuels) played a very small role in personal income across the region (Figure 14).

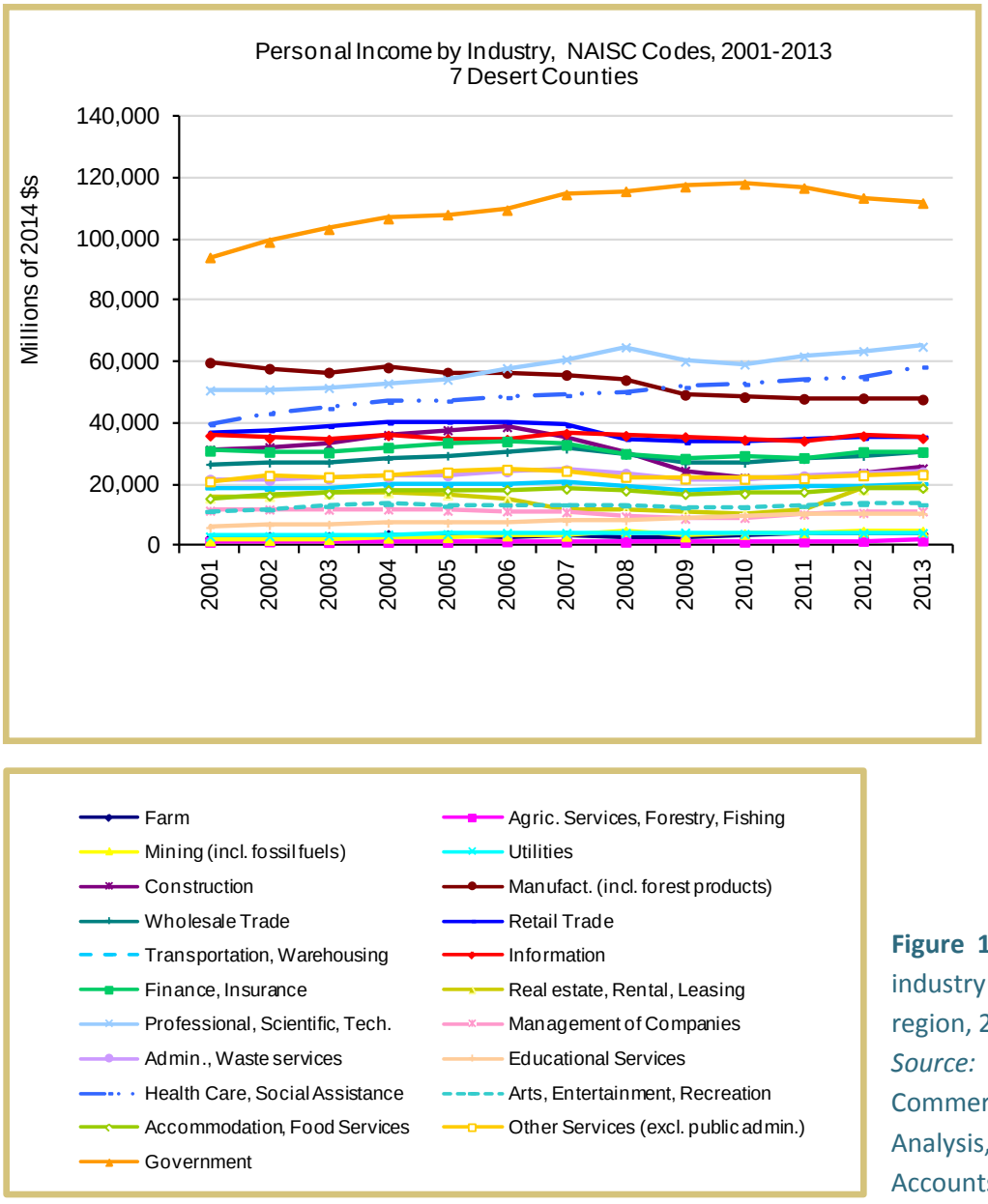


Figure 14. Personal income by industry for 7-county desert region, 2001 – 2013.
Source: US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, Table CA05N.

[14] Two appendices provide more detailed county-level personal income trend data. Appendix B provides extensive detail on personal income labor earnings trends for the periods 1970-2000 and 2001-2013 for each of the 7 desert counties. The break in time frames is due to the shift by the US Department of Commerce, Bureau of Economic Analysis from using the SIC (Standard Industrial Classification) coding system of reporting employment sectors to the NAICS (North American Industrial Classification System). Appendix C combines the time frames from 1969 – 2013 by consolidating personal income industry numbers into common classes, and includes non-labor income for each county for that time period.

For 2013, mining (including oil and gas) only accounted for 0.6% of the $813 million in personal income earned across the 7-county region.[15] The small percentage of total personal income resulting from mining employment in the desert region reflects the relatively small role that mining has played in overall local employment, even though jobs in the mining industry tend to pay more than other jobs.

While average annual wages for jobs across all industries averaged $52,485 in 2013 (Figure 15), mining industry jobs of the type most common in the desert region, those not related to oil and gas, averaged a higher annual wage of $84,325 in 2014$s (Figure 16).

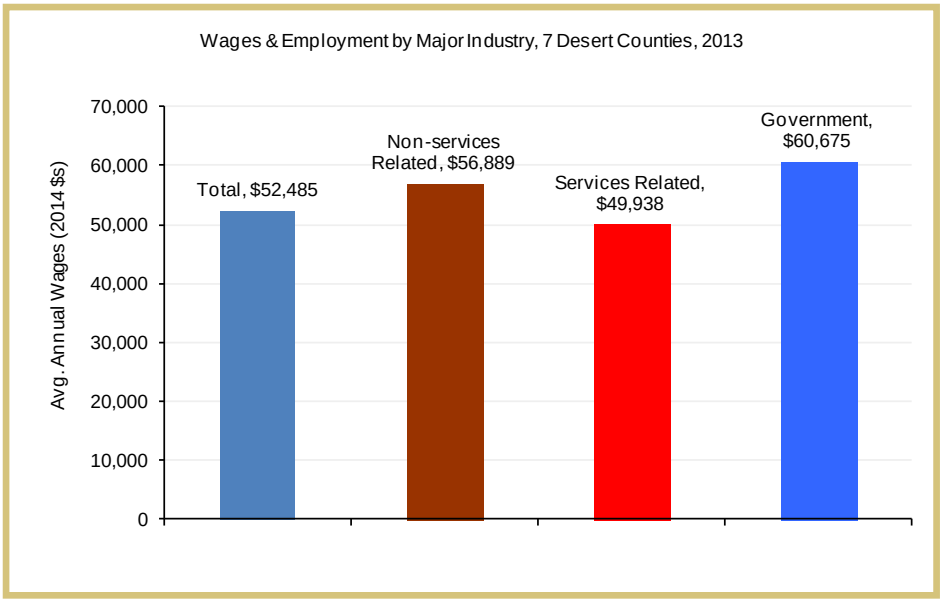


Figure 15. Wages and employment by major industry, for the 7-county desert region, 2013. *Source:* US Department of Labor, 2014, Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

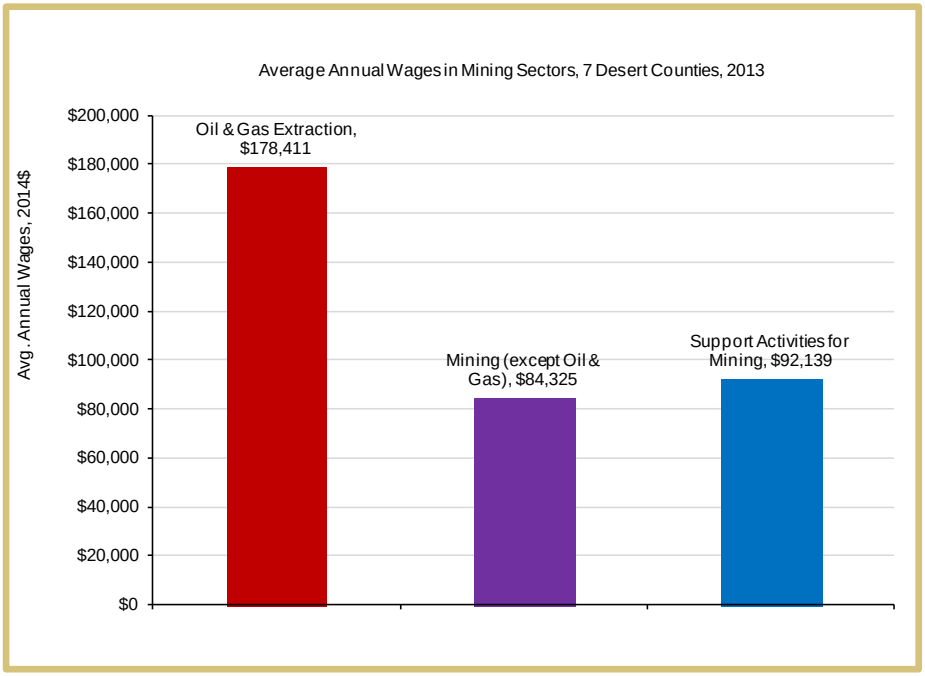


Figure 16. Mining sector wages, 2013, 7-county region. *Source:* US Department of Labor, 2014, Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

[15] US Department of Commerce, Bureau of Economic Analysis, Table CA5.

Estimating Broader Economic Impacts of Mining Activities

Even when direct, indirect, and induced impacts on GDP are considered, the contribution of mining activities to nominal GDP in the 7-county region in 2014 is estimated between 0.04% and 4.12%. When only desert portions are considered, those of Kern, Inyo, and San Bernardino counties showed highest contribution to GDP due to mining activities with 25%, 8%, and 5% contributions, respectively. These impacts likely represent upper limits to impacts, as the multipliers used were developed for use at the state level and likely overestimate impacts at the county and sub-county levels.

While employment and income measures can be used to directly assess the inputs that mining activities have to local economies, there are broader economic impacts that result from employees spending earnings in their local economies, as well as dollars that the mining industry spends locally. Using information on county-level GDP from National Association of Counties and multipliers developed by the National Mining Association, the broader impacts of mining activities on county GDP were examined at the scale of the entire county as well as at the scale of the desert portions of the counties.

In the context of the region's economy overall, the economic impacts of mining on the economies of the desert counties are modest, as reflected by the dollars generated by employment in the sector. Given mining employment numbers for an area, it is possible to make some general estimates of the broader impacts of mining employment on the economies of the area of interest. One way of doing this is to look at industry estimates of the economic contributions of mining at the state level, and use those to estimate contributions in the desert area of interest to local income, employment, and nominal GDP.

The National Mining Association (NMA) produced a report in September 2014 titled *The Economic Contributions of U.S. Mining (2012).*[16] Their analysis looked at contributions at the state level, and for each state further broke out the analysis to consider coal, metal, and non-metal mining contributions. The information from that report on state-level contributions of metal and non-metal mining is used in this analysis to help understand the influence of mining on the counties and the desert portions of the counties.

Results of this analysis (Tables 4 and 5), using NMA state-level multipliers,[17] indicate that the potential influence of mining on income and nominal GDP of the counties ranges between 0.04% and 4.12%.

[16] The Economic Contributions of U.S. Mining (2012), National Mining Association, 2014.

[17] Methodologies used in the NMA study to evaluate the overall economic contribution of mining to US economies in 2012 included *state-level* estimates made using the IMPLAN model and data inputs from the Bureau of Economic Analysis and data from MSHA. IMPLAN is an input-output model that produces economic multipliers to calculate overall economic contributions. For this analysis, we made use of the NMA state-level multipliers and applied them at the *county level*, in the absence of county-level multiplier information. Since the multipliers were developed for a larger geography, i.e., state vs. county, this cross-scale application will have the effects of *inflating* the values resulting from using the multipliers at a different scale then for which they were developed. Thus, the results obtained using these multipliers will likely indicate a *greater* economic impact on local economies from mining activities than may actually occur. For purposes of planning, however, this possible overestimation can provide a likely upper limit for impacts.

This analysis also indicates that mining's broader economic impact is highest for Kern and Inyo counties, and next highest for San Bernardino, Riverside, and Imperial counties (whose somewhat different economic structure than the other counties includes a significant agricultural component). The economies of San Diego and Los Angeles counties appear much less influenced by economic impacts of mining activities.

In Table 4, mining employment is considered in two classes: (1) mine workers only, and (2) employment that is either a direct, indirect, or induced effect from mining employment, including mine workers. This second class of direct effect employment includes support activities and transportation. Then, as a result of mining employment, labor income and contribution to GDP are estimated based on multipliers derived from the NMA data. These numbers are then compared to countywide values for total employment, labor income, and nominal GDP, to estimate the contributions made by metal and non-metal mining employment in these counties.

A corresponding analysis, shown in Table 5, was performed for the desert portions of the 7 counties, with values for labor income and nominal GDP adjusted for those areas using population proportions, as explained in the table footnotes.

Estimated Economic Contributions from Metal and Non-metal Mining Employment in State of California and All Areas of Desert Counties, Using MSHA Reported Employment and National Mining Association Estimates (Derived from State-Level Estimates)

	Mining Employment (persons)				Mining Labor Income** ($millions)				Mining Contribution to GDP*** ($millions)			
	Mine Workers	% of 2013 Total Employment	Direct, Indirect, and Induced Workers*	% of 2013 Total Employment	Labor Income of Mine Workers	% of Labor Income	Labor Income of Direct, Indirect, and Induced Workers	% of Labor Income	GDP Inputs by Mine Workers	% of Nominal GDP 2014	GDP Inputs by Direct, Indirect, and Induced Workers	% of Nominal GDP 2014
California	11,200	0.052	81,200	0.38	727	0.053	5,271	0.388	1,323	0.060	9,595	0.44
Imperial	332	0.425	2,407	3.08	22	0.560	156	3.972	39	0.565	284	4.12
Inyo	47	0.453	341	3.29	3	0.573	22	4.198	6	0.606	40	4.04
Kern	1,661	0.414	12,042	3.00	108	0.374	782	2.709	196	0.445	1,423	3.23
Los Angeles	274	0.005	1,987	0.03	18	0.005	129	0.036	32	0.005	235	0.04
Riverside	528	0.059	3,828	0.42	34	0.085	248	0.617	62	0.080	452	0.58
San Bernardino	1,418	0.159	10,281	1.15	92	0.212	667	1.538	168	0.208	1,215	1.50
San Diego	174	0.009	1,262	0.07	11	0.009	82	0.068	21	0.010	149	0.07

* Total employment contribution multiplier from direct, indirect, and induced employment (includes mine workers) as a result of mining: 7.25 per mining employee; ** Labor income multiplier: $64,914 based on NMA estimates; *** GDP multiplier: $118,165 based on NMA estimates

Table 4. Estimated economic contributions from metal and non-metal mining employment in desert counties, using county employment numbers from MSHA reported employees and NMA state-level multipliers applied at county level. *Sources:* MSHA reported employment numbers, US Department of Commerce, Mine Safety and Health Administration; NMA, *The Economic Contributions of U.S. Mining (2012)* state- level estimates, used to infer multipliers for county-level data; 2013 employment from US Dept of Commerce, BEA, REA, Table CA30; 2014$s labor income (in real terms) from US Dept of Commerce, BEA, REA, Tables CA05 and CA05N as reported by Headwaters Economics; GDP for counties from National Association of Counties, County Explorer, 2014 nominal GDP, http://explorer.naco.org/; GDP for California from NMA estimates.

Estimated Economic Contributions from Metal and Non-metal Mining Employment in Desert Portions of Desert Counties, Using MSHA Reported Employment and National Mining Association Estimates (Derived from State-Level Estimates), Adjusted by Proportion of Population in Desert Portions of Counties

	Mining Employment (persons)				Mining Labor Income** ($millions)				Mining Contribution to GDP*** ($millions)			
	Desert Mine Workers	% of 2013 Desert Total Employment †	Desert Direct, Indirect, and Induced Workers*	% of 2013 Desert Total Employment †	Labor Income of Desert Mine Workers ($millions)	% of Desert Labor Income ††	Labor Income of Desert Direct, Indirect, and Induced Workers	% of Desert Labor Income ($millions) ††	GDP Inputs by Desert Mine Workers ($millions)	% of Nominal Desert GDP 2014 †††	GDP Inputs by Desert Direct, Indirect, and Induced Workers ($millions)	% of Nominal Desert GDP 2014 †††
Imperial	332	0.43	2,407	3.08	22	0.56	156	3.98	39	0.57	284	4.12
Inyo	45	0.99	326	7.14	3	1.27	21	9.19	5	1.22	39	8.85
Kern	1,424	3.23	10,324	23.39	92	2.91	670	21.11	168	3.48	1,220	25.21
Los Angeles	66	0.03	479	0.20	4	0.03	31	0.01	8	0.03	57	0.22
Riverside	57	0.03	413	0.23	4	0.05	27	0.33	7	0.04	49	0.31
San Bernardino	1,263	0.57	9,157	4.10	82	0.76	594	0.34	149	0.74	1,082	5.35
San Diego	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

* Total employment contribution multiplier from direct, indirect and induced employment (includes mine workers) as a result of mining: 7.25 per mining employee; ** Labor income multiplier: $64,914 based on NMA estimates; *** GDP multiplier: $118,165 based on NMA estimates

† Desert total employment was estimated by adjusting countywide employment numbers using % of population from each county in desert portion;

†† Labor income for desert portion was estimated by adjusting countywide labor income using % of population from each county in desert portion;

††† Nominal GDP for desert portion was estimated by adjusting countywide nominal GDP using % of population from each county in desert portion

Table 5. Estimated economic contributions from metal and non-metal mining employment in desert portions of desert counties, using county employment numbers from MSHA reported employees and NMA state-level multipliers applied at county level. County values for total employment, labor income, and nominal GDP were adjusted by proportion of population residing in desert portion of each county (see Figure 4).

Sources: MSHA reported employment numbers, US Department of Commerce, Mine Safety and Health Administration; National Mining Association, *The Economic Contributions of U.S. Mining (2012)* state-level estimates, used to infer multipliers for county-level data; 2013 employment from US Dept of Commerce, BEA, REA, Table CA30; 2014$s labor income (in real terms) from US Dept of Commerce, BEA, REA, Tables CA05 and CA05N as reported by Headwaters Economics; GDP for counties from National Association of Counties, County Explorer, 2014 nominal GDP, http://explorer.naco.org/; GDP for California from NMA estimates. County population estimates for desert portions from US Census American Community Survey 2013 estimates.

Tax Payments

The NMA report also discusses economic contributions that can be attributed to tax payments as a result of mining activities. While not available at this time at the county level, contributions made by mining activities at the national and state levels (for California) can be reported for perspective. Tax payment economic contributions include income taxes on company profits and employee wages, property taxes on equipment and structures, and excise taxes on output. Using the IMPLAN model, NMA estimates that in 2012 mining activity in the US generated $46 billion in tax revenues: $28 billion in federal taxes and $18 billion in state and local taxes. This model includes both *direct* contributions and *indirect and induced* contributions, such as effects of upstream suppliers to mining and spending by mining and supplier employees.

For California, the *direct* tax contributions as a result of mining activities are estimated as $404 million (15% of total contribution) and *indirect and induced* contributions as $2,285 million (85% of total contribution). Of mining's reported total contribution of $2,689 million to taxes in California, 38% ($1,026 million) went to state and local taxes, and 62% ($1,664 million) to federal taxes. Working backwards to elucidate the multiplier used, approximately *$ 9,300 in state and local taxes* and *$15,000 in federal taxes* paid per employee were attributed to the mining economy in the state for each of the 110,750 mining employees in California in 2012**.** These values can be multiplied by the number of mining employees in an area to estimate tax contributions at the state and local levels. For example, using this formula, the 1,418 mine workers in San Bernardino County contributed $13 million in state and local taxes and $21 million in federal taxes for 2012.

Mining Vis-à-Vis Other Economic Sectors

Mining's contribution to the California Desert's economy is overshadowed by growth in other economic sectors that track closely with economic trends throughout the interior West. These trends reflect the increasing importance of regional amenities, notably natural and cultural attractions, and are defined by growth in services, professional, and government sectors, and non-labor income. These sectors and income sources have grown over the past 4 decades—serving as the key economic drivers throughout the region. These trends also have profound implications for the economic role of public lands, where protected public lands become an important economic asset. Tourism and recreation remains one of the bright spots of the region's economy, having rebounded to pre-recession levels: total direct travel spending in the desert region in 2013 reached $6.2 billion.

Over the last 4 decades, the economy of the California Desert, similar to most of the interior West, has become much more diversified, with a mix of service-sector businesses joining traditional extractive resource industries. (The service sector encompasses both high- and low-wage employment, including hospitality, food service, engineering, management, finance, real estate, and health care professionals.) The growth in the service industries is generally characterized as amenity driven; that is, tied to a region's natural and cultural attractions, including the quality of life provided by smaller-sized communities.

As noted in prior sections, mining operations are historically and locally significant in the California Desert, but the industry's contributions are overshadowed regionally and at the county level by other sectors' economic performance. A consideration of the implications of mining's relative performance to other sectors underscores broader economic trends consistently experienced throughout the West and reflects the growing economic role of the region's amenities and the evolving economic role of public lands. As seen above (Figure 14), the sectors adding the most new personal labor income between 2001 and 2013, were health care/social assistance, government, and professional/scientific/technical. Mining (including fossil fuels) played a very small role in personal income across the region. As well, non-labor income is becoming a larger component of the economies of the desert counties.

This amenity-driven growth is generally defined by the following trends, which have been relatively uniform across the interior West since 1970:

- Growth in services and professional-related employment and income that reflects the emergence of amenity-driven jobs tied to quality of life concerns, including the diverse recreational opportunities a region provides; the increasing contribution of tourism to the local economy; and the role that the communications technology plays in allowing "footloose" businesses to locate in areas with high amenities. Like mining, these economic sectors have their attendant "spillover" economic impacts.[18]

- Growth in government-related employment and income, which reflects the relatively large expanse of public lands in the West that are managed by multiple federal and state agencies and, in the California Desert, also includes significant military facilities and operations.

- Growth in non-labor income that highlights the role that federal transfer payments (i.e., social security) and other sources of income (i.e., returns on financial investments) play in boosting the local economy. These speak to the presence of retirees, owners of second homes, and other residents whose contributions are not captured in jobs and labor income data.

These trends have profound implications for the economic role of public lands. Traditionally, that role has focused on resource extraction: mining, grazing, and logging being the most prominent. But in the past four decades, that role has evolved. Protected public lands, where resource extraction is limited or prohibited, have emerged as an important economic asset.

[18] For example, the latest figures from the report *2014 National Park Visitor Spending Effects: Economic Contributions to Local Communities, States, and the Nation* attribute contributions to local economies from National Park Service 2014 visitor spending of $89 million, $73 million, and $31 million from Death Valley National Park, Joshua Tree National Park, and Mojave National Preserve, respectively, with visitor spending supporting over 2,700 jobs.

A 2012 study by Headwaters Economics titled *West is Best: How Public Lands in the West Create a Competitive Economic Advantage*[19] found that western counties with protected federal lands—such as national parks, monuments, and wilderness—enjoy a competitive economic advantage that results in more jobs and increased per capita income. A statistical analysis done as part of the report shows that, for non-metro counties in the West with protected federal lands, per capita income in that county was on average $436 higher for every gain of 10,000 acres of protected public land. Other analysis showed that western non-metropolitan counties that have greater than 30% of their land base in federally protected lands increased jobs by 345% over the last 40 years, while by contrast counties with no protected federal public land increased jobs by 83%.

Trends in the desert region are consistent with trends in other regions, states, and communities in the West, and speak to a broader economic transformation that has been ongoing over the last 4 decades. Headwaters Economics' analysis shows that industries that include travel and tourism comprised over 15% of total private employment in all 7 desert counties in 2013, with Inyo County employment over 33% in those industries.

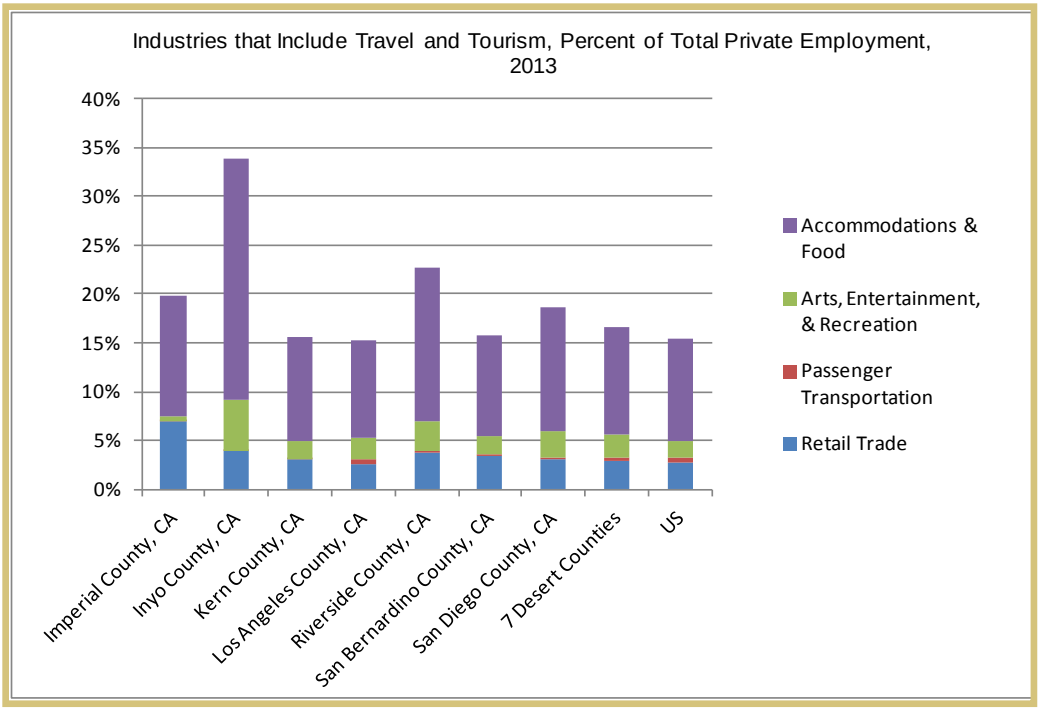


Figure 17. Industries that include travel and tourism as percent of total private employment in 2013 for 7 desert counties. *Source:* Headwaters Economics, US Department of Commerce, County Business Patterns 2015.

[19] The study, "*West is Best: How Public Lands in the West Create a Competitive Economic Advantage*," found that, from 1970 to 2010, western non-metro counties with more than 30 percent of their land base in federal protected status increased jobs by 345%. As the share of federal lands in protected status goes down, the rate of job growth declines as well. Western non-metro counties with no protected federal land increased jobs by 83%. Accessed at http://headwaterseconomics.org/economic-development/trends-performance/west-is-best-value-of-public-lands-release.

In fact, tourism and recreation remains one of the bright spots of the region's economy, having rebounded to pre-recession levels. A recent review of travel impacts on California's economy shows that total direct travel spending in the desert region in 2013 reached $6.2 billion (preliminary figures for 2014 indicated continued growth totaling $6.3 billion).[20]

But the economic role of protected public lands is not limited to tourism and recreation. Several key military installations are located in the California Desert, including the Twentynine Palms Marine Corps Air Ground Combat Center, Fort Irwin National Training Center, China Lake Naval Weapons Center, Edwards Air Force Base, and the Chocolate Mountain Gunnery Range. The Combat Center at Twentynine Palms is one of the largest employers in San Bernardino County, and the estimated contribution to the local economy is $1.7 billion annually.[21]

These facilities depend on surrounding public lands to carry out their operations, most notably flight training programs. Additionally, as major land managers in their own right with a long-standing tradition of environmental stewardship, these facilities depend on adjacent public lands to serve as key corridors and linkages to habitat and wildlife under their purview. Protecting adjacent lands can help ensure the ongoing viability of military facilities while ensuring that their environmental programs are effective.

Finally, protected public lands continue to be part of the overall draw for retirees, young entrepreneurs, and urban refugees who are looking to relocate primarily for quality-of-life considerations. These include amenities such as clean air, outdoor recreational opportunities, low real estate prices, low crime rates, and a pleasant climate, among others. Interestingly, as a recent article in *Travel and Leisure* underscores, some are moving to the desert because of these amenities first and are then looking for employment opportunities or creating their own.[22] This more recent trend may speak to the value of place-based economic development strategies that some communities in the California Desert may wish to pursue.[23]

Influences on Mining in the California Desert

Mining activity is influenced by many factors, depending on the specific commodity. Industrial minerals currently being mined in the California desert, such as construction aggregate and cement inputs, are influenced by local and regional demand and supply. Mining for most metals such as gold, base metals, and rare earth elements is affected by global supply/demand factors. The availability of public lands for mineral exploration and mining has a much smaller influence on mining activity than regional and global economic forces.

[20] California Travel Impacts, 1192-2014p, Dean Runyan Associates, April 2015, p.37.

[21] Community Impact Report, 2013. Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center.

[22] See: http://www.travelandleisure.com/articles/joshua-tree-travel.

[23] For examples see the Sonoran Institute's recent report on place-value community development.

Mineral extraction in the California desert has a range of influences, depending on the resource, from the health of the regional economy and the performance of other economic sectors to global markets and prices.

For example, mining for commodities such as construction aggregate and the inputs to cement manufacturing (primarily limestone and silica) is influenced primarily by regional economic factors, particularly the construction industry, and fluctuates according to the demand for residential, commercial, and infrastructure construction.

Metals mining, such as gold, silver, copper, lead, zinc, molybdenum, and rare earth elements, is influenced primarily by global demand and prices determined in global markets. When global prices increase, exploration mining for metals increases; when global demand wanes and prices decrease, mineral exploration and mining of these metals slows down or stops completely in some instances.

Recent developments at the rare earth mine at Mountain Pass provide a good example of how global market forces affect metals mining, sometimes in highly volatile fashion. When rare earth prices surged in 2010 as a result of Chinese export controls, Molycorp, Inc. restarted mining and processing at Mountain Pass. As China subsequently decreased its constraints on exports, prices plummeted. In June 2015, Molycorp filed for bankruptcy and in late August 2015 announced that it would cease production at Mountain Pass. It appears likely that most of the employees at the facility will be laid off.

It is worth noting that, in the context of the proposed California Desert Conservation and Recreation Act of 2015, there does not appear to be a relationship between public lands conservation and mining activity. As can be seen in Figures 18 and 19 (the 7-county summaries from Figures 8 and 9), percent of private employment in mining and numbers of jobs in non-oil and gas mining sectors have not changed appreciably over the last 15 years. During this time period, many portions of the California Desert have received conservation designations.

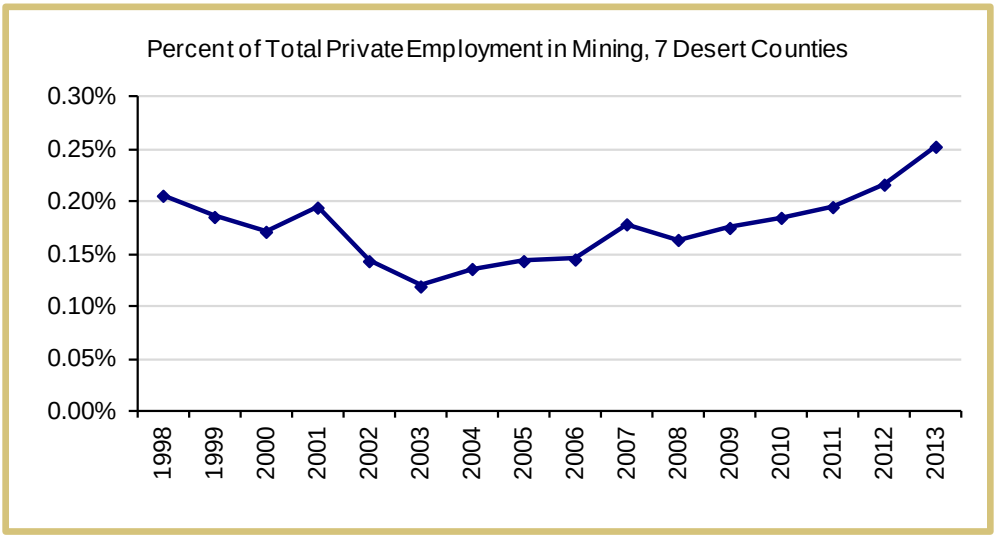


Figure 18. Percent of total private employment in all mining (includes oil and gas) in all 7 desert counties combined, between 1998 and 2013. *Source:* US Census Bureau, County Business Patterns, 2015.

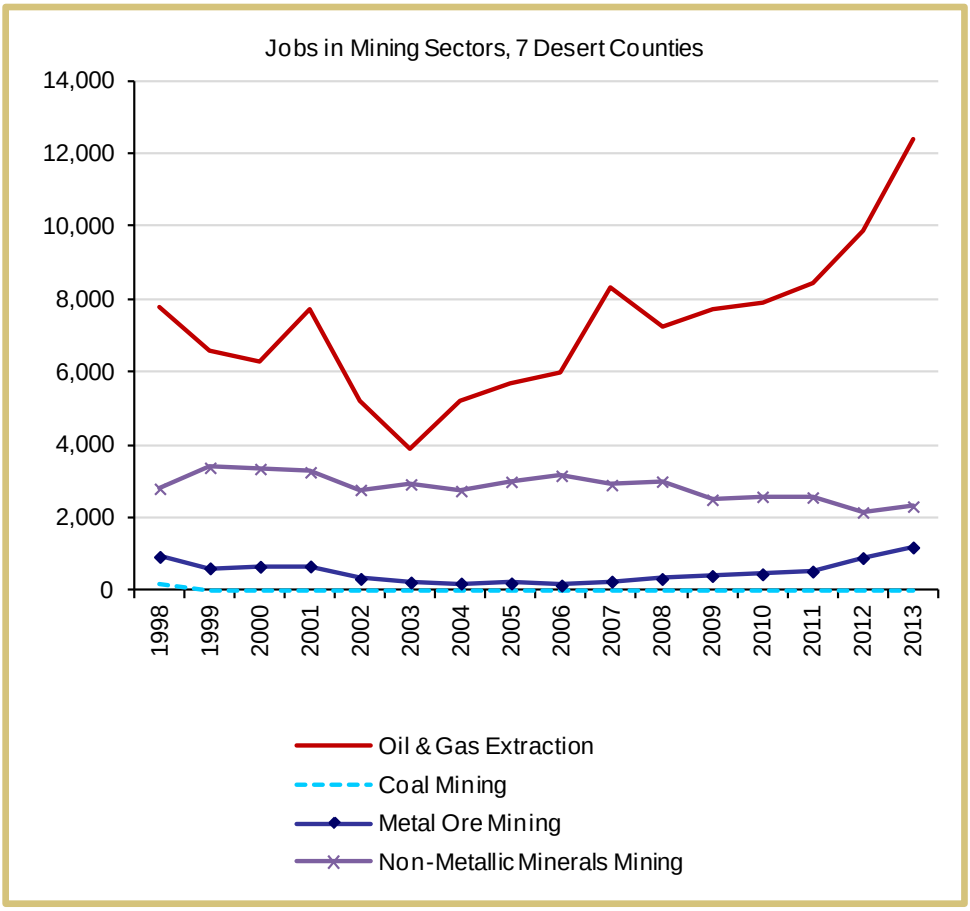


Figure 19. Jobs in mining sectors, all 7 desert counties combined, 1998 – 2013. *Source:* US Census Bureau, County Business Patterns, 2015.

The California Desert Conservation and Recreation Act

The California Desert Conservation and Recreation Act of 2015 (CDCRA) is proposed legislation that would provide for conservation, recreation, and renewable energy development in the California Desert. This section of the report examines the interaction between the proposed conservation designations and existing and potential future mineral resource development.

Provisions of the CDCRA

Through its extensive conservation designations, the legislation seeks to preserve the region's natural and cultural attractions, which have fueled much of the region's growth and prosperity. Protected public lands such as designated wilderness, national parks, national preserves, and national monuments protect key amenities that serve as the foundation for the region's tourism and recreation businesses, military operations, real estate development, and other economic sectors.

Introduced in February 2015 by Senator Dianne Feinstein with Senator Barbara Boxer as co-sponsor, the proposed legislation builds on 1994 legislation that established Death Valley and Joshua Tree national parks and protected more than 7.6 million acres of California Desert as Wilderness Areas. Subsequent

legislative efforts, going back to 2009, have sought to expand upon this conservation legacy, but have been unsuccessful to date.

The CDCRA would create two new national monuments:

- The **Mojave Trails National Monument**, which would encompass 965,000 acres of land, including former Catellus-owned lands that were donated to the US government with the intention of preservation; and
- The **Sand to Snow National Monument**, which would encompass 135,000 acres of land from the desert floor of the Coachella Valley to the peak of Mount San Gorgonio.

The proposed legislation also would designate:

- 6 new **BLM Wilderness Areas** covering 250,000 acres;
- 18,610 acres of BLM land in Inyo County as the **Alabama Hills National Scenic Area**, preserving it for continued recreational use;
- 77 miles of waterways as **Wild and Scenic Rivers**; and
- 5 existing **BLM Off-Highway Vehicle areas** (covering approximately 142,000 acres of California desert) as permanent Off-Highway Vehicle (OHV) recreation areas, providing off-highway enthusiasts certainty that these uses of the desert will be protected in a manner similar to conservation areas.

Additionally, the CDCRA would **expand national park units,** including: Death Valley National Park by 39,000 acres, Joshua Tree National Park by 4,500 acres, and the Mojave National Preserve by 22,000 acres.

The proposed legislation also includes several provisions related to **renewable energy development**. It encourages development of new renewable energy in Solar Energy Zones established by the federal government. It requires the exchange of isolated state parcels currently surrounded by national parks and wilderness, providing the state with lands that could be used for renewable energy, recreation, or conservation; and allows for upgrades to transmission lines necessary to bring renewable energy to urban areas. Figure 20 shows the area of study.

The focused and relatively permanent nature of current large mining operations allows for proposed and future conservation proposals to accommodate these operations' site-specific needs. Moreover, in certain instances, future mineral resource needs can be readily considered when drafting public lands protection proposals.

As noted in prior sections, much of the region's economic growth has been in service-related sectors. When combined with growth in non-labor income, these trends underscore economic and demographic changes that are strongly connected to the region's amenities, its natural and cultural attractions. The CDCRA's extensive conservation designations align with key sectors of the region's economy that have experienced growth in jobs and income over the past 4 decades, including the tourism and recreation businesses, military operations, real estate development, and other economic sectors. These sectors have a direct stake in preserving the desert.

Overall Impact on Existing Mineral Operations and Mining Claims

As currently drafted, the proposed CDCRA recognizes and protects existing mining claims and minimizes impacts on current mining operations. A careful screening of the location of current activities and operations indicates minimal potential impacts in a few areas. Any effort to address these impacts would need to take into consideration the broad range of resource values in these areas.

Given the robust mineral and management analysis conducted by the DRECP team, the study area used for our analysis of mineral resource data coincides with the DRECP boundary (Figure 20). The DRECP boundary is largely similar to the CDCA boundary, with minor variations in their western boundary. Both boundaries also fully contain the bulk of the Feinstein legislation proposals, with the exception of the Alabama Hills NSA and a Death Valley wilderness addition in Inyo County.

Various types of mining occur widely across the region, as can be seen in Figure 21, derived from MSHA data. The great majority of the current and recently operating mines in the desert portion of the region are extracting sand, gravel, and stone for use as construction aggregate. Although there are relatively few mines extracting metals or non-metallic commodities in the desert portion of the region, those mines include the top 3 mining employers, Rio Tinto (boron compounds), Molycorp (rare earth elements), and New Gold (gold). See Appendix D for details on the top 5 employers by number of employees, and Appendix E for more detail and maps showing the geographic distribution of mining employment in the desert region.

In drafting the proposed CDCRA, provisions were included to ensure that existing mining claims are protected. As currently written, the proposed the CDCRA would recognize all existing valid mining claims and mineral rights within the proposed boundaries. As such, it would not interfere with current or future mining activities on these claims.[24] The CDCRA specifically states that non-wilderness activities (which includes mining) on areas adjacent to boundaries of wilderness areas designated by the act will not be restricted or precluded.[25]

[24] See language from CDCRA on pages 22, 48, 49, 71, 78, 79, 80, 81, 82, 108, 117, 122, 128, 129 and 130. https://www.congress.gov/114/bills/s414/BILLS-114s414is.pdf

[25] CDCRA, page 141.

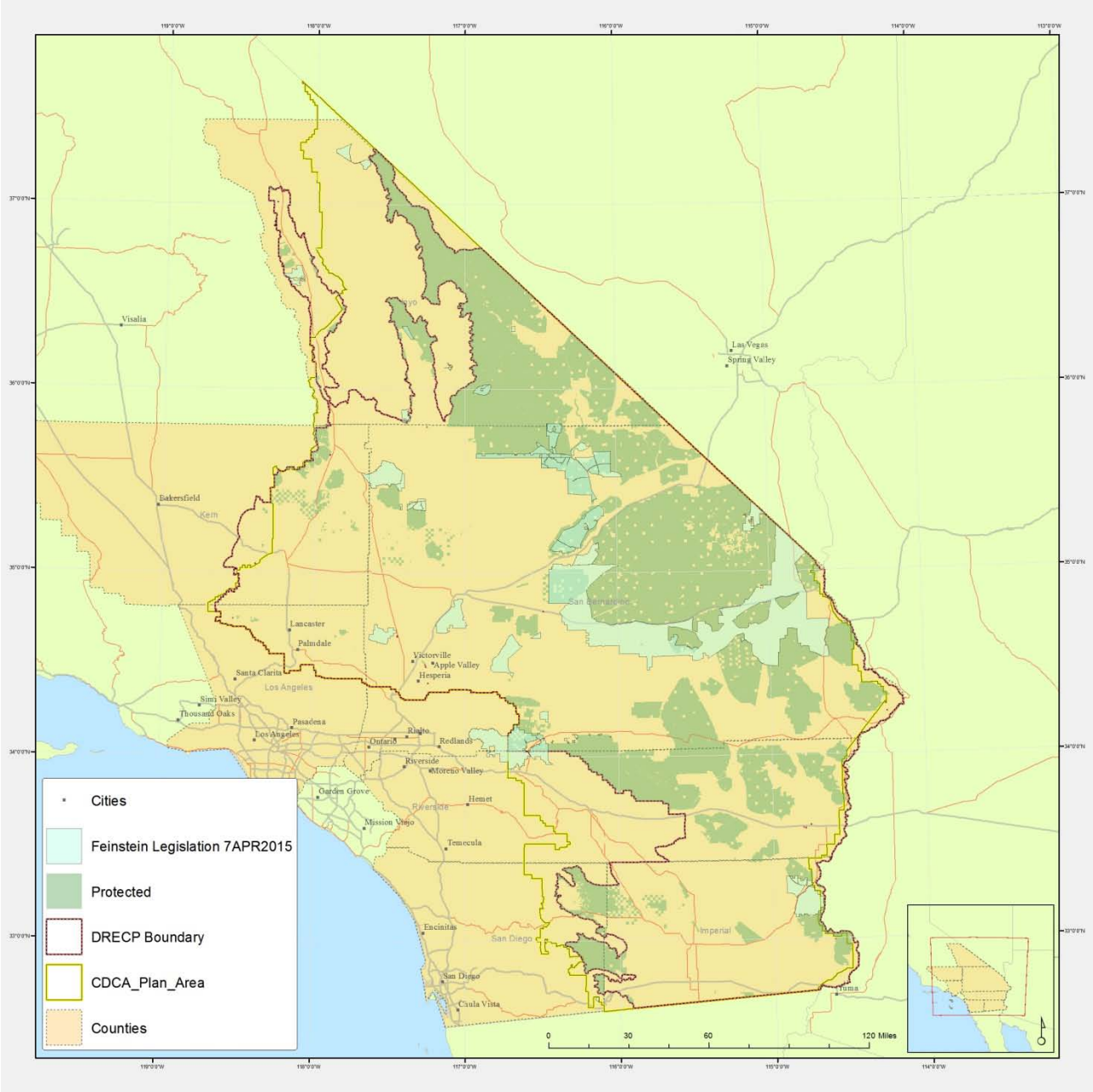


Figure 20. Study area for GIS mining analysis.

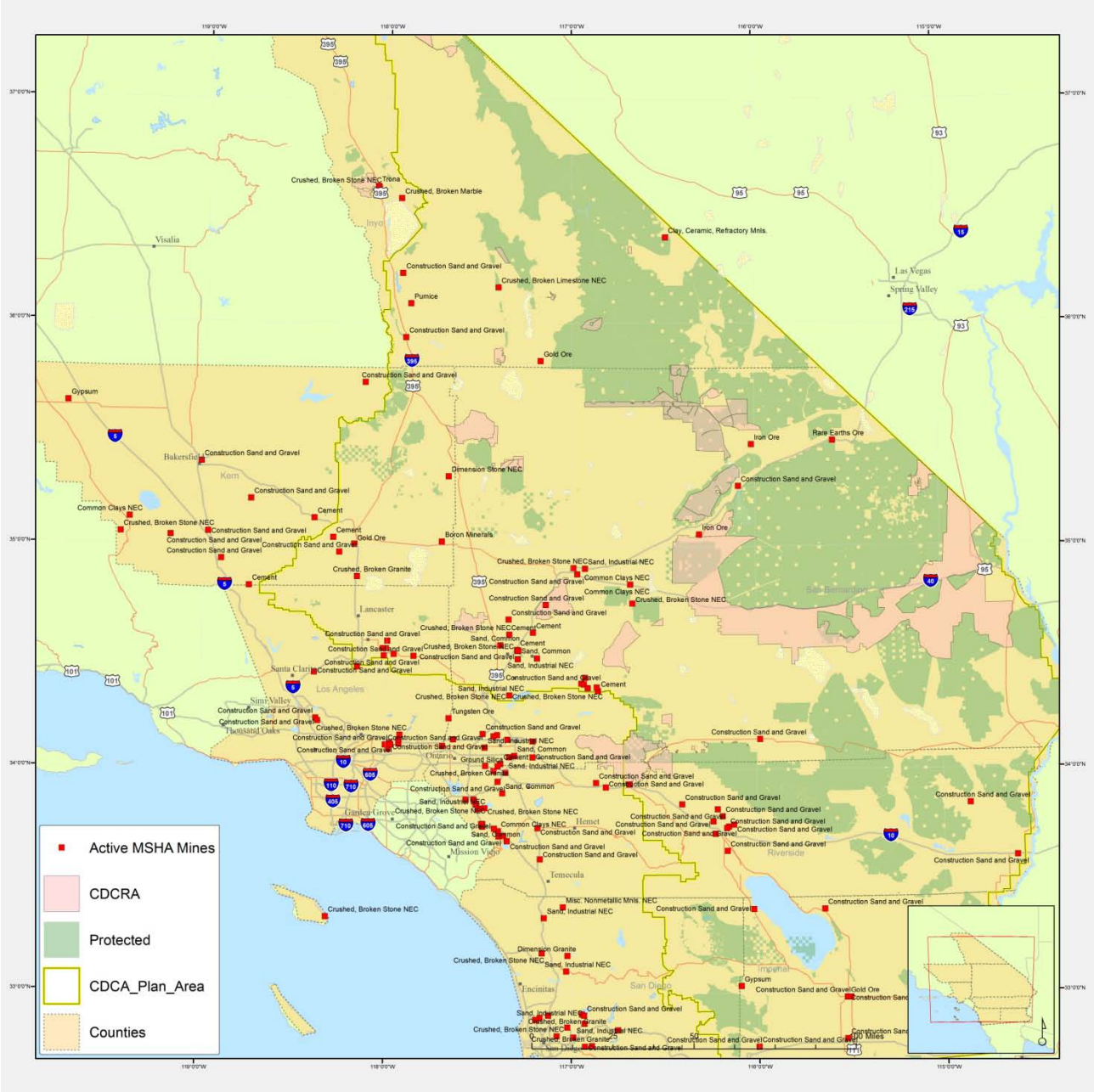


Figure 21. Current mining operations in the desert region. *Source:* US Department of Commerce, Mine Safety and Health Administration.

In addition, existing operating mines have been excluded from the proposed CDCRA boundaries, as can be seen in Figure 21. For example, rare earth elements, which are mined and processed at facilities in the Mountain Pass area, are important because of their use in technologies such as satellites, electric cars, wind turbines, and photovoltaic panels. Military uses of these elements include guided missile systems and unmanned drones. Magnets made with rare earths are used in smart phones, computers, headphones, and other forms of information technology. The CDCRA boundaries specifically exclude the area surrounding the rare earth element mine at Mountain Pass. Furthermore, the recognition of valid existing mining rights within the proposed boundaries allows for potential future development of rare earth mineral deposits on known prospective formations within the boundaries.

Another example is construction aggregate, which is an important mineral resource present in extensive deposits within the study area (see Figure 22), sourced from alluvial sand and gravel deposits as well as from bedrock outcrops. Essential for construction of infrastructure, particularly transportation infrastructure (highways, high-speed rail), construction aggregate is a bulk commodity that is economic to haul up to approximately 50 miles by truck. As such, it is critical that adequate deposits are present and minable close to transportation corridors for use in new construction and maintenance of existing roads and associated bridges, overpasses, drainage ways, and other structures. The CDCRA boundaries include buffers around key transportation corridors and existing aggregate mining operations.

Figure 22. Sand and gravel locations and proposed conservation designations.

To determine locations with potential impacts between CDCRA conservation designated areas and mining, a geographic information system (GIS) analysis was conducted that highlighted areas with the conjunction of known mineral occurrence, currently active mining claims, and high mineral potential. These areas were then overlain on the proposed boundaries of the CDCRA to identify locations with potential conflicts with current and potential future mining activities.[26]

Our assessment identified 12 areas where some impacts may occur, discussed below. Any effort to address these impacts would need to take into consideration the broad range of natural, cultural, and other resource values in these areas. The extents of the detailed area maps are shown on the index map in Figure 23, with reference to Figure 24 that shows mining clusters in the region.

An explanation of terms used in the site-specific descriptions and maps included below is provided in the sidebar, to aid in their interpretation.

High, Medium and Low Density of Active Mining Claims

Low Active Mining Claim Density: less than 18 active claims per section

Medium Active Mining Claim Density: between 18 and 46 active claims per section

High Active Mining Claim Density: more than 46 active claims per section

High-Potential Mineral Zones

Areas with existing or historic mineral activity and an increased likelihood of future mineral development. From the DRECP EIS analysis, http://www.drecp.org/draftdrecp.

Known Mineralization

Based on Mineral Resources Data System dataset. http://mrdata.usgs.gov/mrds/

High Value

Materials with a high unit value.

Significant Deposit

Large tonnage and/or high-grade mineral deposit.

Mining claim data

Originates from the Bureau of Land Management's Land & Mineral Legacy Rehost 2000 System (LR2000 System), which is updated daily and mapped at the section level. http://www.blm.gov/lr2000/

[26] Appendix C contains a detailed description of the datasets and processing used for this analysis.

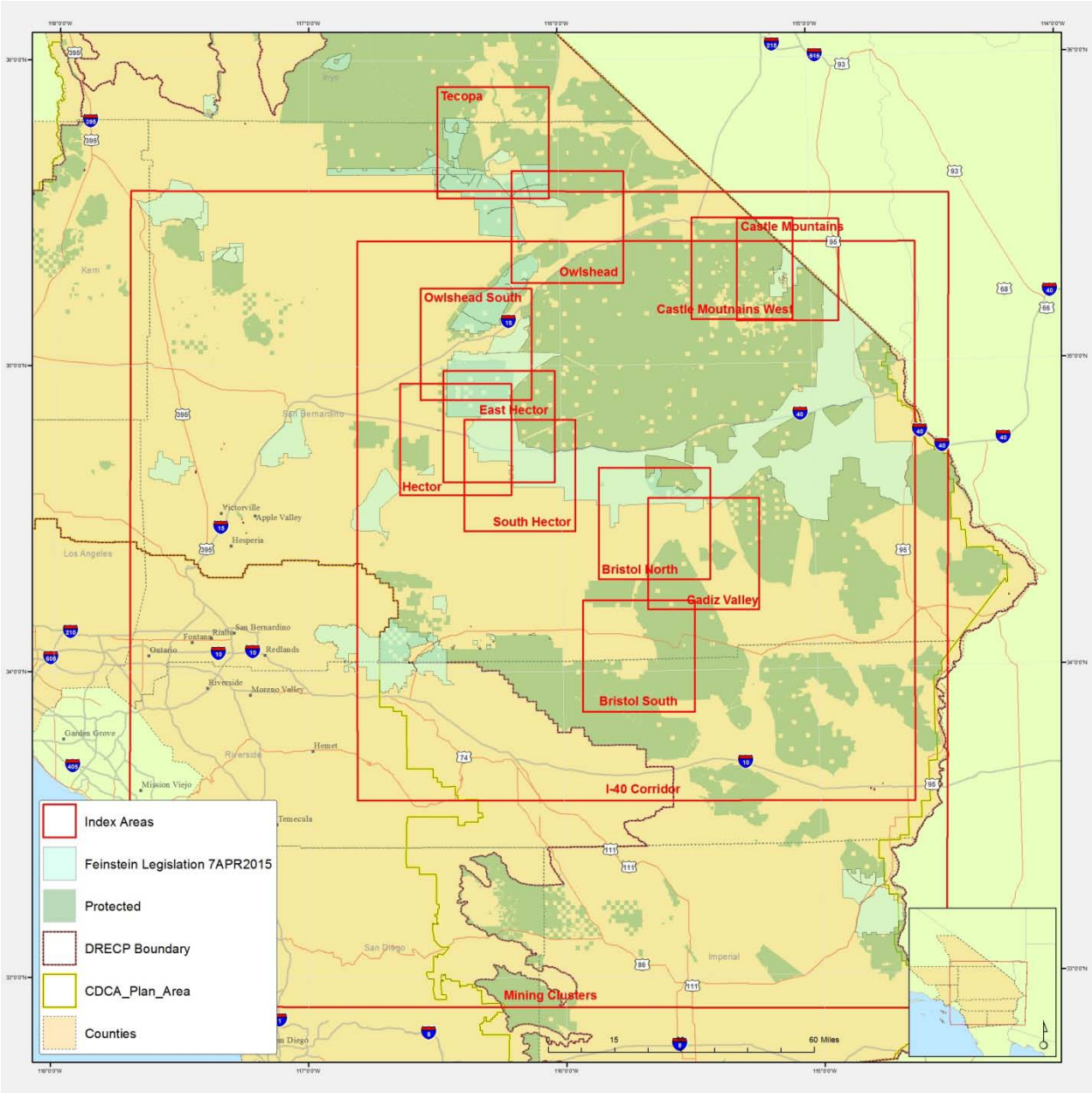


Figure 23. Index map for area detail shown in Figures 24 – 37.

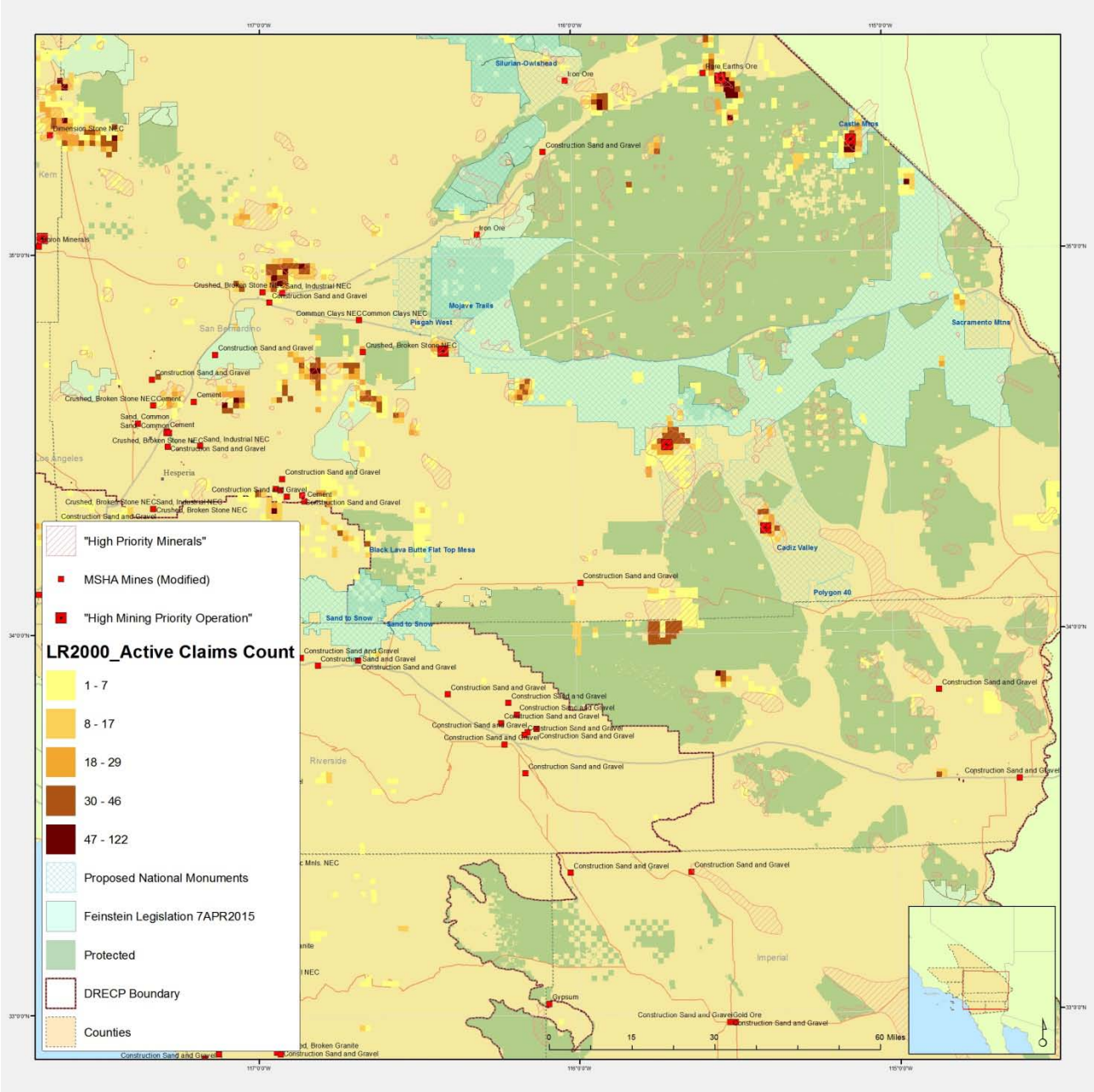


Figure 24. Mining clusters.

The following sections provide brief summaries of areas with potential impacts shown on the accompanying maps.

Area 8 (Tecopa)

This area has an extensive area with a low density of active mining claims, high-potential mineral zones, and known mineralization for the commodities of talc, decorative rock, and construction aggregate. Many of these resources have been abundantly identified as occurring elsewhere in the region; see for example Figure 22 showing sand and gravel locations.

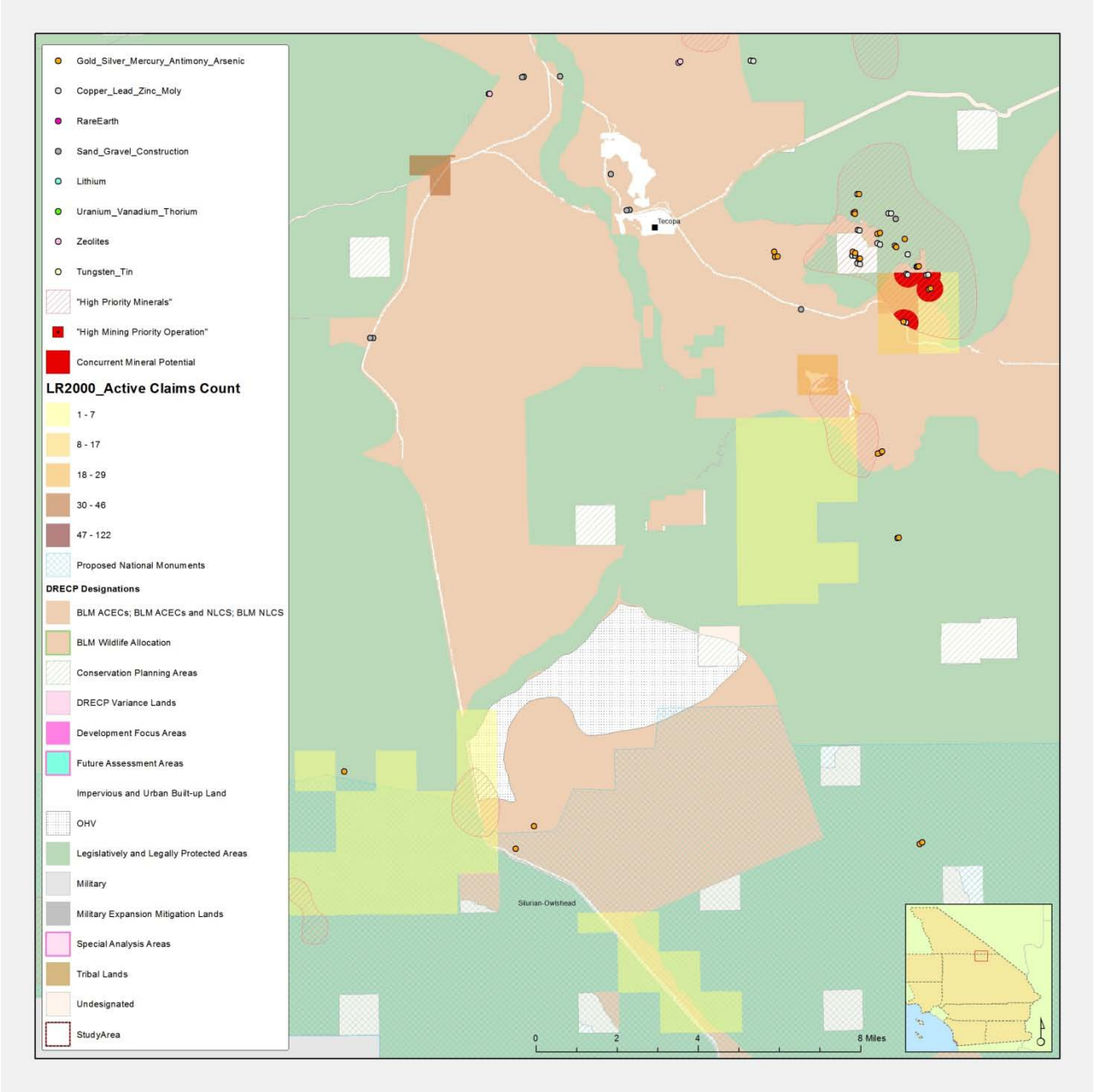


Figure 25. Area 8, Tecopa.

Area 7 (Owlshead)

This is a small area with low-density active mining claims, several small high-potential mineral zones, and known base and precious metal mineralization, along with decorative rock deposits. The decorative rock is too distant from potential markets to be economically viable, and the base and precious metals present are widely available in other deposits in the region and elsewhere.

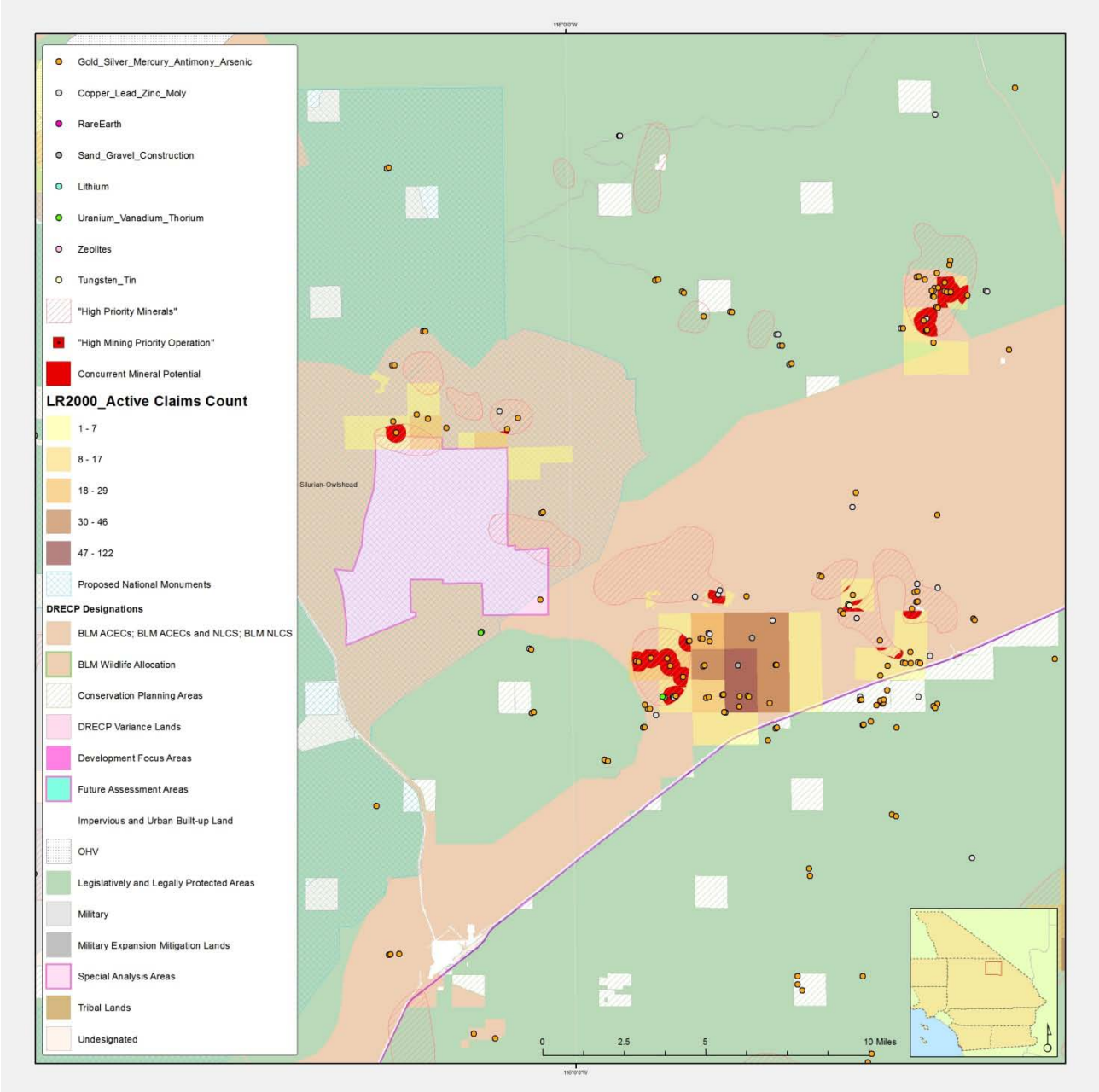


Figure 26. Area 7, Owlshead.

Area 25 (Checkerboard)

This is a small area with a low density of active mining claims, two small high-potential mineral zones, and known mineralization that includes manganese, decorative rock, barite, limestone, and construction aggregate. The decorative rock is distant from potential markets. The construction aggregate in this area is outside of the proposed CDCRA boundary.

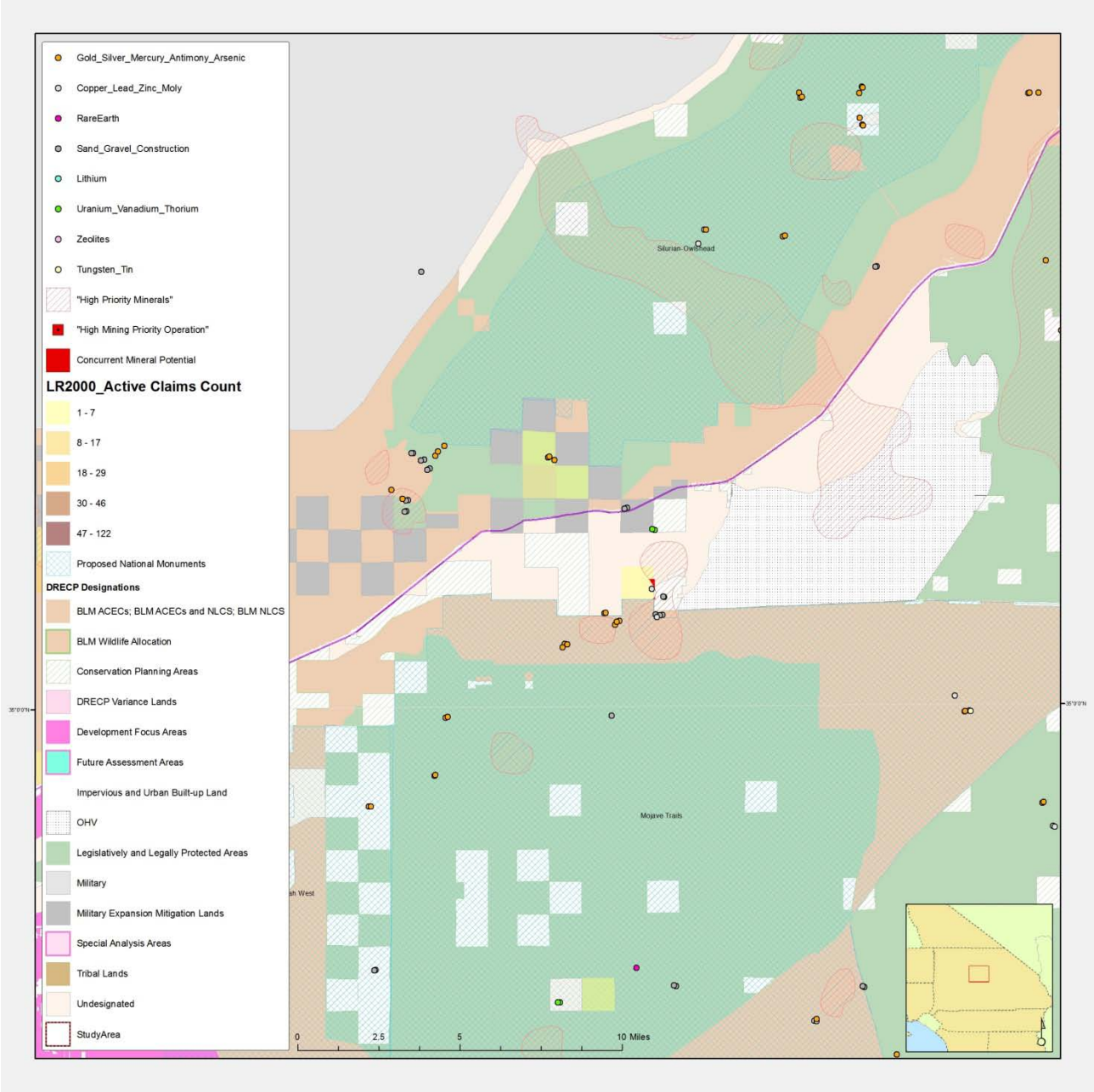


Figure 27. Area 25, Checkerboard.

Area 21 (Hector)

This is an extensive area of active mining claims at a moderate density. The Hector Clay Mine produces hectorite, a high-value lithium clay used in an array of chemical and industrial products. The mine has been operating for more than 60 years. The deposit also contains zeolites; both lithium and zeolites are high-value products with extensive markets.

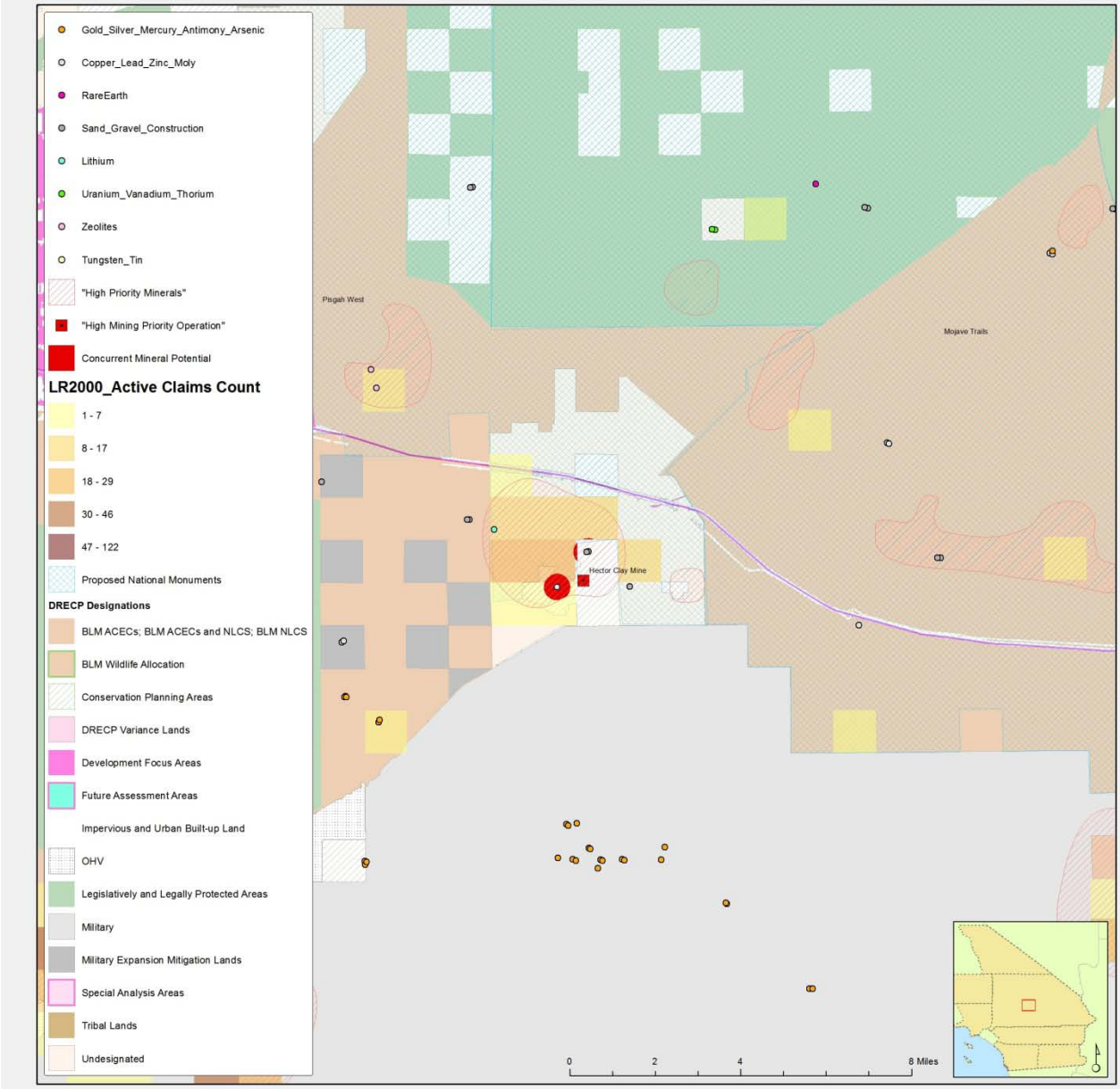


Figure 28. Area 21, Hector.

Area 24 (East Hector)

This is a small area with a high density of active mining claims, a high-potential mineral zone, and known mineralization that includes construction aggregate, manganese, gypsum, barite, and strontium. The strontium is in a potentially significant deposit, and the construction aggregate is adjacent to the Interstate 40 transportation corridor.

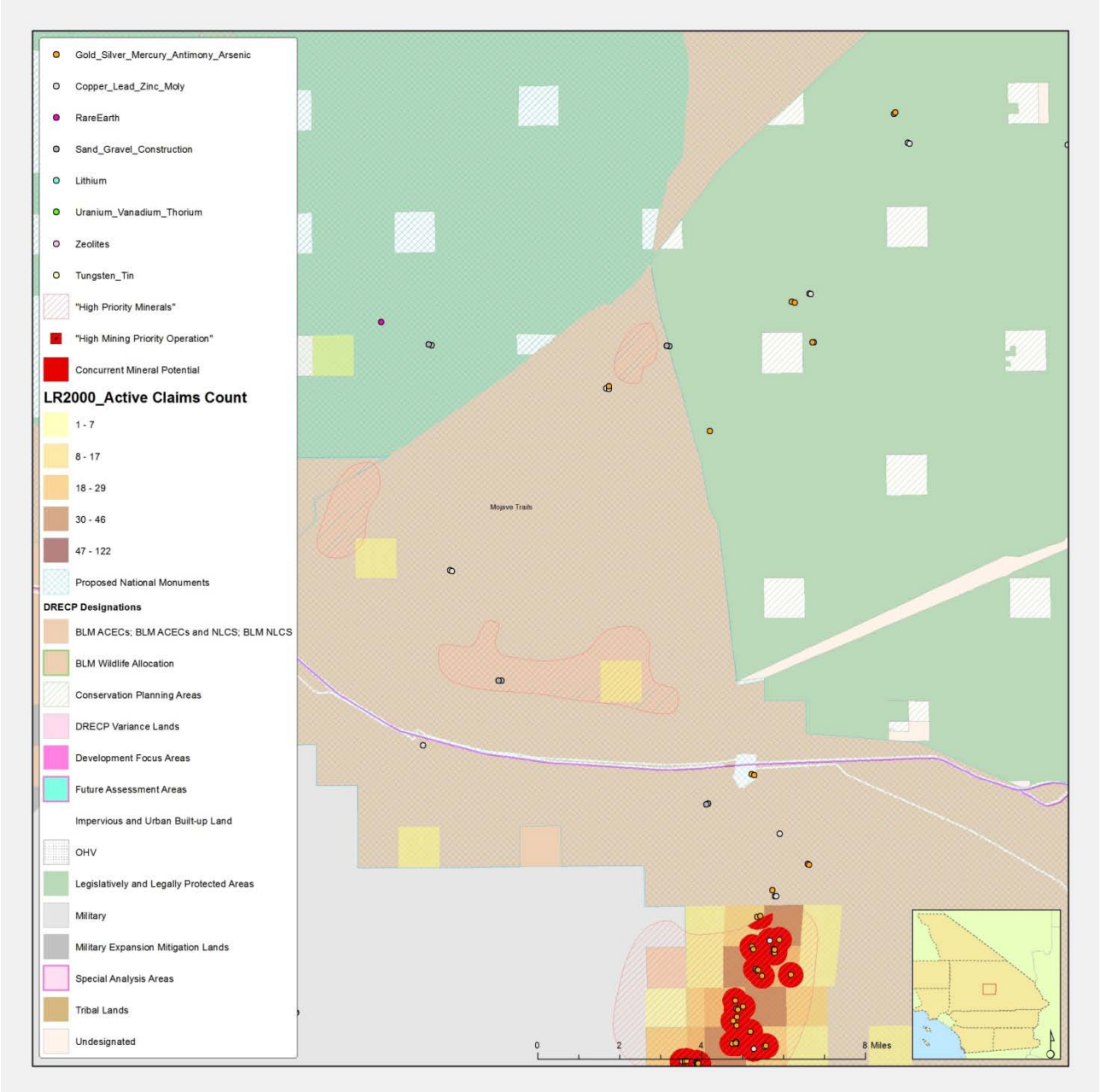


Figure 29. Area 24, East Hector.

Area 20 (South Hector)

This includes an extensive area with a high density of active mining claims, a high-potential mineral zone, and known mineralization that includes gold. The gold is present in a potentially significant deposit. The area is contiguous with and overlapping the military base boundary.

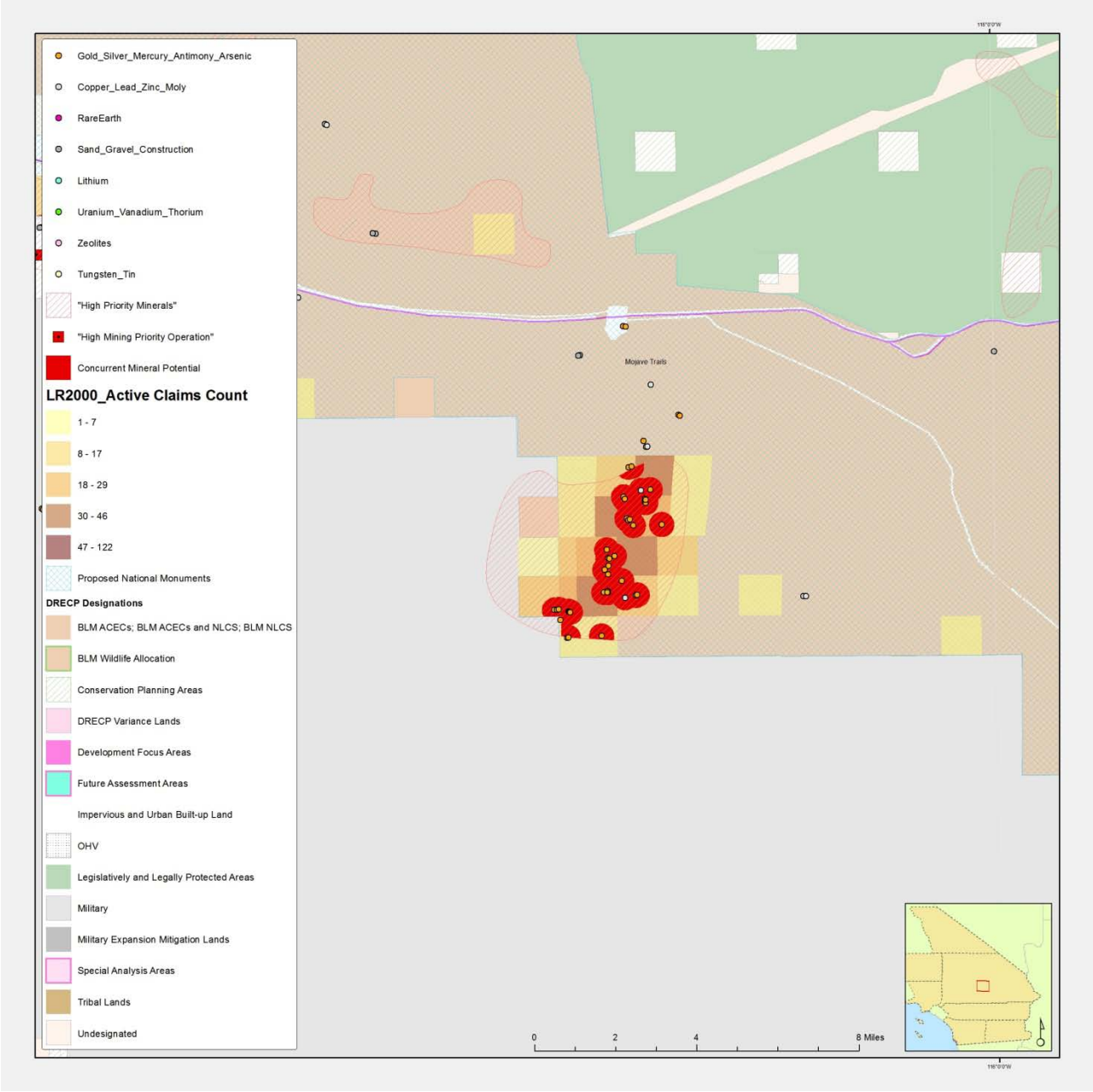


Figure 30. Area 20, South Hector.

Area 4 (Bristol South)

This area includes the Bristol Dry Lake and has extensive active mining claims with areas of high and low claim density. The Bristol Dry Lake salt mine is located on the northern portion of the lake bed. The mine is owned by Tetra Technologies and produces sodium chloride and calcium chloride. The salt deposit extends across the lake bed. The lake bed also has mineral potential for lithium, strontium, and gypsum.[27]

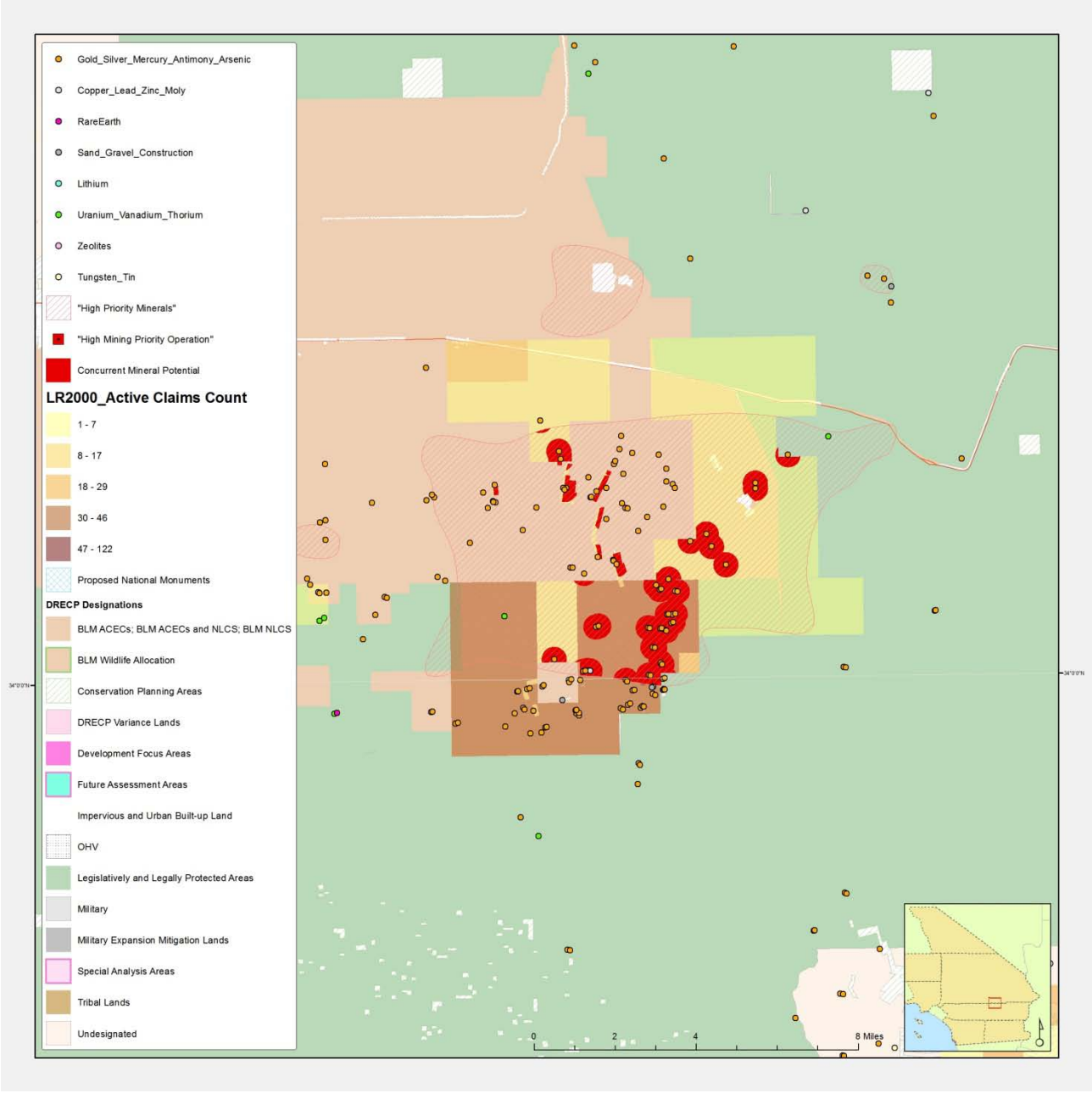


Figure 31. Area 4, Bristol South.

[27] As noted on maps from the 1980 CDCA Final EIS, available at http://babel.hathitrust.org/cgi/pt?id=mdp.39015022247806;view=1up;seq=7

Area 13 (Bristol North)

This area includes a small area with a low density of active mining claims, a high-potential mineral zone, and known mineralization that includes construction aggregate, pumice, and perlite. The construction aggregate is located outside of the CDCRA boundary. Pumice and perlite are available in several deposits elsewhere in the area.

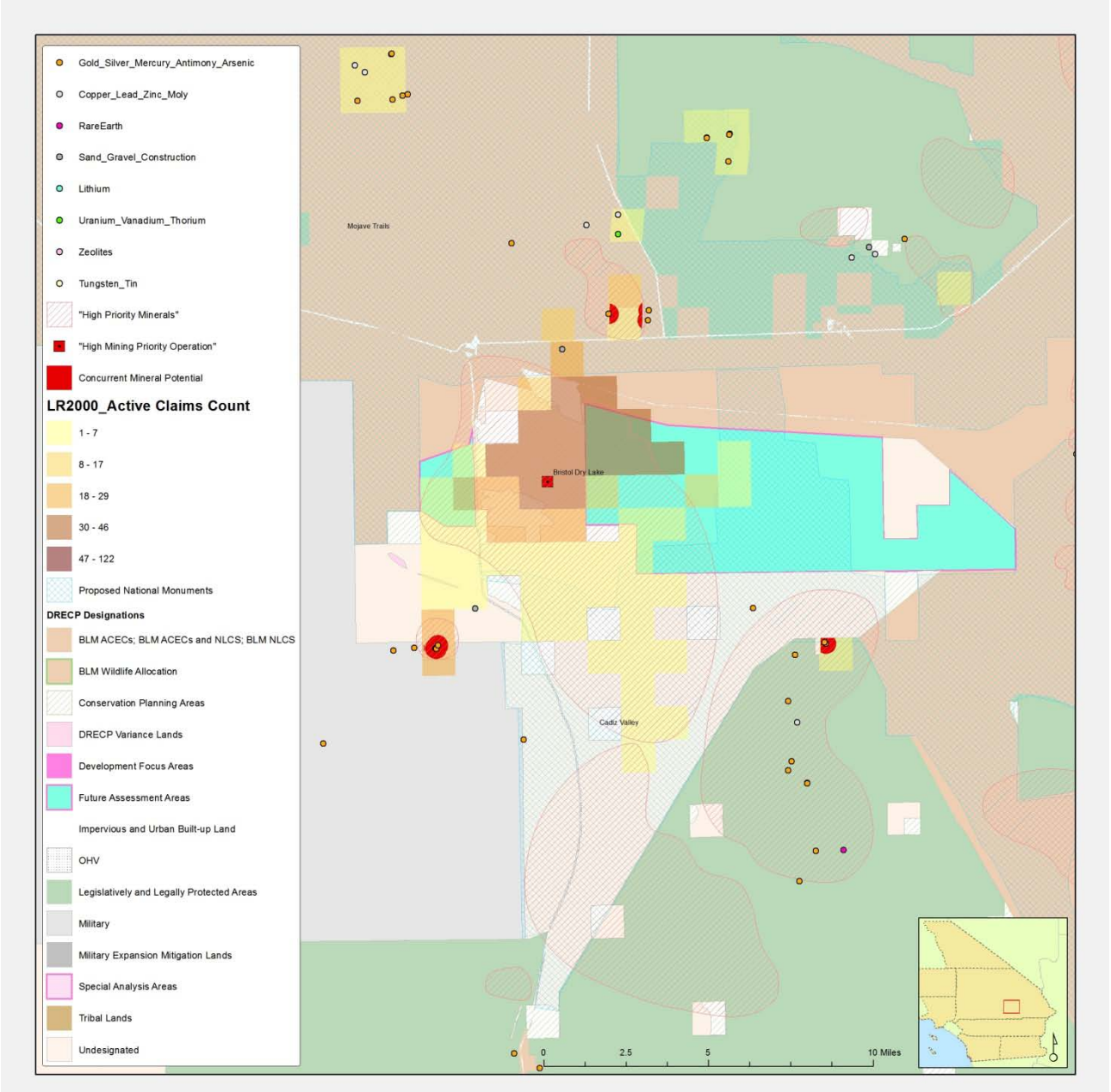


Figure 32. Area 13, Bristol North.

Area 23 (Cadiz Valley)

This includes an extensive area with moderate- to high-density active mining claims, a high-potential mineral zone, and significant potential for lithium deposits. The area with lithium potential has been excluded from the CDCRA boundary.

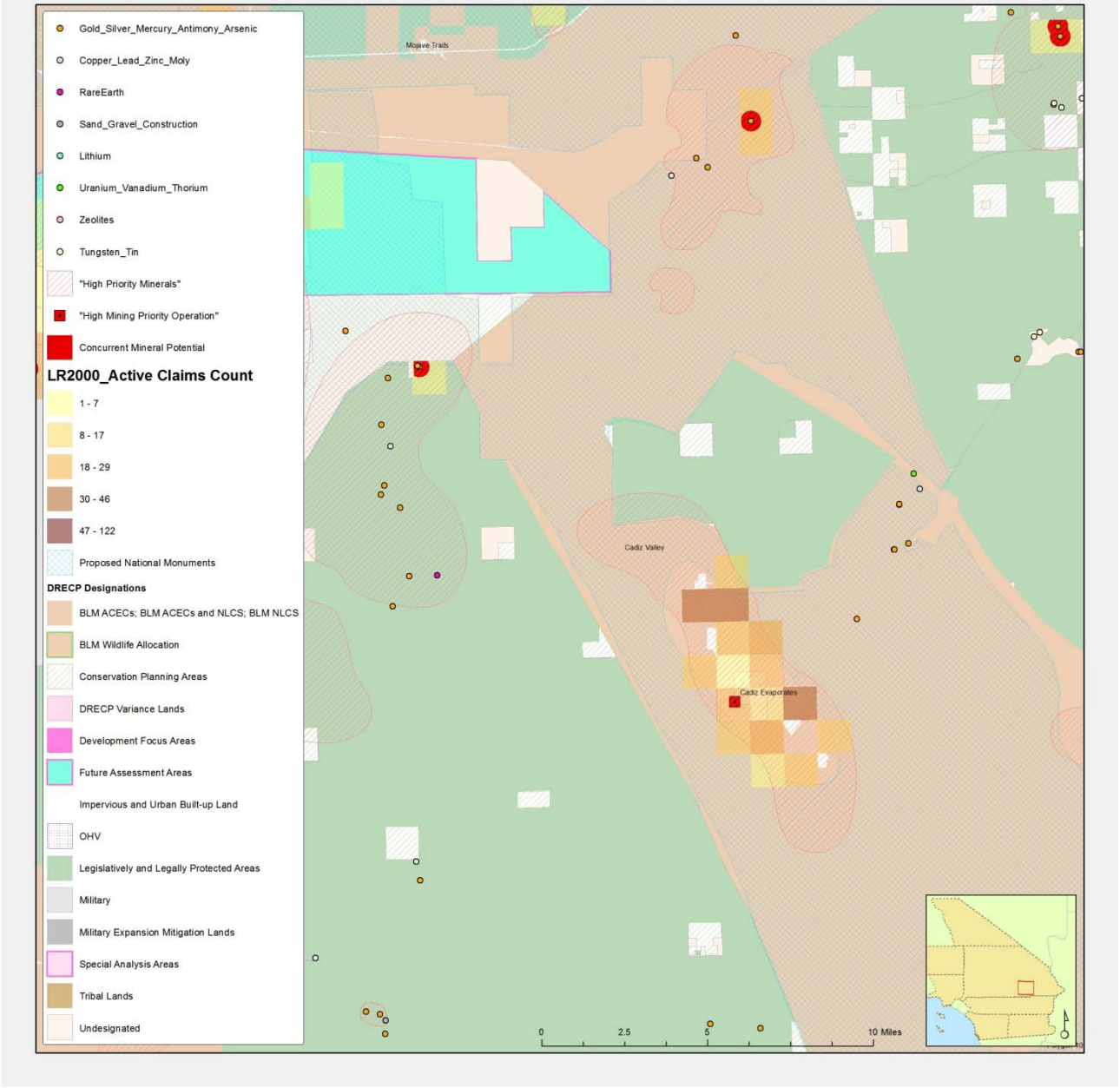


Figure 33. Area 23, Cadiz Valley.

Area 14 (Castle Mountains)

This includes an extensive area with high-density active mining claims, a high-potential mineral zone, and a potential for gold mineralization. Gold deposits are widely present in the region and elsewhere.

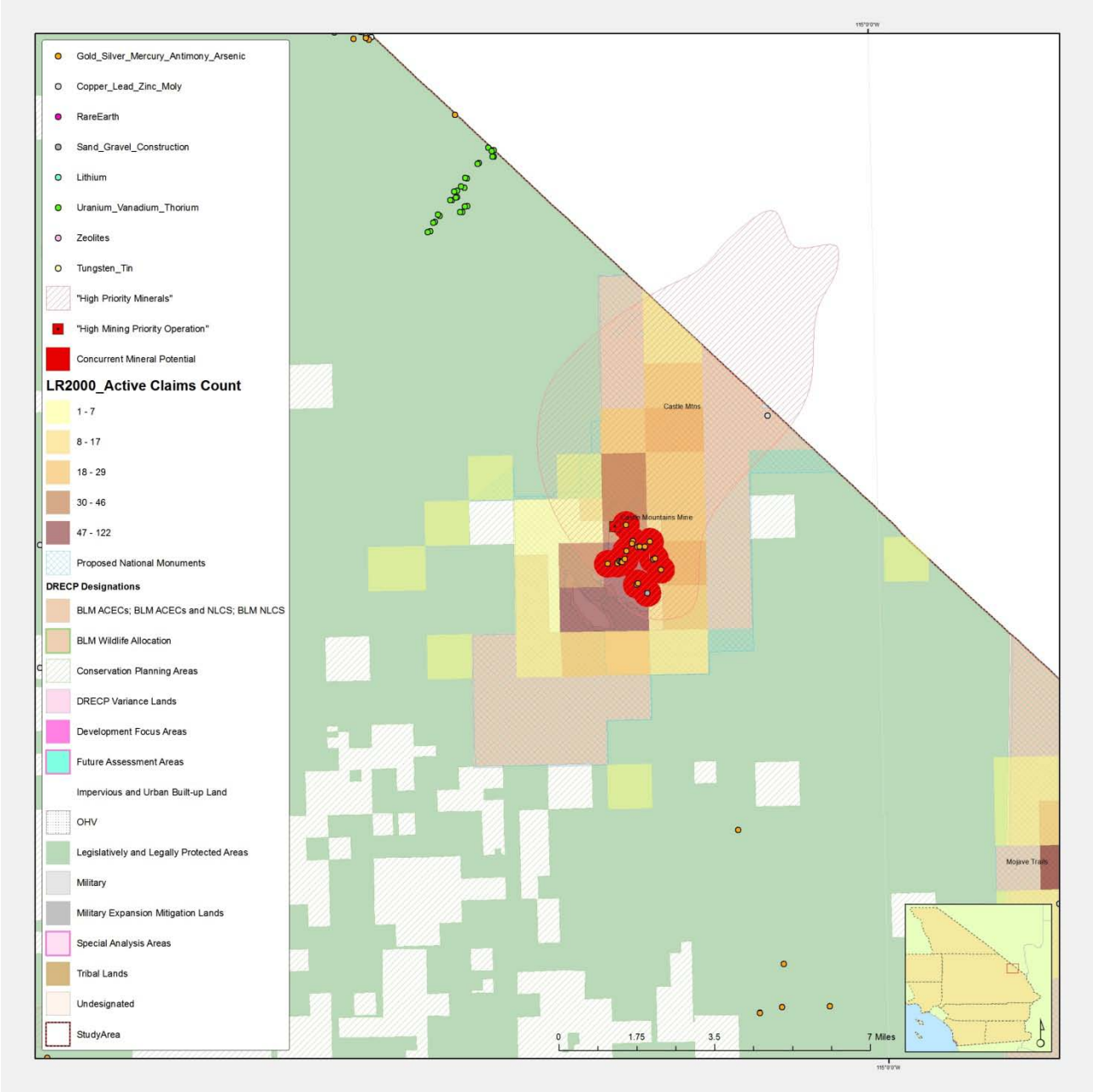


Figure 34. Area 14, Castle Mountains.

Area 6 (Castle Mountain Mine)

This includes an extensive area of moderate- to high-density active mining claims, a high-potential mineral zone, and known mineralization in the forms of precious and base metals, pumice, construction aggregate, and clay. All privately held lands (patented and unpatented lands) associated with a proposed gold mine have been excluded from the CDCRA boundary.

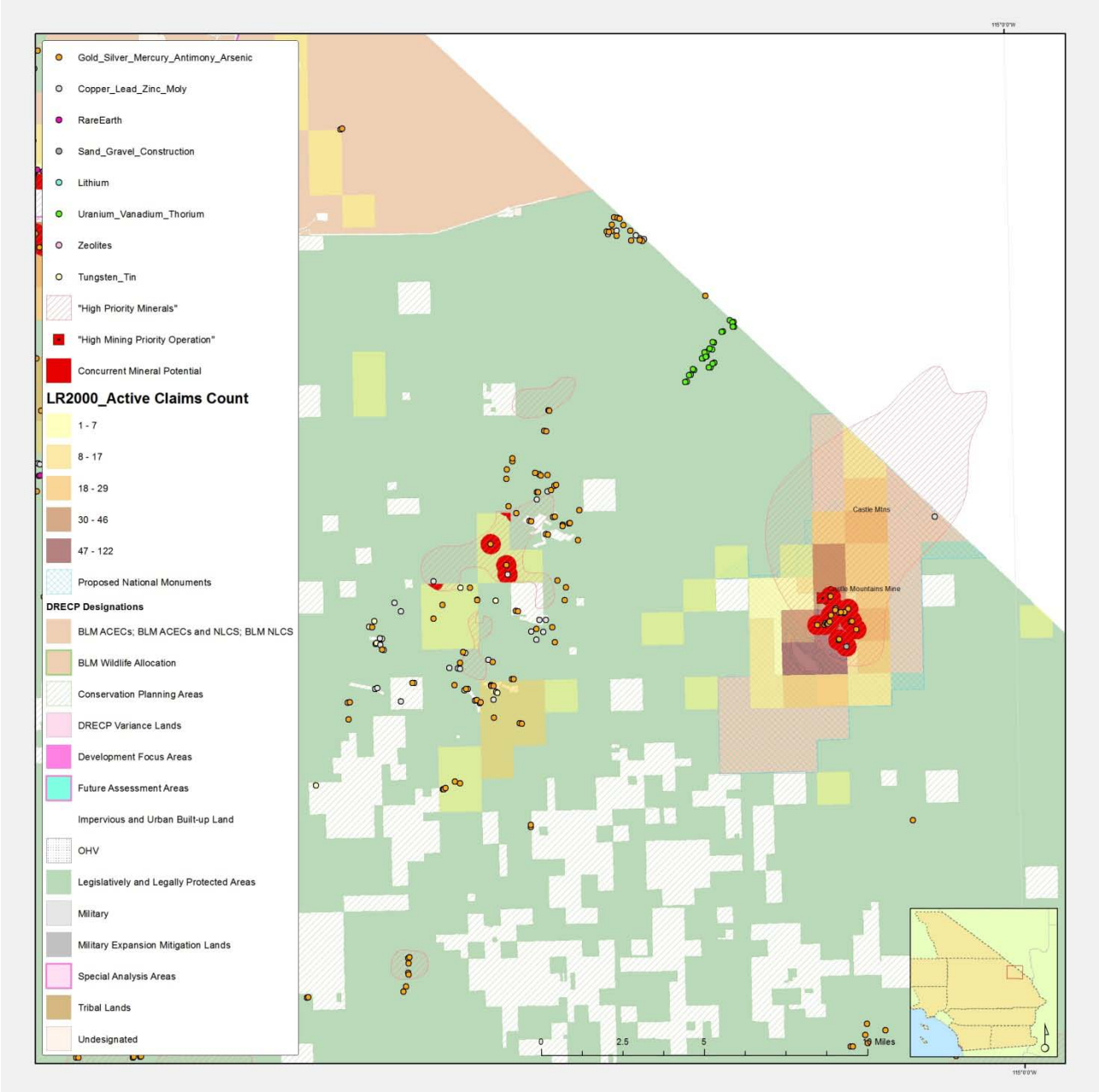


Figure 35. Area 6, Castle Mountain Mine.

Area 22 (Interstate 40 Corridor)

This area is located along Interstate 40 from its junction with Interstate 15 to its junction with US 95. Construction aggregate pits, deposits, and potential exist along much of this important transportation corridor. Ongoing maintenance and new infrastructure construction in this corridor may require additional aggregate resources.

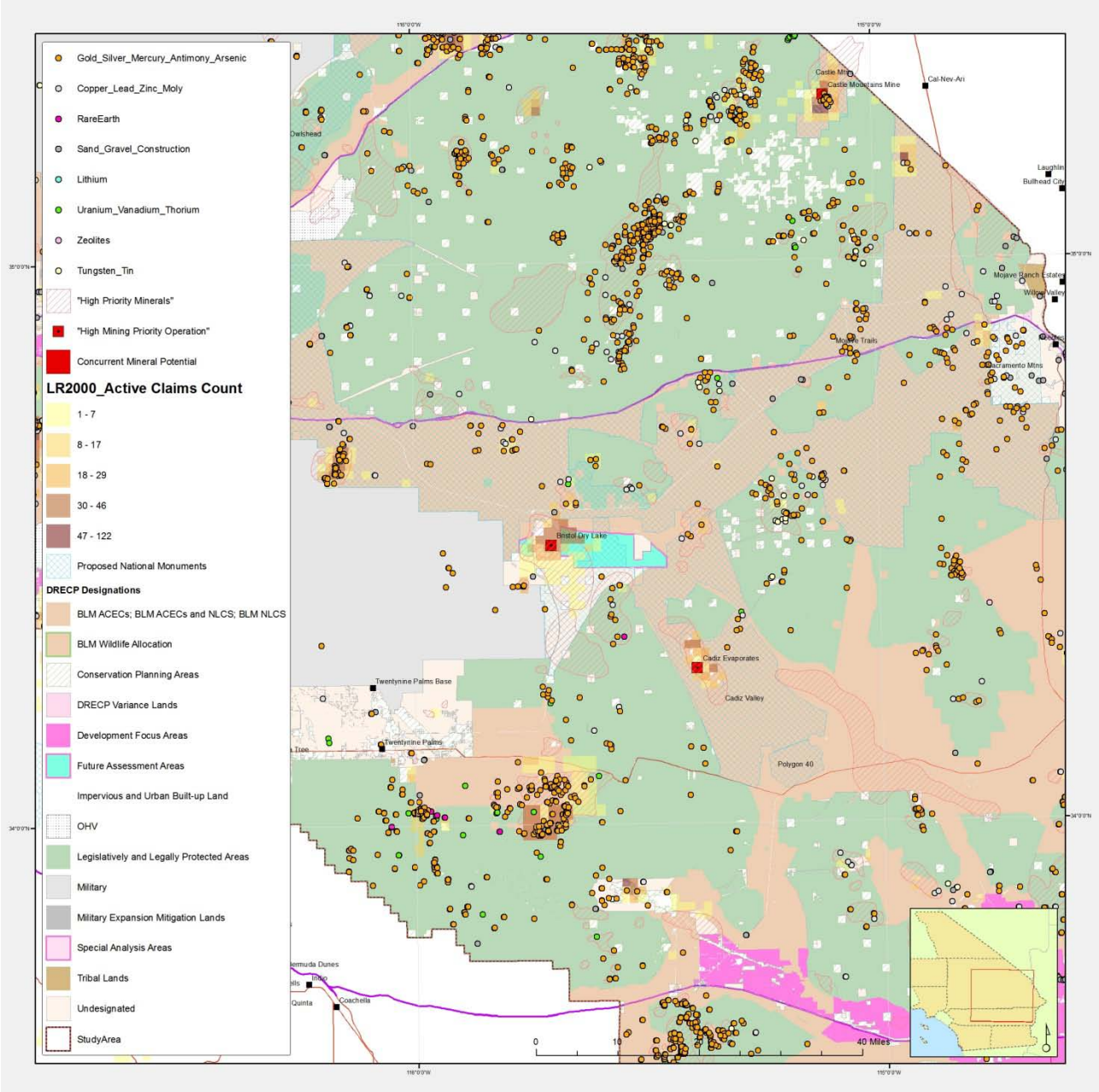


Figure 36. Area 22, Interstate 40 Corridor.

Potential Impacts on Future Mining Activities

The CDCRA will have minimal impacts on future mining activities in the California Desert due to the existence of extensive mineral potential outside of the proposed boundaries and the Act's preservation of existing valid mineral rights (many coinciding with high mineral potential zones. Uncertainty regarding additional mineral potential in the proposed CDCRA, juxtaposed with the clearly identified environmental and cultural values of these lands, argue that the tradeoffs between these two sets of values in favor of conservation would be a wise societal choice.

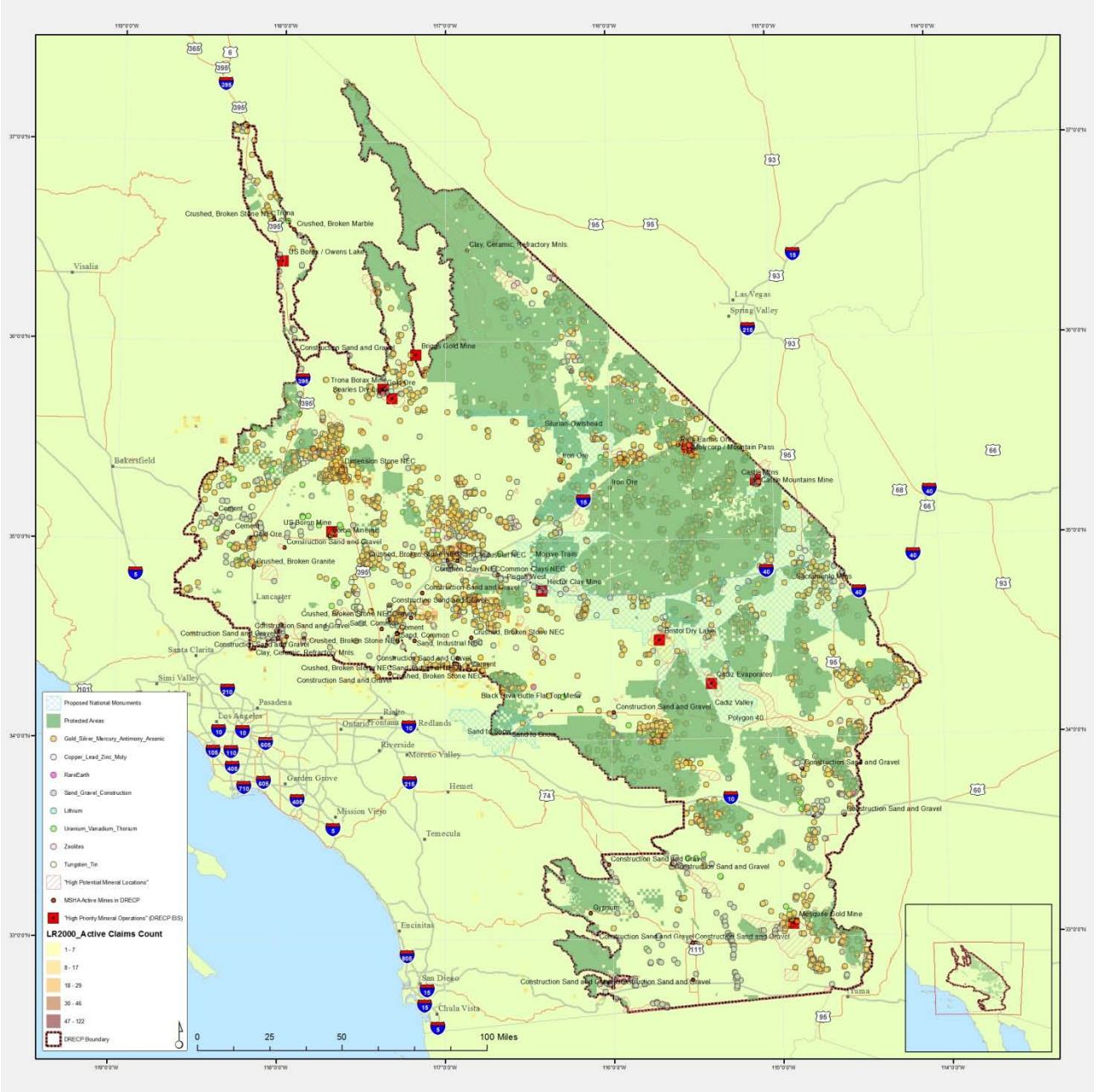


Figure 37. Areas of known mineralization, active mining claims, and high-potential mineral zones in study area.

As identified by known mineralization, active mining claims, and high-potential mineral zones (see Figure 37), extensive and abundant mineral potential exists outside of the proposed CDCRA boundaries in areas where mineral exploration and mining are allowed. This potential includes a wide range of mineral commodities, allowing for future mineral resource development to occur across the region where economic mineral deposits are discovered.

Construction aggregate and rare earth minerals are two commodities worthy of additional consideration regarding potential future mining impacts due to their importance locally and nationally.

Construction aggregate is critical for transportation infrastructure construction projects, such as highway and high-speed rail. This bulk commodity can be hauled economically up to 50 miles by truck, which means it is critical that adequate deposits of this mineral resource are present and able to be mined near transportation corridors, so they can be used in new construction and maintenance of existing roads and associated bridges, overpasses, drainage ways, and other structures. Extensive deposits of this important mineral resource are found in the study area, sourced from alluvial sand and gravel deposits and bedrock outcrops. To ensure adequate construction aggregate for future needs, buffers around the transportation corridors within the CDCRA area and existing aggregate mining operations have been excluded from the proposed boundaries.

As noted in the section on impacts on current mining operations, rare earth elements are essential for key industrial, energy, information, and military technologies. As such they are important for the national economy and for security reasons. A significant rare earth mineral deposit is present in the Mountain Pass area and has been mined extensively. Additional deposits may be present in the area immediately surrounding the existing mine. The CDCRA boundaries specifically exclude the area surrounding the mine, allowing for additional mineral exploration and mining. Furthermore, the recognition of valid existing mining rights within the proposed boundaries allows for potential future development of rare earth mineral deposits on known prospective formations within the proposed boundaries.

The area within the proposed boundaries for the CDCRA likely includes additional potential for other mineral commodities, including limestone, clay, zeolites, decorative rock, base metals, precious metals, and rare earth elements, among others. A large proportion of this mineral potential exists in areas with active mining claims. As the CDCRA specifically recognizes all existing valid mining claims and mineral rights within the proposed boundaries, the legislation would not interfere with future mineral exploration or mining activities on these claims.

Furthermore, extensive prospective areas for these and other mineral commodities exist elsewhere in adjacent locations in the California Desert, regionally, and in neighboring states (see for example the US Geological Survey Circular 1178, *1998 Assessment of Undiscovered Deposits of Gold, Silver, Copper, Lead and Zinc in the United States*).

These facts along with the uncertainty regarding additional mineral potential in the proposed CDCRA, juxtaposed with the clearly identified environmental and cultural values of these lands, argue that the tradeoffs between these two sets of values in favor of conservation would be a wise societal choice.

Summary/Conclusions

Mining plays a small economic role in the 7 desert counties of California, and that role has remained relatively constant for the past 4 decades. Mining does appear to play a somewhat more important economic role in the desert portions of the 7 counties considered in this analysis, where the direct and indirect economic effects of mining employment are experienced by a smaller total desert population. Using industry multipliers, the potential influence of mining on income and nominal GDP is deemed highest for Kern and Inyo counties, and next highest for San Bernardino, Riverside, and Imperial counties (Imperial County's economic structure is somewhat different than the other counties, in that it includes a significant agricultural component). Kern, Inyo, and San Bernardino counties likely experience the most contributions and impacts to their economies, and may have most potential for possible conflicts with conservation and resource initiatives. The economies of San Diego and Los Angeles counties appear much less influenced by the economic impacts of mining activities, and these counties could potentially be excluded from further study.

The locations of larger, site-specific mining operations (such as the large rare earth mine and the numerous aggregate operations) tend to concentrate mining employment in certain areas that are relatively permanent and predictable, allowing the potential for planning to proactively adjust or propose boundaries for conservation or renewable energy development that take into account these known areas of concentration. Less easily planned for are considerations for less locatable resources whose potential for future extraction is uncertain based on unknown future global trends influenced by demand and supply.

Further investigations into the ways in which proposed initiatives such as the CDCRA have the potential to impact areas in the California Desert with mineral resource potential can utilize the information presented in this report and the mapped locations of existing, active mining operations to look specifically at the potential of a proposal's impact on: (1) existing mining activities (mining operations and claims); and (2) where possible, on future mining activities. Future activities can be assumed in some instances where well-established, existing mining operations have access to decades of resources; in other instances, such prediction is difficult.

While all attempts were made to present the most accurate and precise data here, caveats about data and data use remain in place. Aggregation and disaggregation of mining employment data and data unavailable due to privacy concerns at the county level made inference of some of the economic impacts of mining difficult or impossible. Where appropriate, mapping of locations and known population distribution proportions were used to supplement tabular data to allow better visualization of the extent of known mining operations. The state level multipliers derived from the National Mining Association report that were used at the county level will have the tendency to overemphasize the economic impacts of mining activities on the county; thus, the values presented in Tables 4 and 5 are likely a bit overinflated. However, the trends they reflect in terms of the economic impacts on the different counties are likely valid, and should assist in informing decision making and policy in desert areas where development or conservation activities are proposed.

Our assessment of the CDCRA's impact on current and future mining activities indicates that the CDCRA provides ample opportunities for mineral resource development. As noted, past conservation designations of the California Desert, which have been significant, have had little impact on mining and the region's economy. This lack of impact is due in large part to the conservation legislation's alignment with past and current economic trends, which are tied to amenity-based growth.

The study finds that mining plays a small economic role in the 7 desert counties of California and that role has remained relatively constant for the past 4 decades. Conversely, over the same time period, the California Desert has experienced steady growth in population, employment, and personal income. This growth is largely driven by businesses and demographic changes that benefit directly from preserving the desert.

The study concludes that the California Desert Conservation and Recreation Act of 2015 is compatible with ongoing mining activities and allows for future development of critical and competitive mineral resources. Consequently, the protective designations proposed under the legislation likely represent the highest and best economic use of those public lands.

Appendix A. Employment Growth Trends for 7 Desert Counties.

Detail on employment growth trends for the periods 1970-2000 and 2001-2013 for each of the 7 desert counties are provided in Appendix A. Employment is reported by place of work. The break in time frames is due to the shift by the US Department of Commerce, Bureau of Economic Analysis from using the SIC (Standard Industrial Classification) coding system of reporting employment sectors to the NAICS (North American Industrial Classification System).

Source: US Department of Commerce, Bureau of Economic Analysis, Tables CA25 and CA25N. Headwaters Economics county measures reports.

Note: Missing data on some charts is due to data that is not disclosed at that reporting level due to privacy reasons.

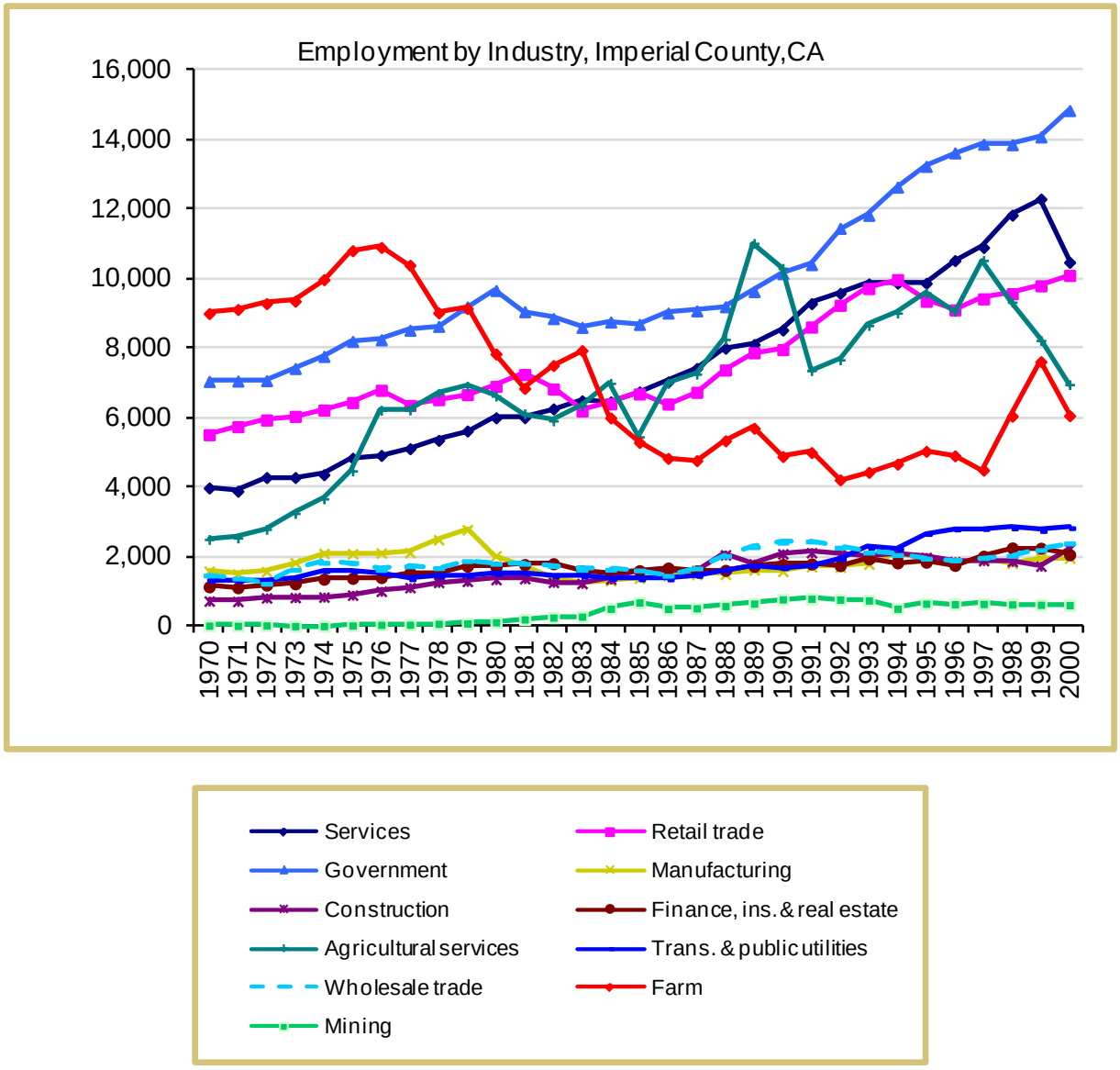


Figure A1. Imperial County Employment Trends, 1970-2000.

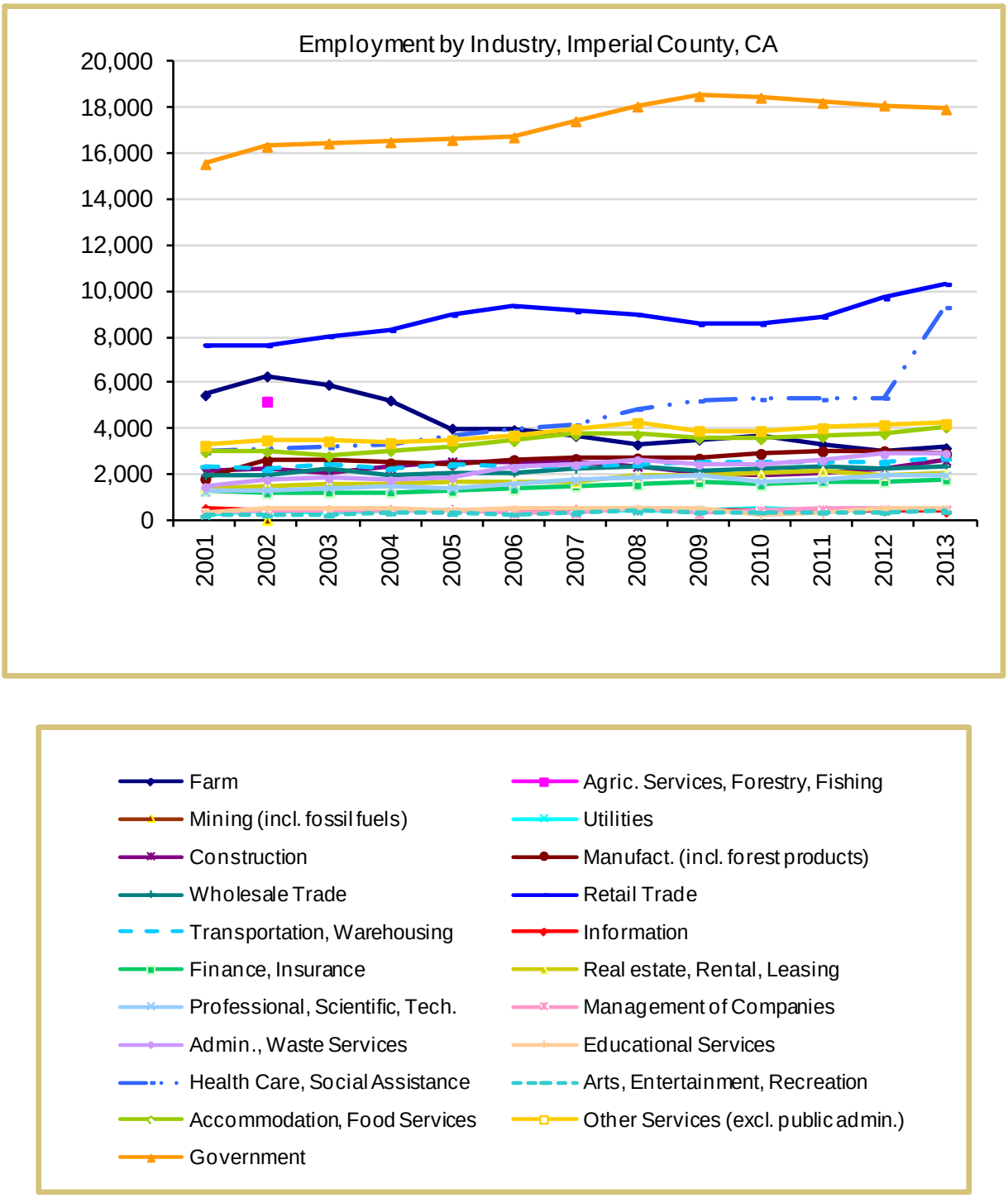


Figure A2. Imperial County Employment Trends, 2001-2013.

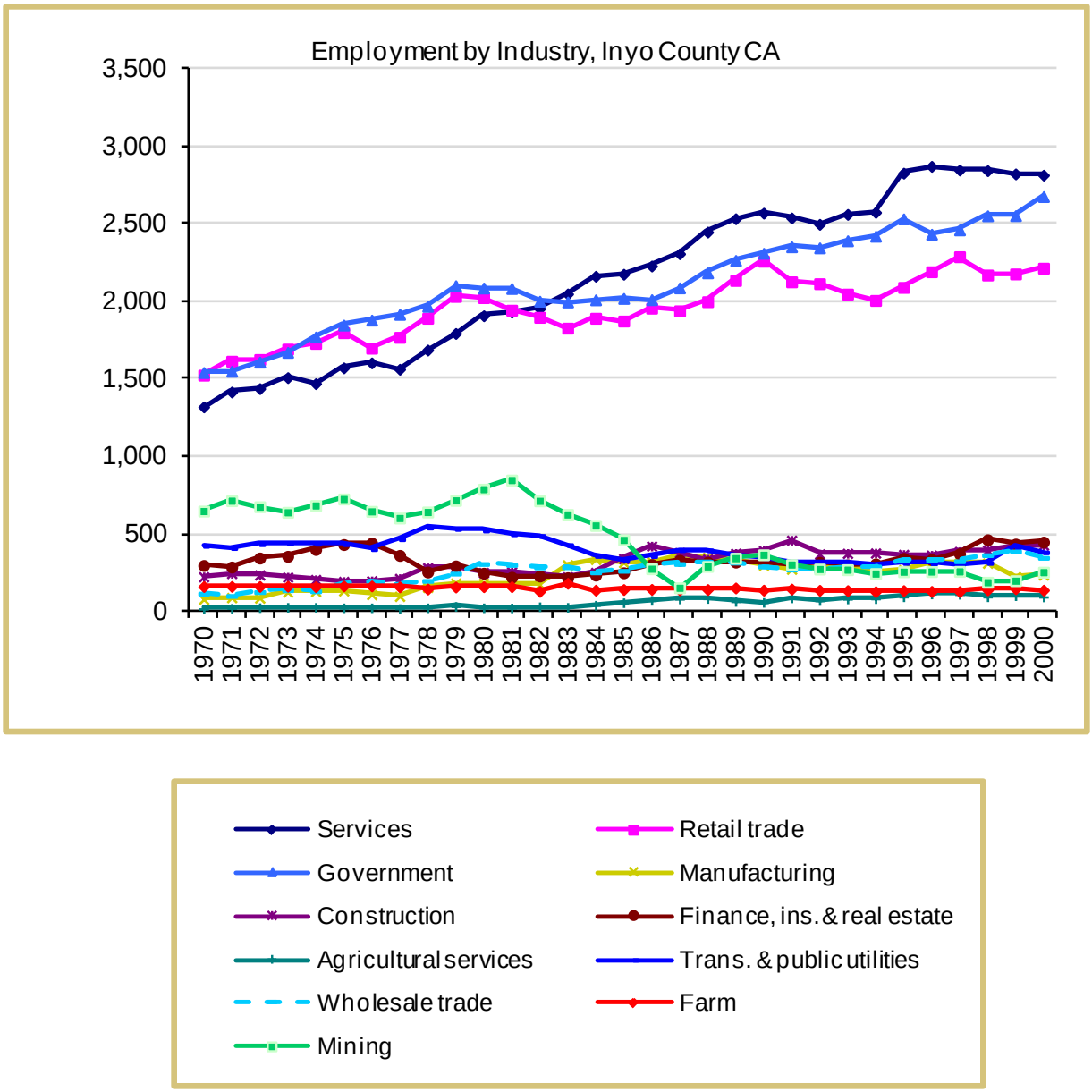


Figure A3. Inyo County Employment Trends, 1970-2000.

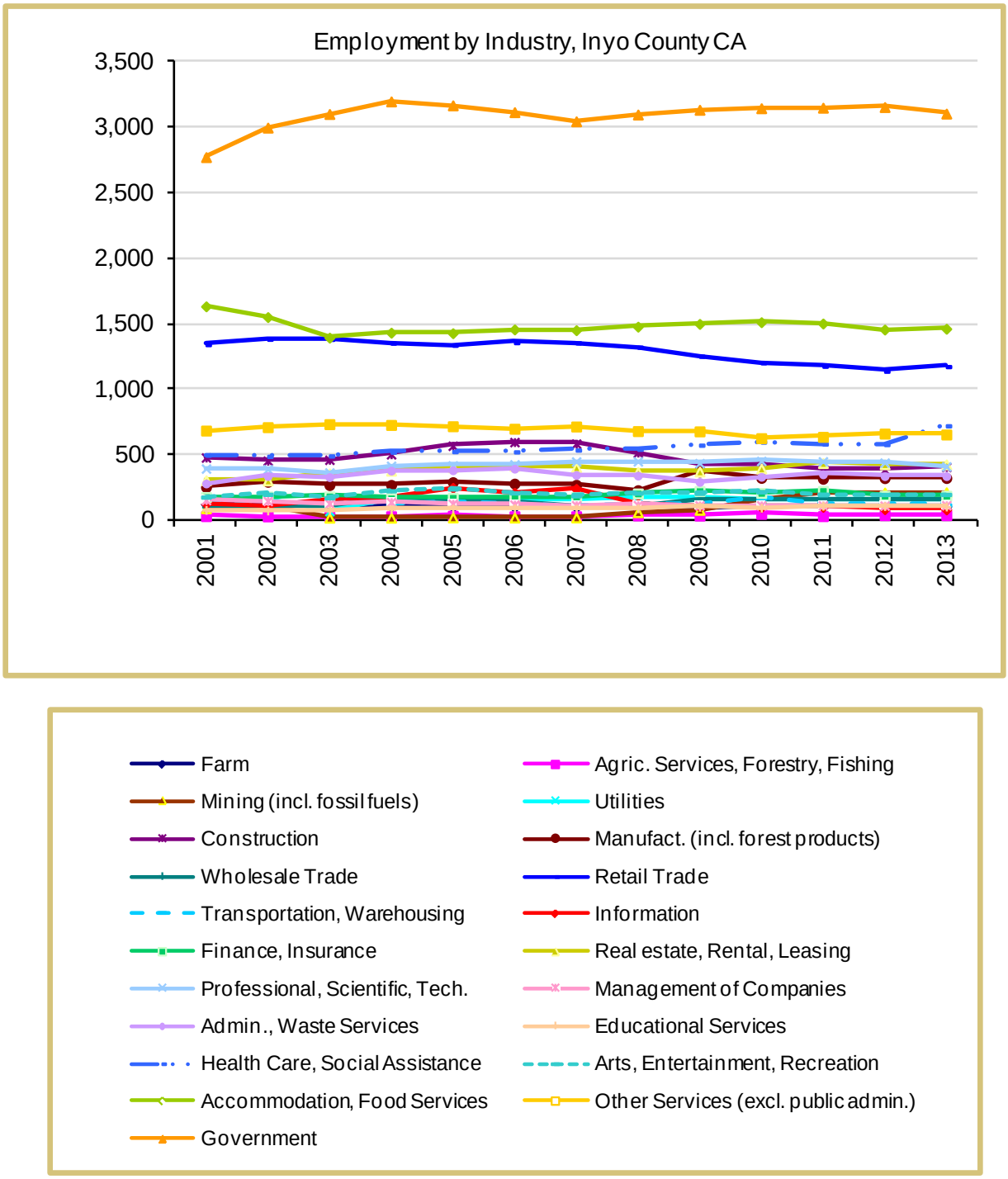


Figure A4. Inyo County Employment Trends, 2001-2013.

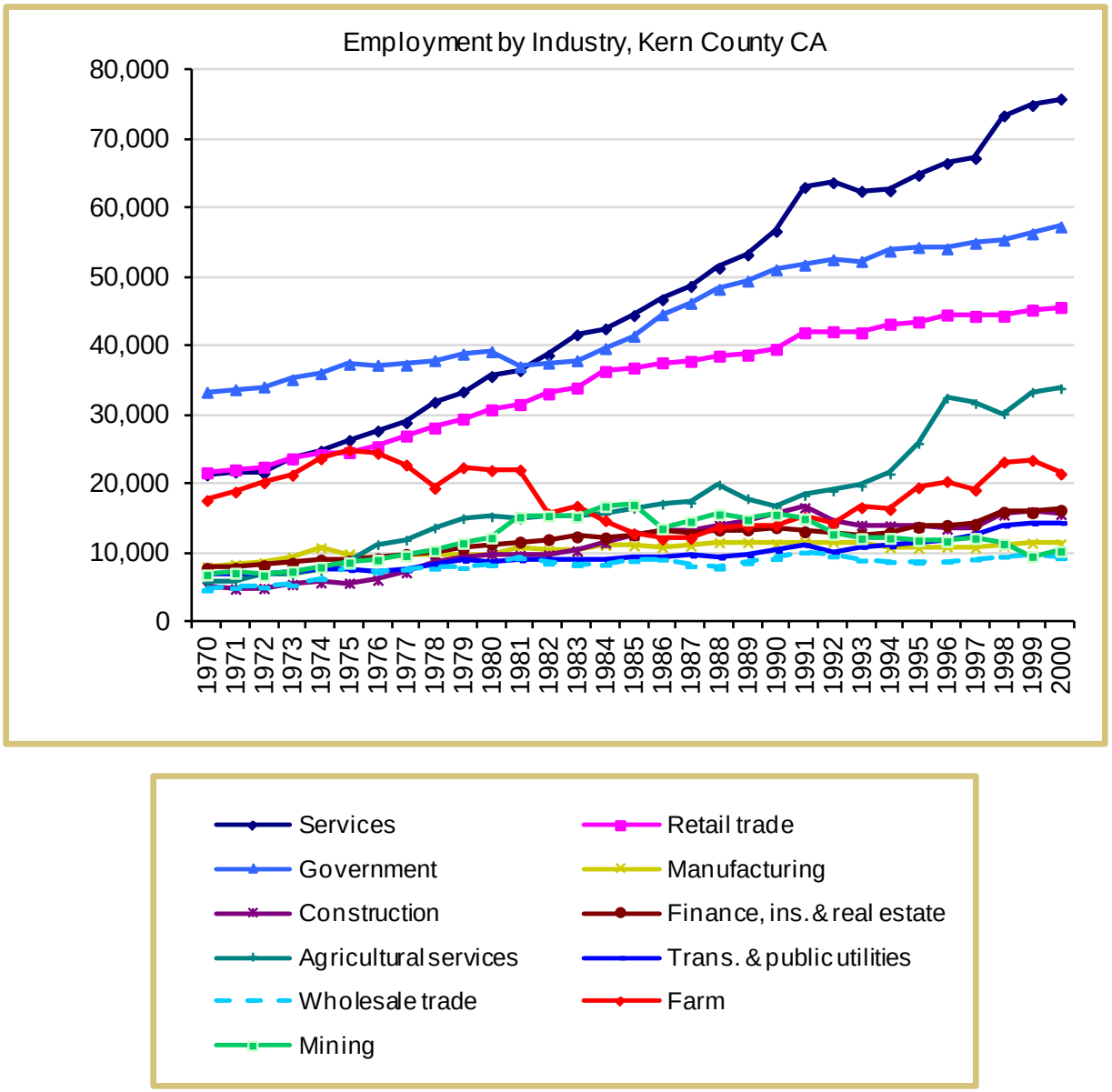


Figure A5. Kern County Employment Trends, 1970-2000.

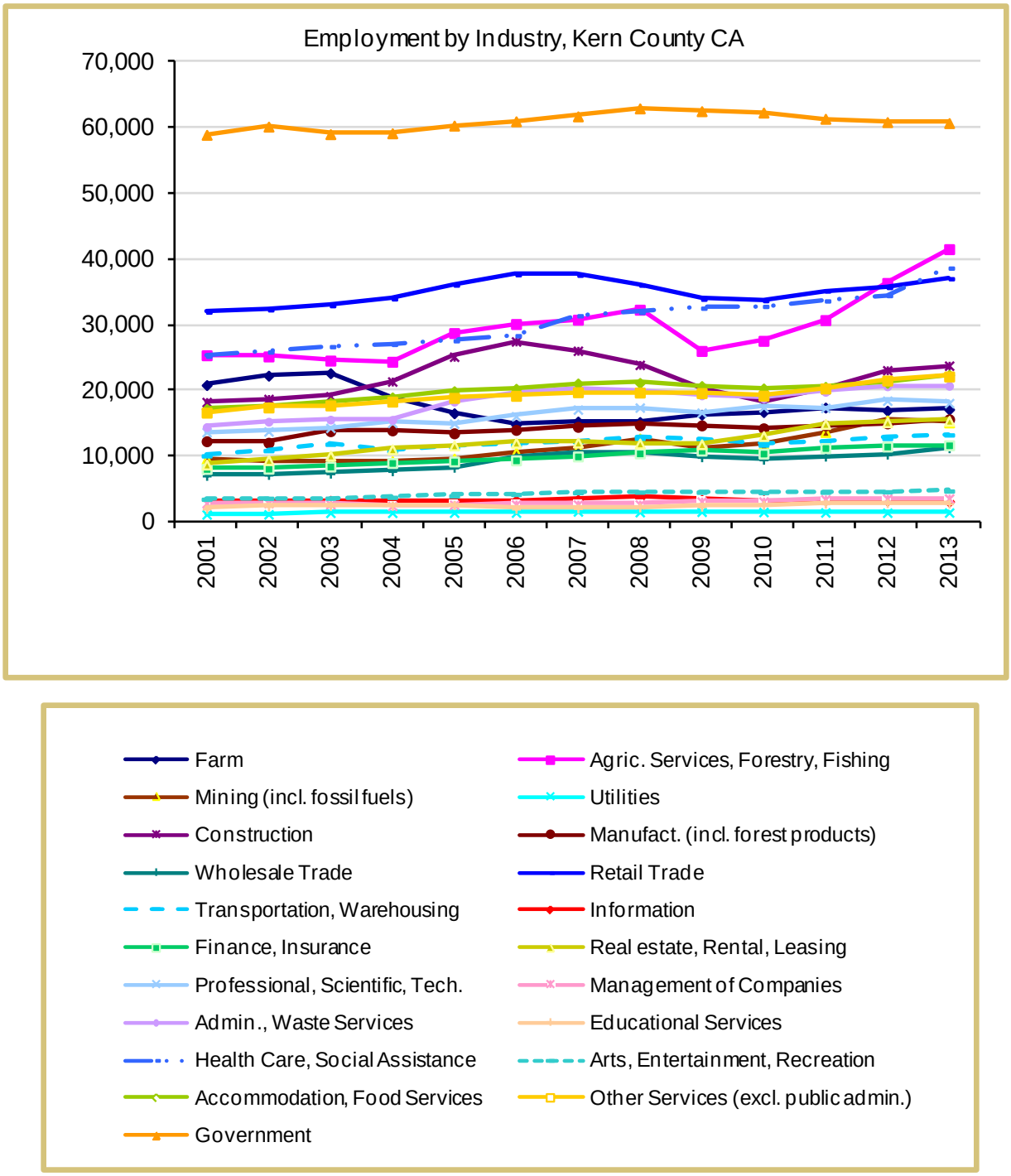


Figure A6. Kern County Employment Trends, 2001-2013.

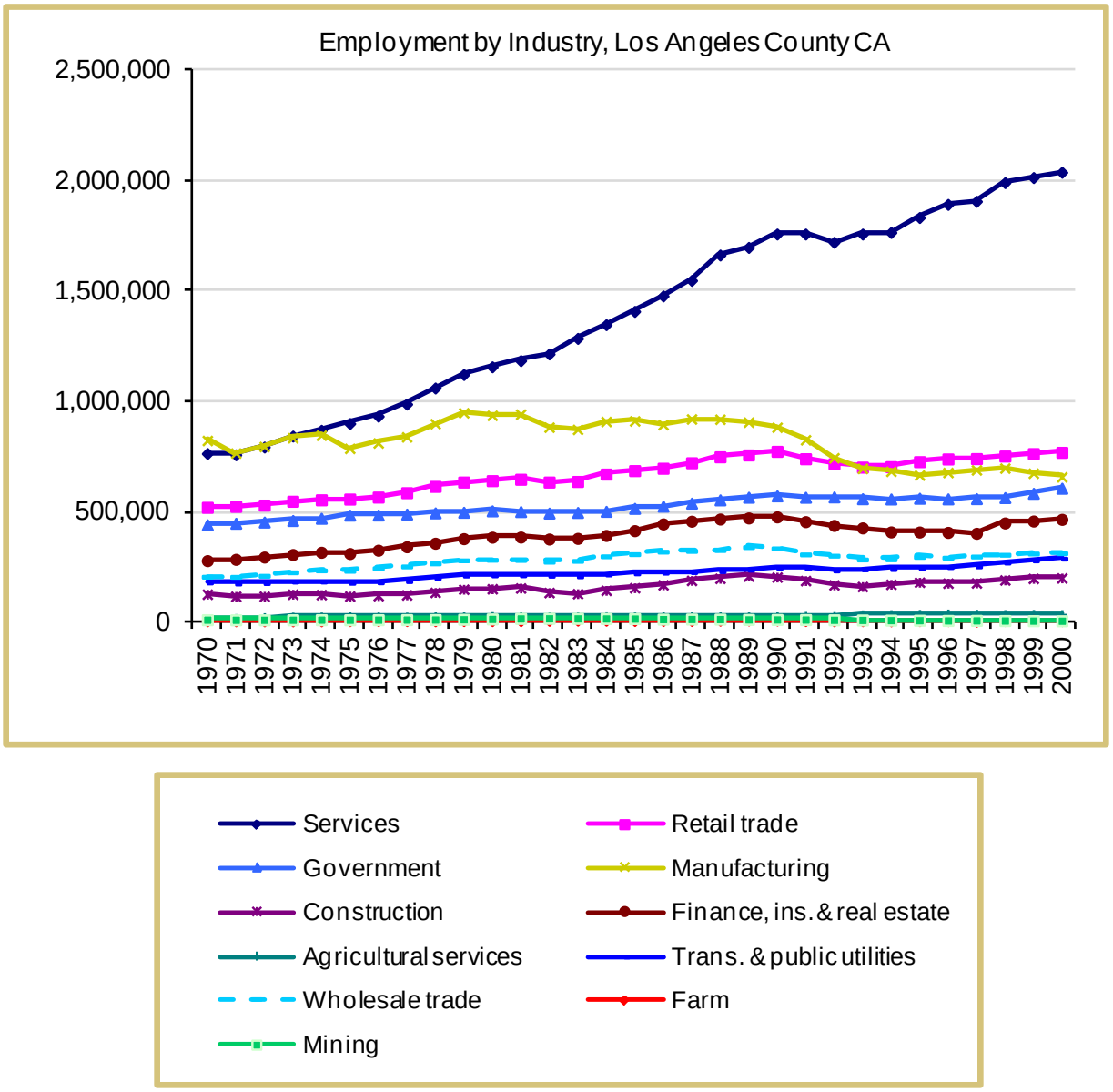


Figure A7. Los Angeles County Employment Trends, 1970-2000.

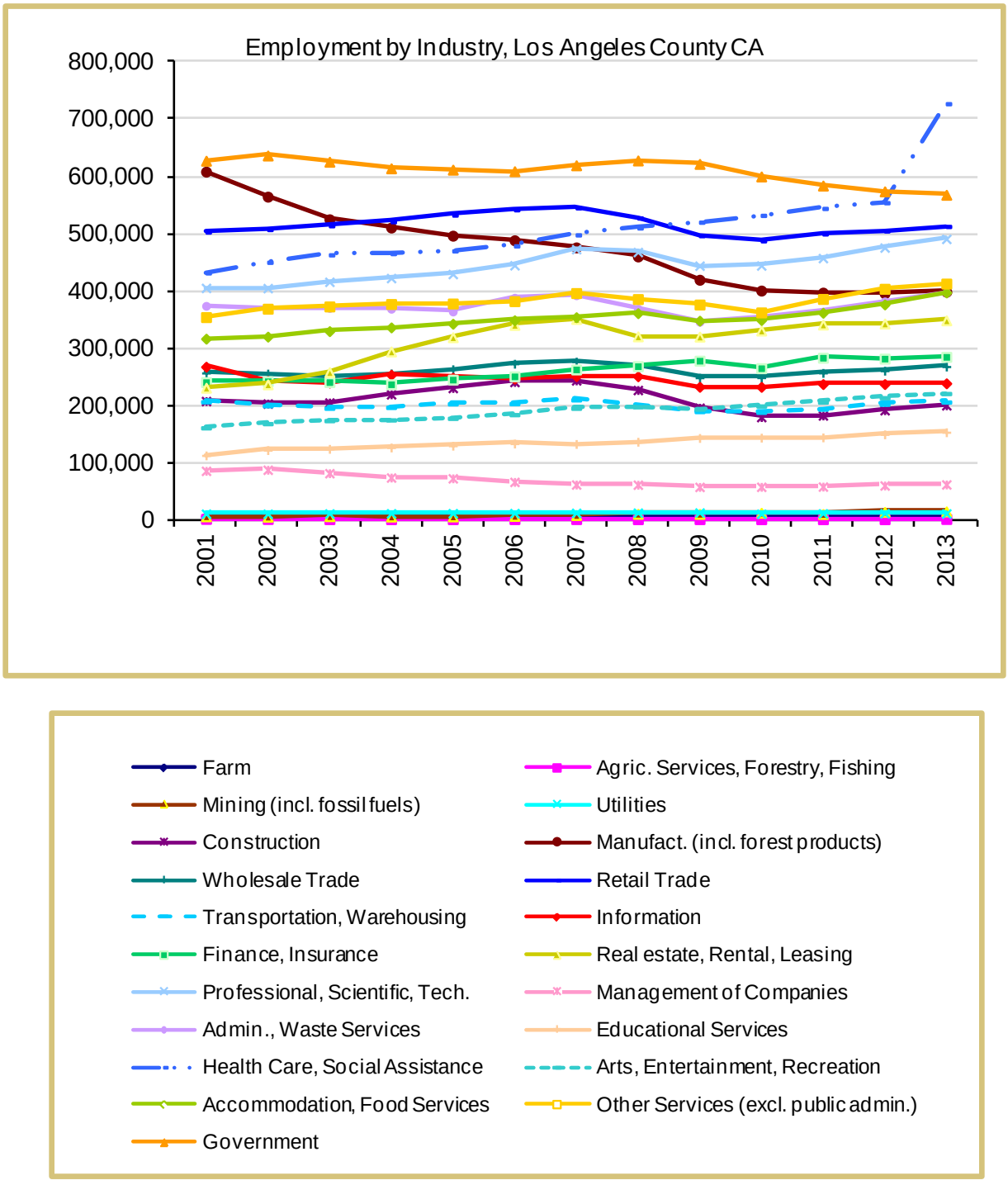


Figure A8. Los Angeles County Employment Trends, 2001-2013.

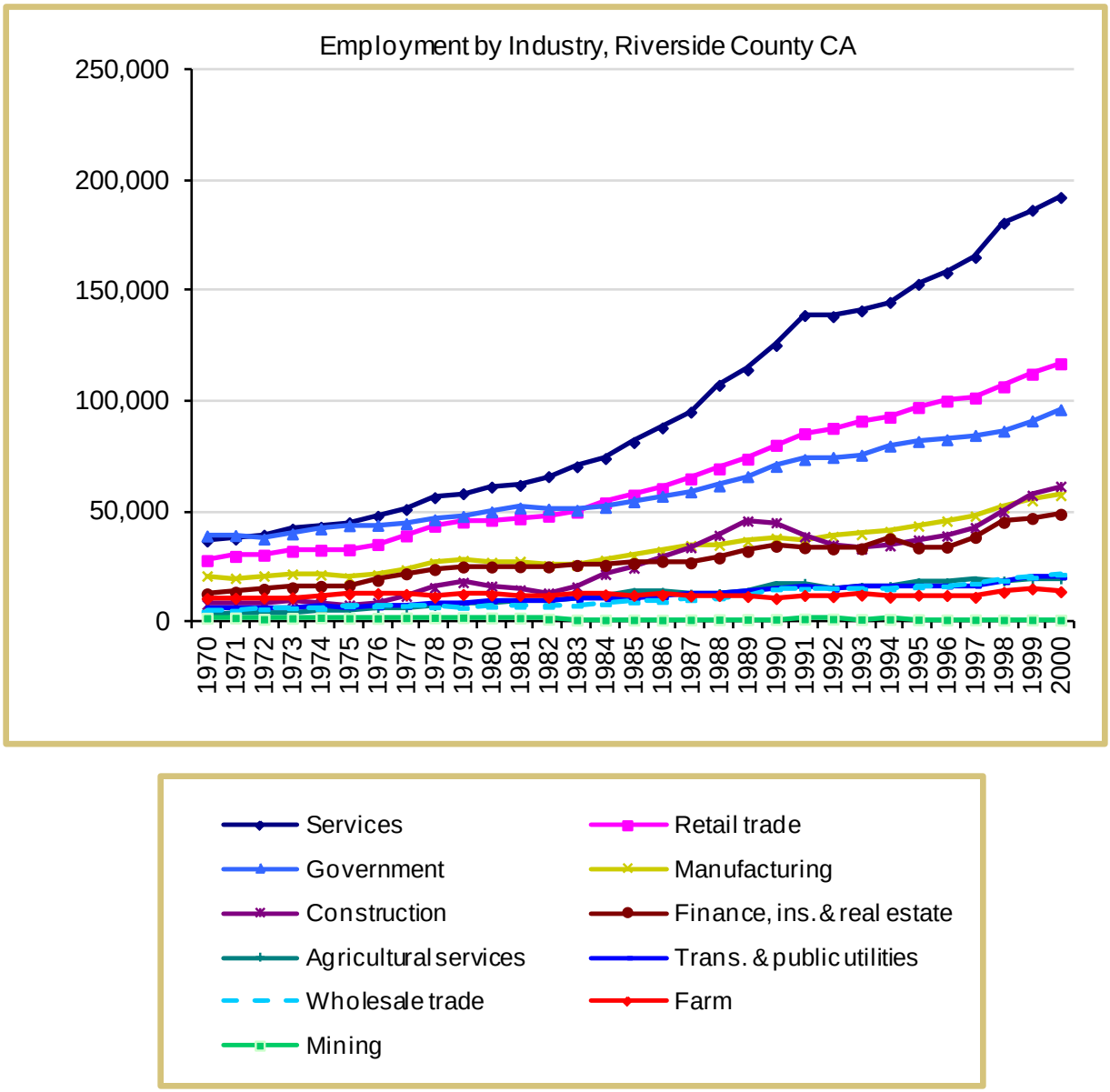


Figure A9. Riverside County Employment Trends, 1970-2000.

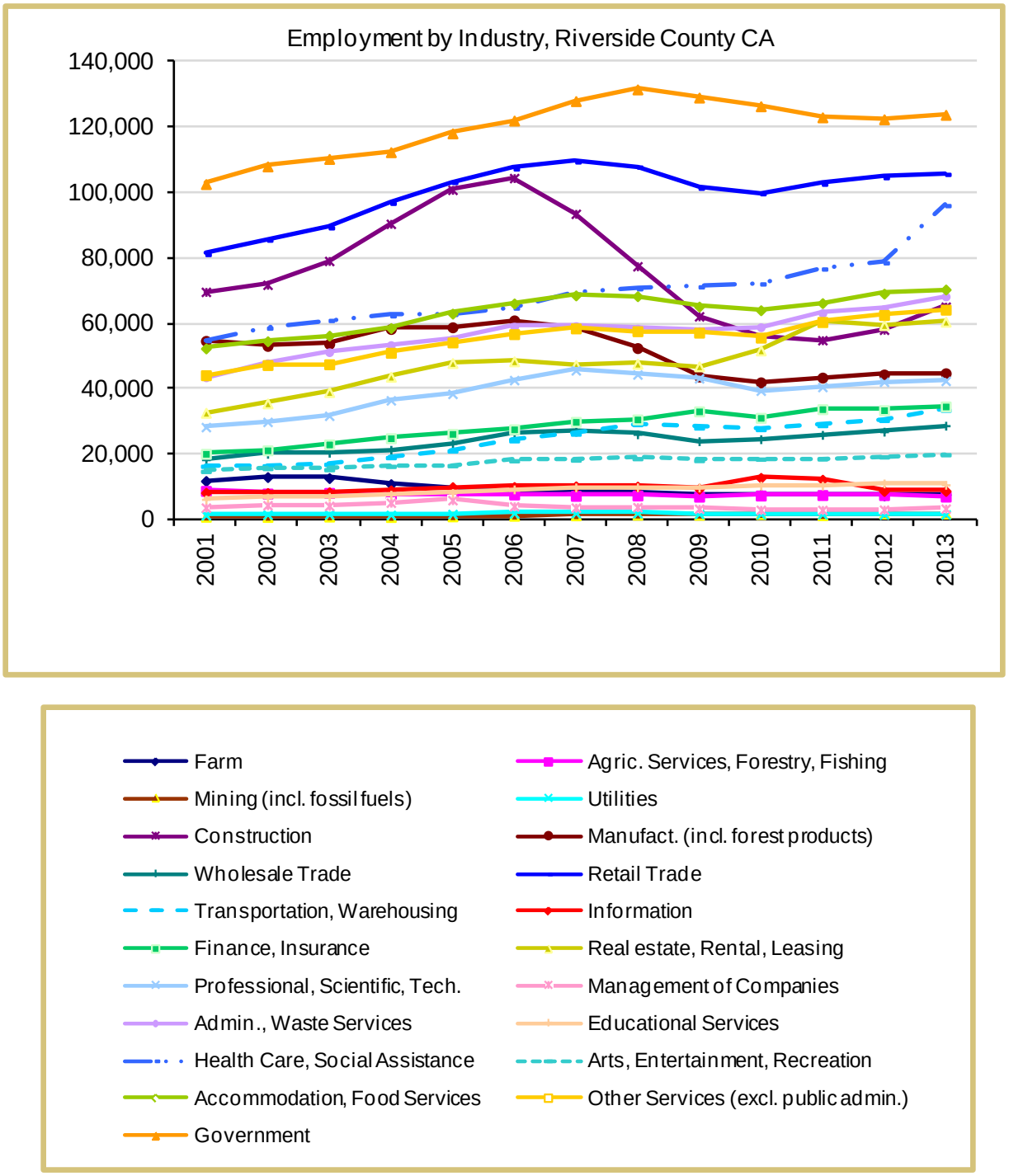


Figure A10. Riverside County Employment Trends, 2001-2013.

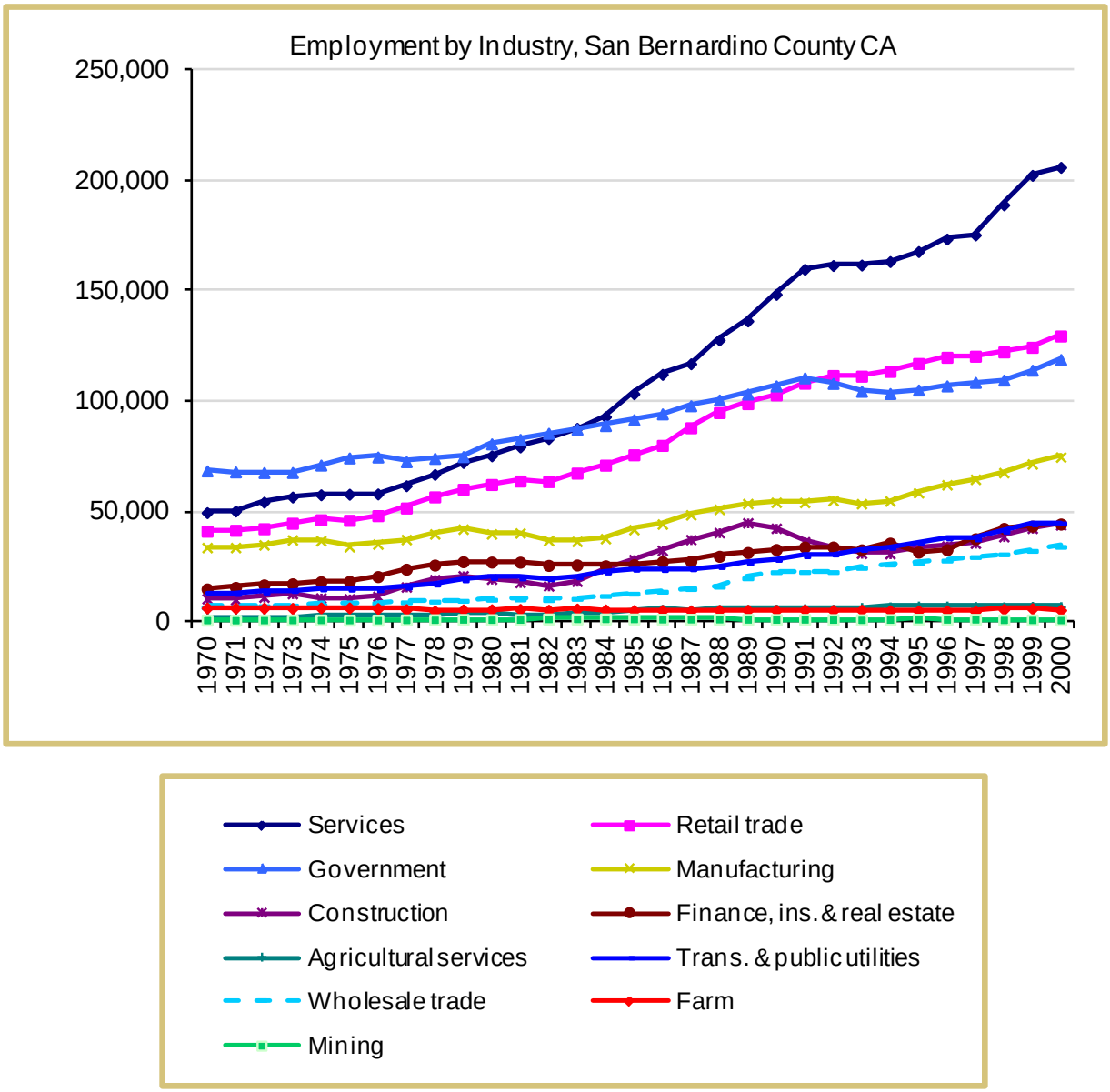


Figure A11. San Bernardino County Employment Trends, 1970-2000.

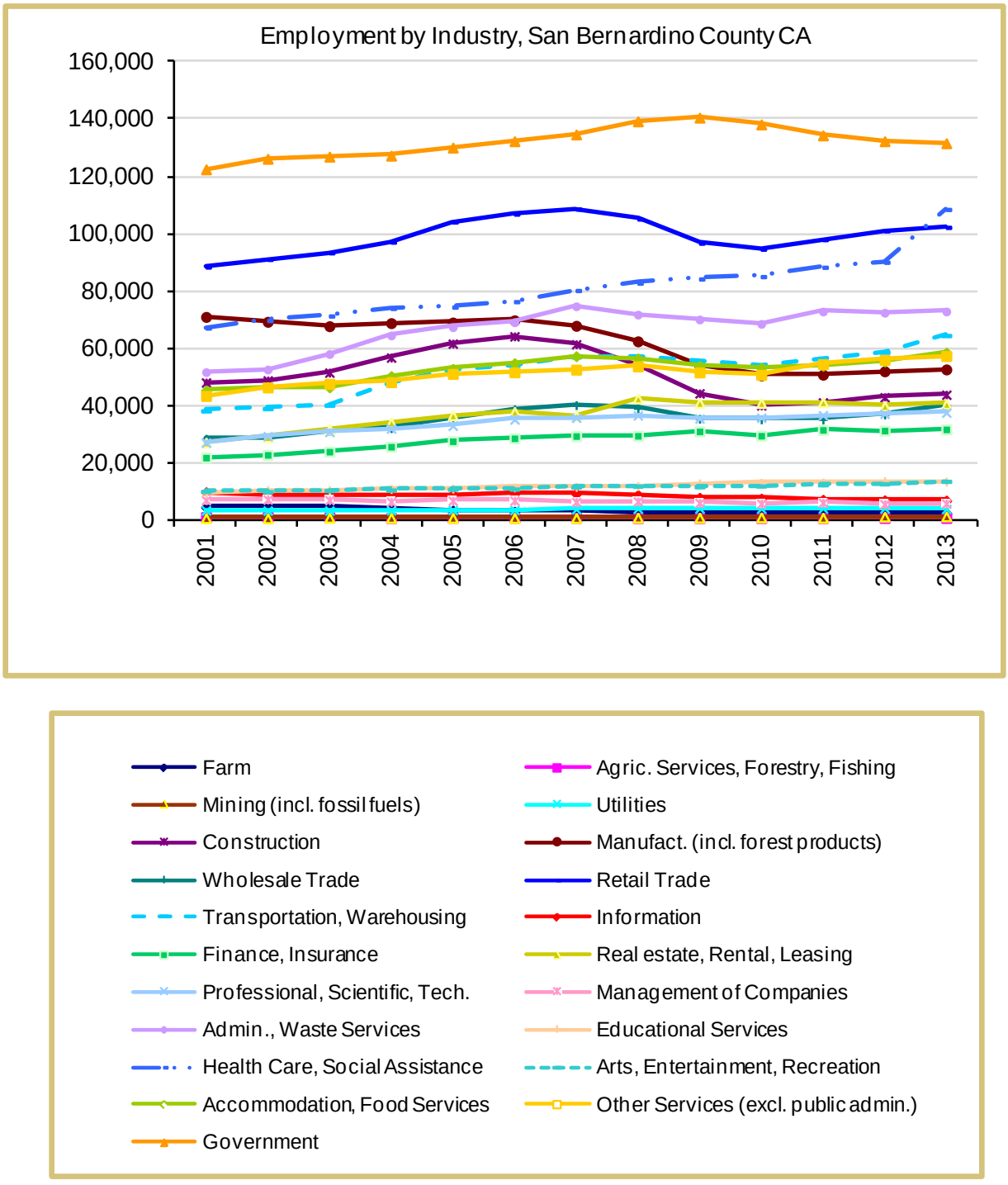


Figure A12. San Bernardino County Employment Trends, 2001-2013.

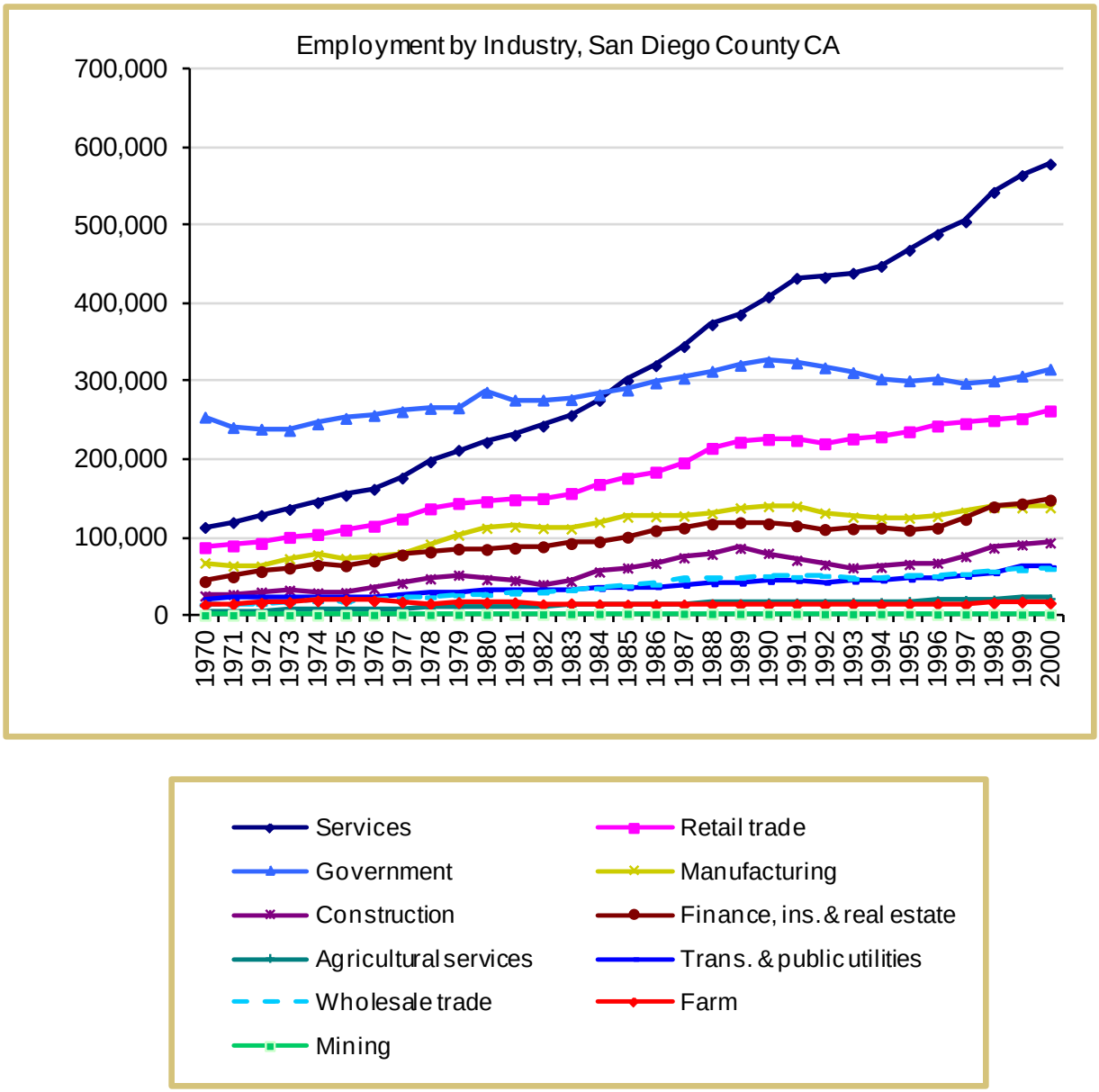


Figure A13. San Diego County Employment Trends, 1970-2000.

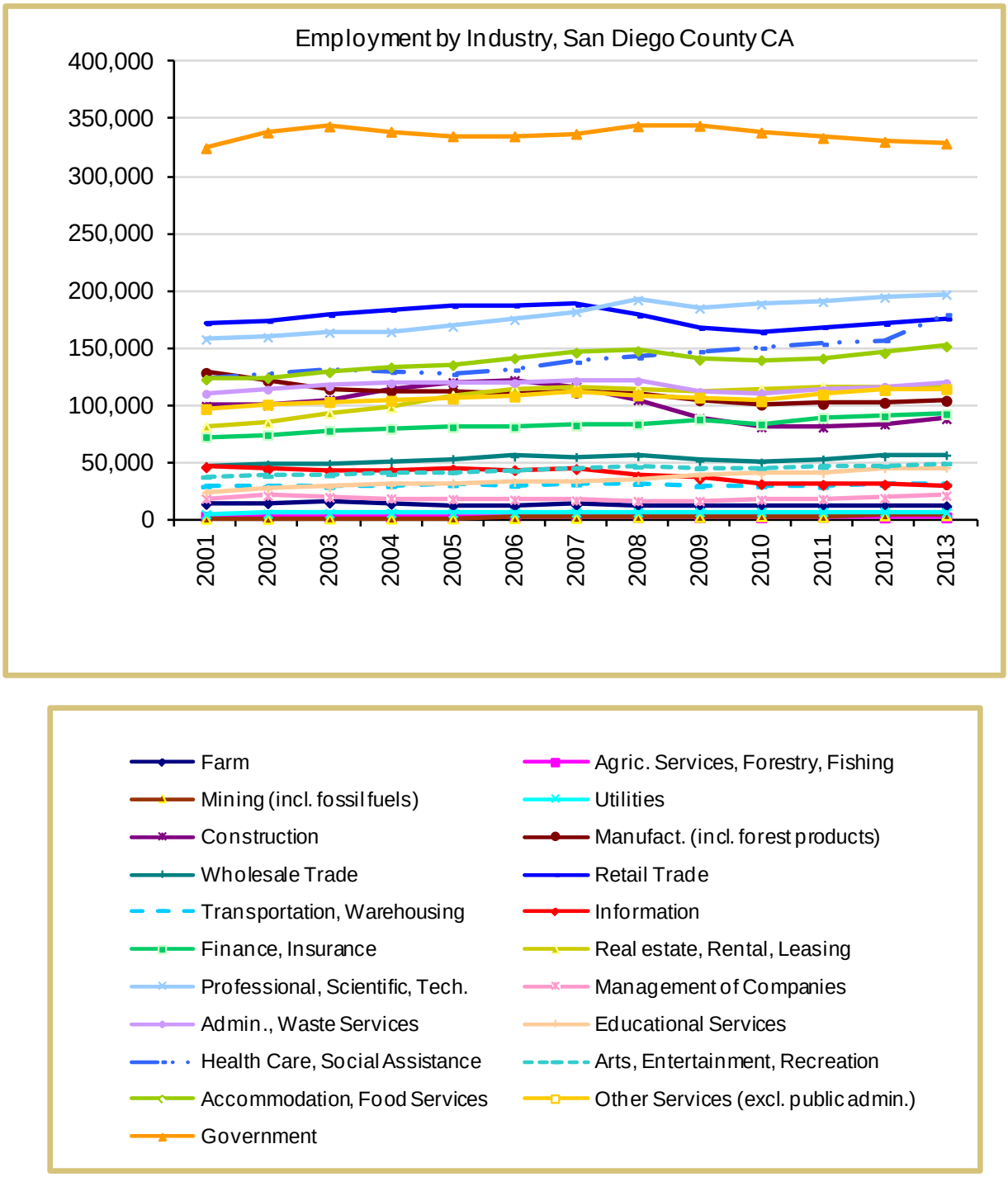


Figure A14. San Diego County Employment Trends, 2001-2013.

Appendix B. Personal Income Labor Earnings Trends and Income Sources for 7 Desert Counties.

Detail on personal income trends for the periods 1970-2000 and 2001-2013 for each of the 7 desert counties are provided in Figures B1 – B14. These graphs reflect personal income labor earnings for these two time periods. The break in time frames is due to the shift by the US Department of Commerce, Bureau of Economic Analysis from using the SIC (Standard Industrial Classification) coding system of reporting personal income sectors to the NAICS (North American Industrial Classification System).

Note: Missing data on some charts is due to data that is not disclosed at that reporting level due to privacy reasons.

Personal Income by Industry Trends Source: US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts, Tables CA05 and CA05N. Headwaters Economics county measures reports.

To get a better idea of which sectors were contributing to employment and income, the income sources including non-labor income for each of the seven counties were examined over the period 1969 – 2013 and are shown in Figures B15 – B21.

Income Sources Data Source: Derivations from US Department of Commerce, Bureau of Economic Analysis, Regional Economic Accounts.

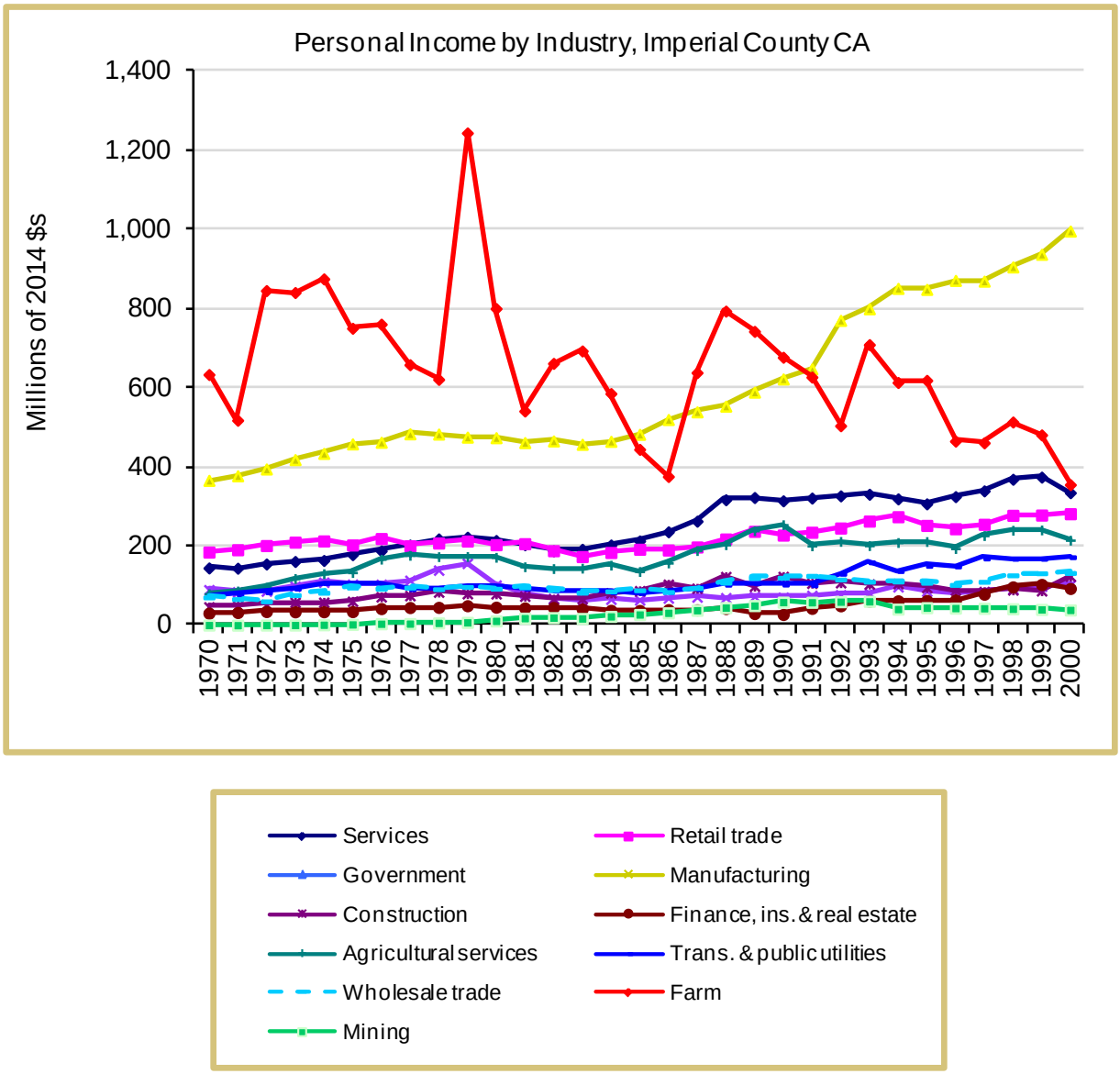


Figure B1. Imperial County Personal Income Labor Earnings Trends, 1970-2000.

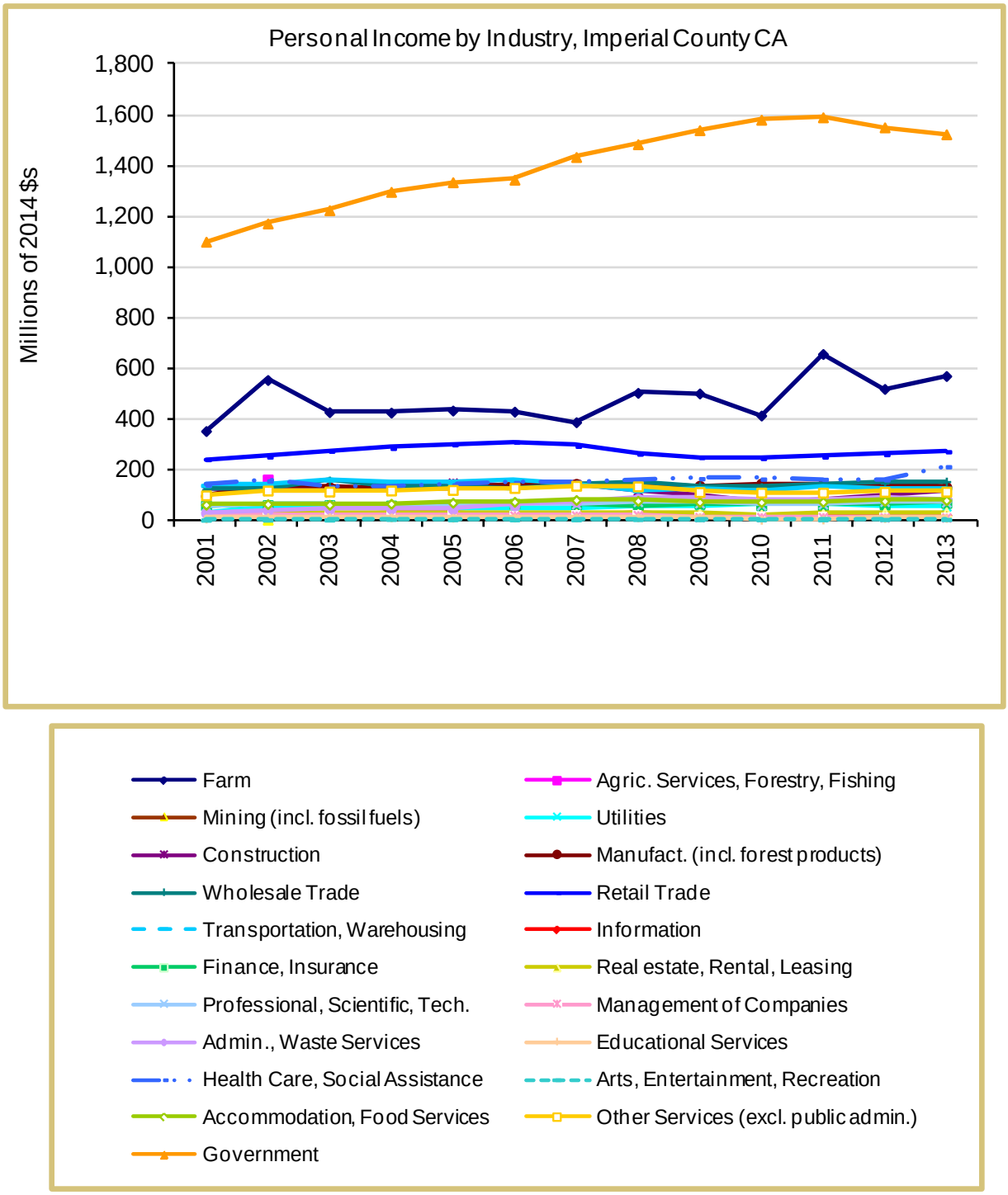


Figure B2. Imperial County Personal Income Labor Earnings Trends, 2001-2013.

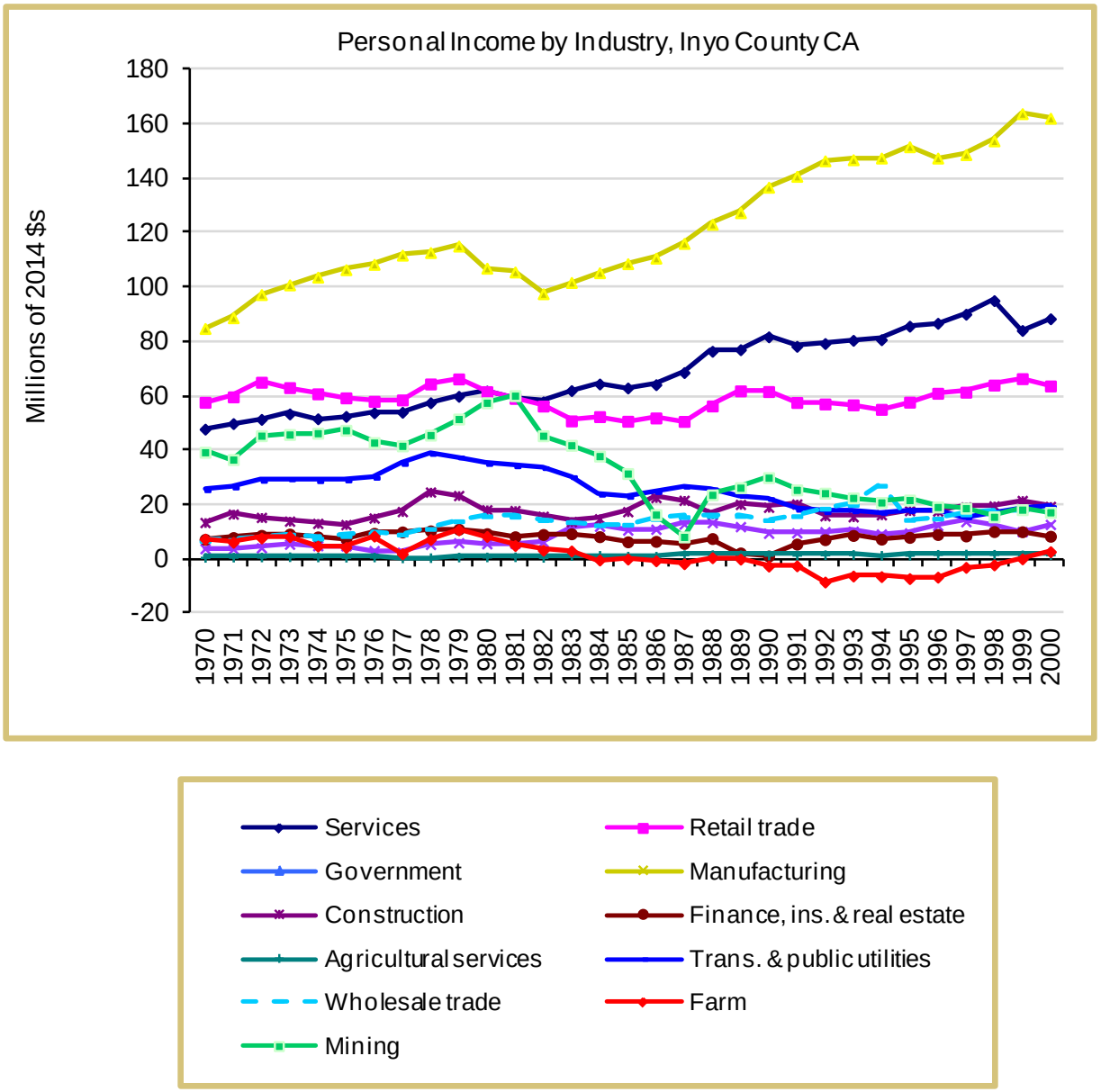


Figure B3. Inyo County Personal Income Labor Earnings Trends, 1970-2000.

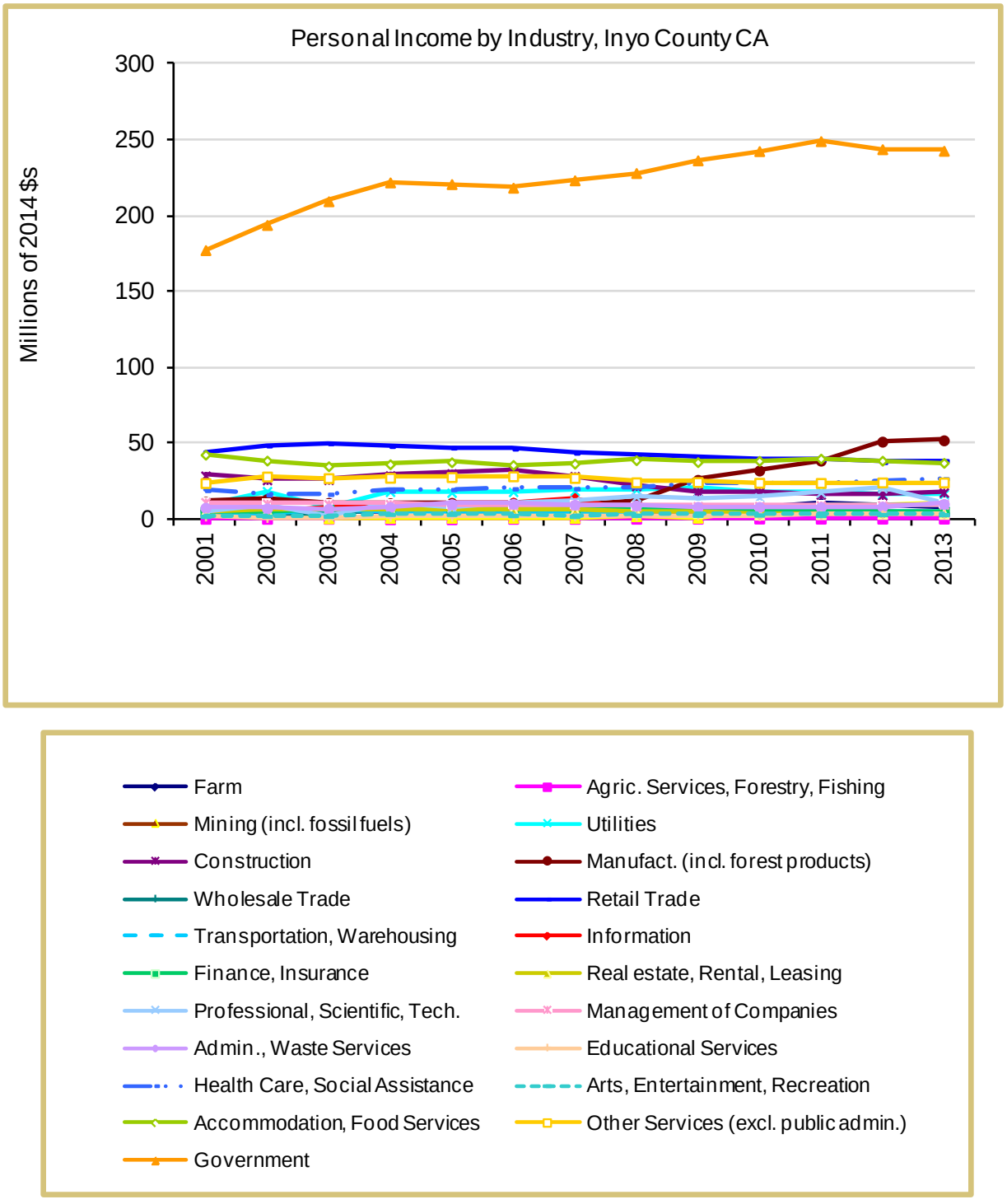


Figure B4. Inyo County Personal Income Labor Earnings Trends, 2001-2013.

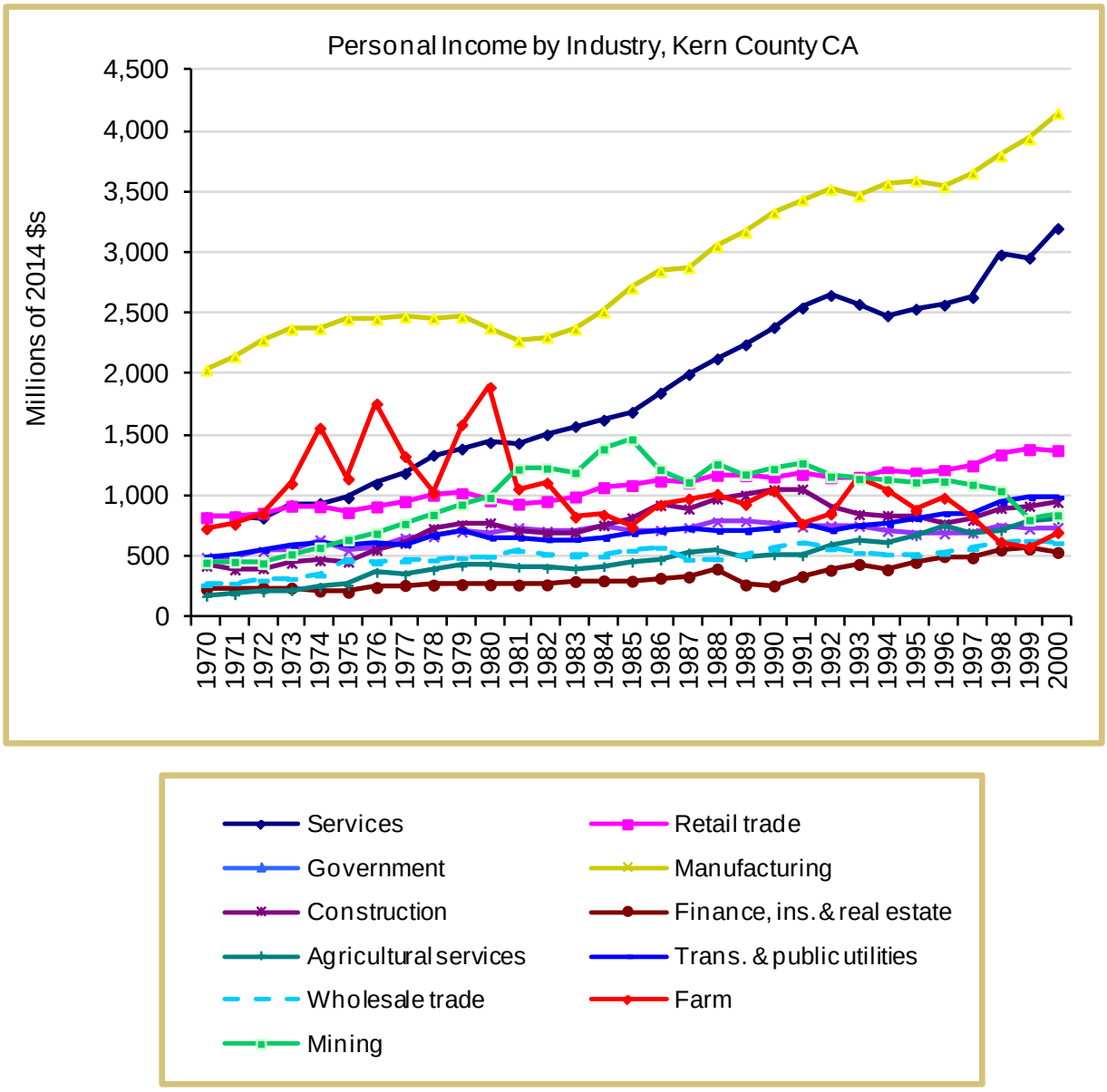


Figure B5. Kern County Personal Income Labor Earnings Trends, 1970-2000.

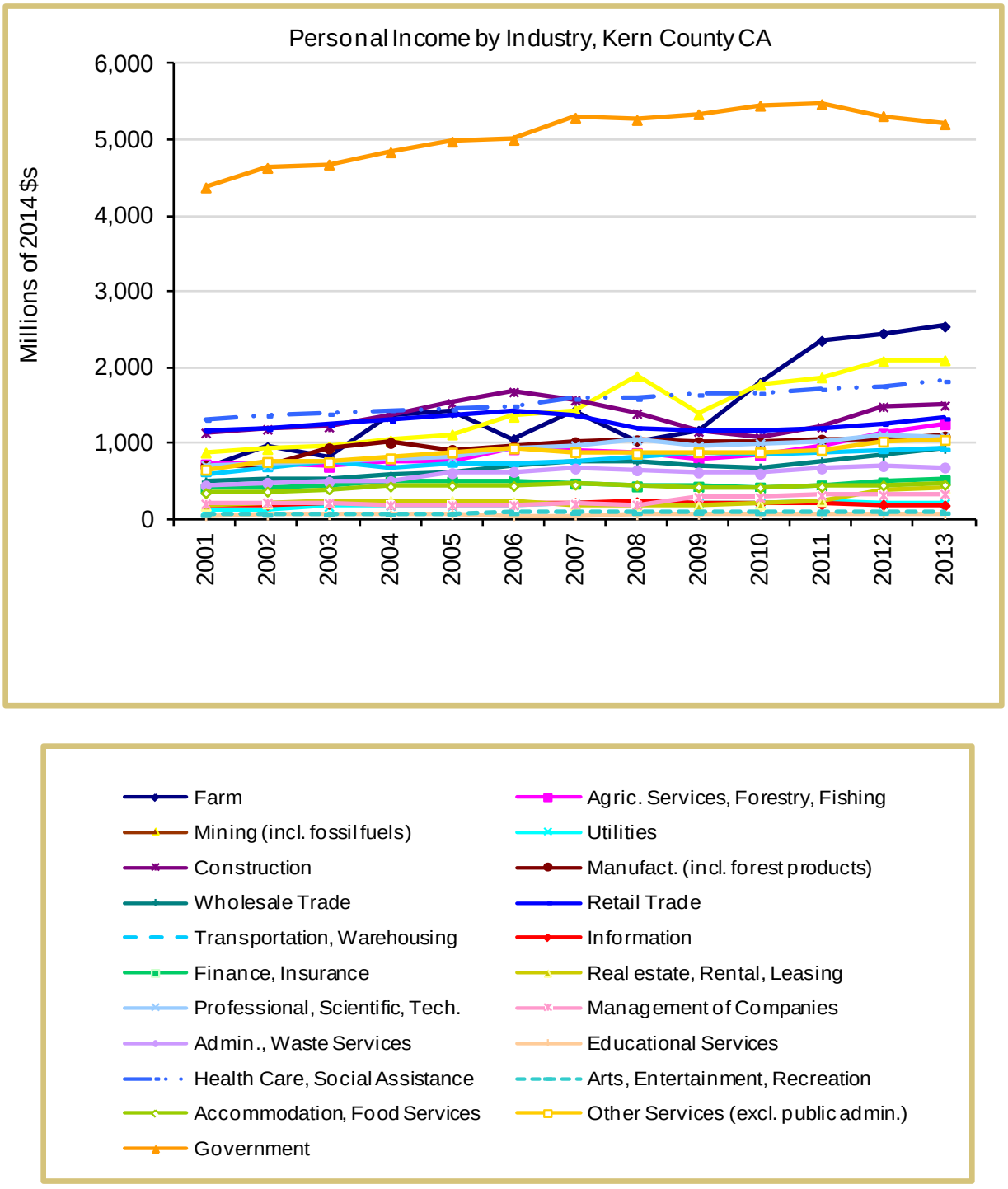


Figure B6. Kern County Personal Income Labor Earnings Trends, 2001-2013.

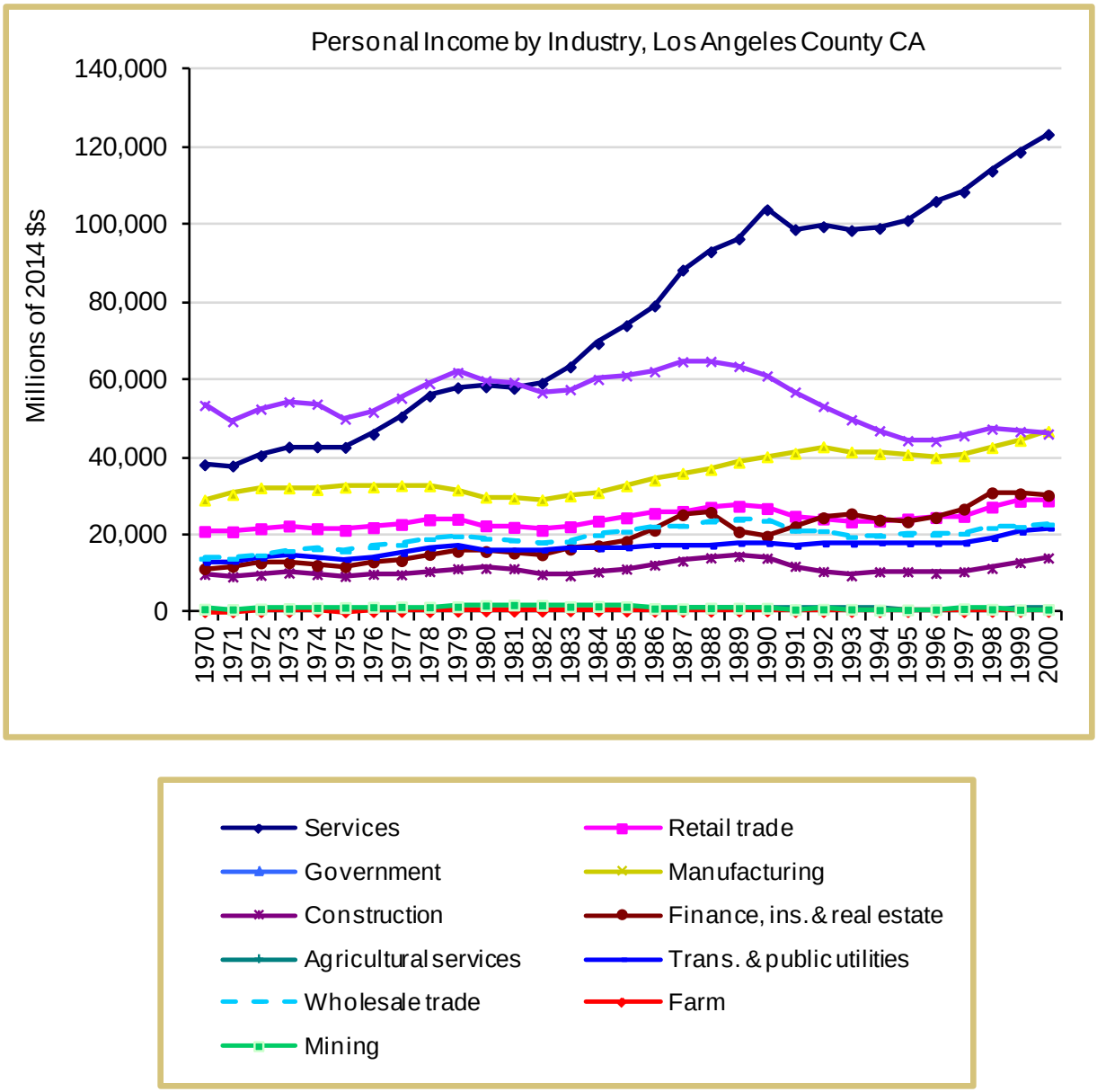


Figure B7. Los Angeles County Personal Income Labor Earnings Trends, 1970-2000.

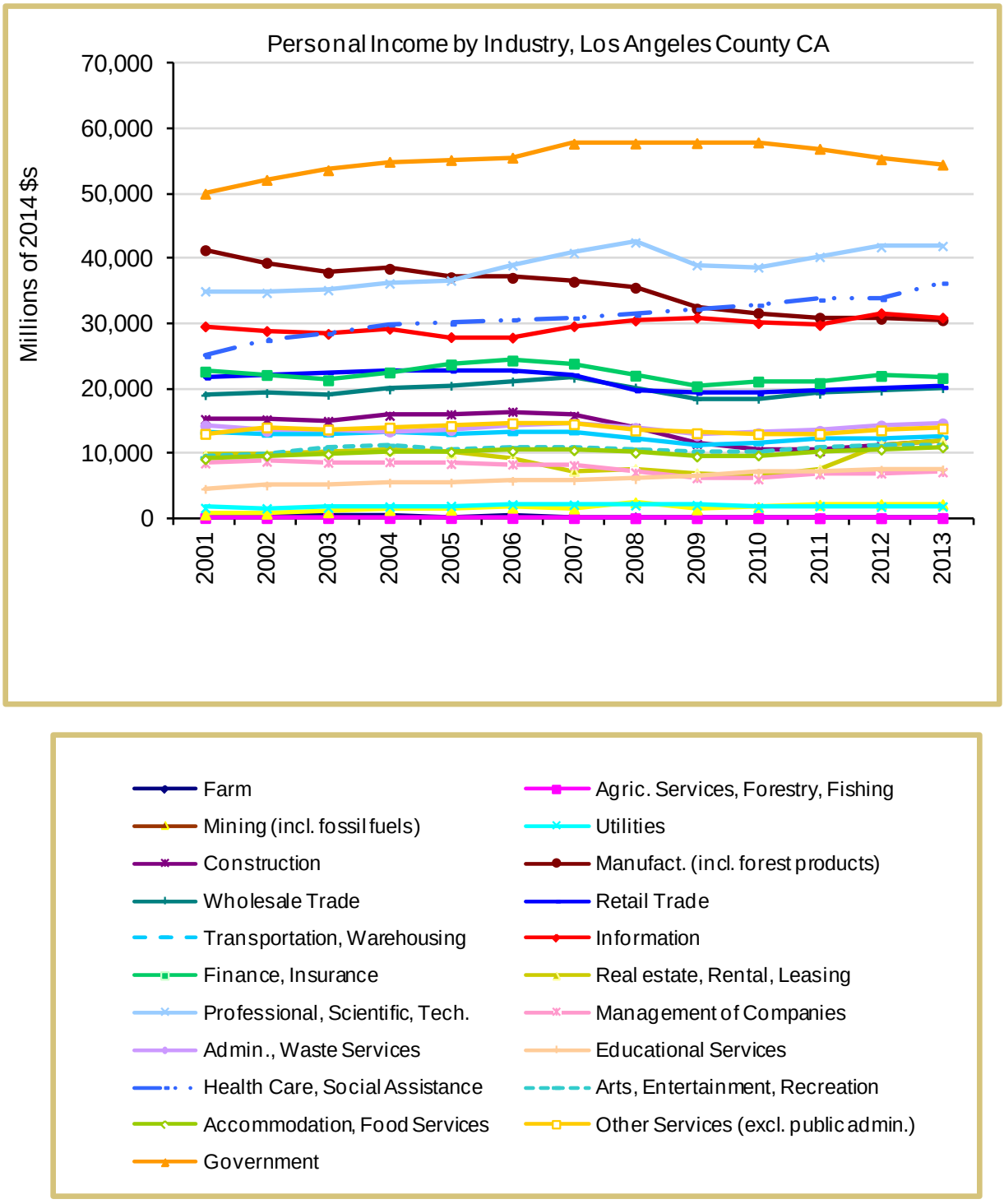


Figure B8. Los Angeles County Personal Income Labor Earnings Trends, 2001-2013.

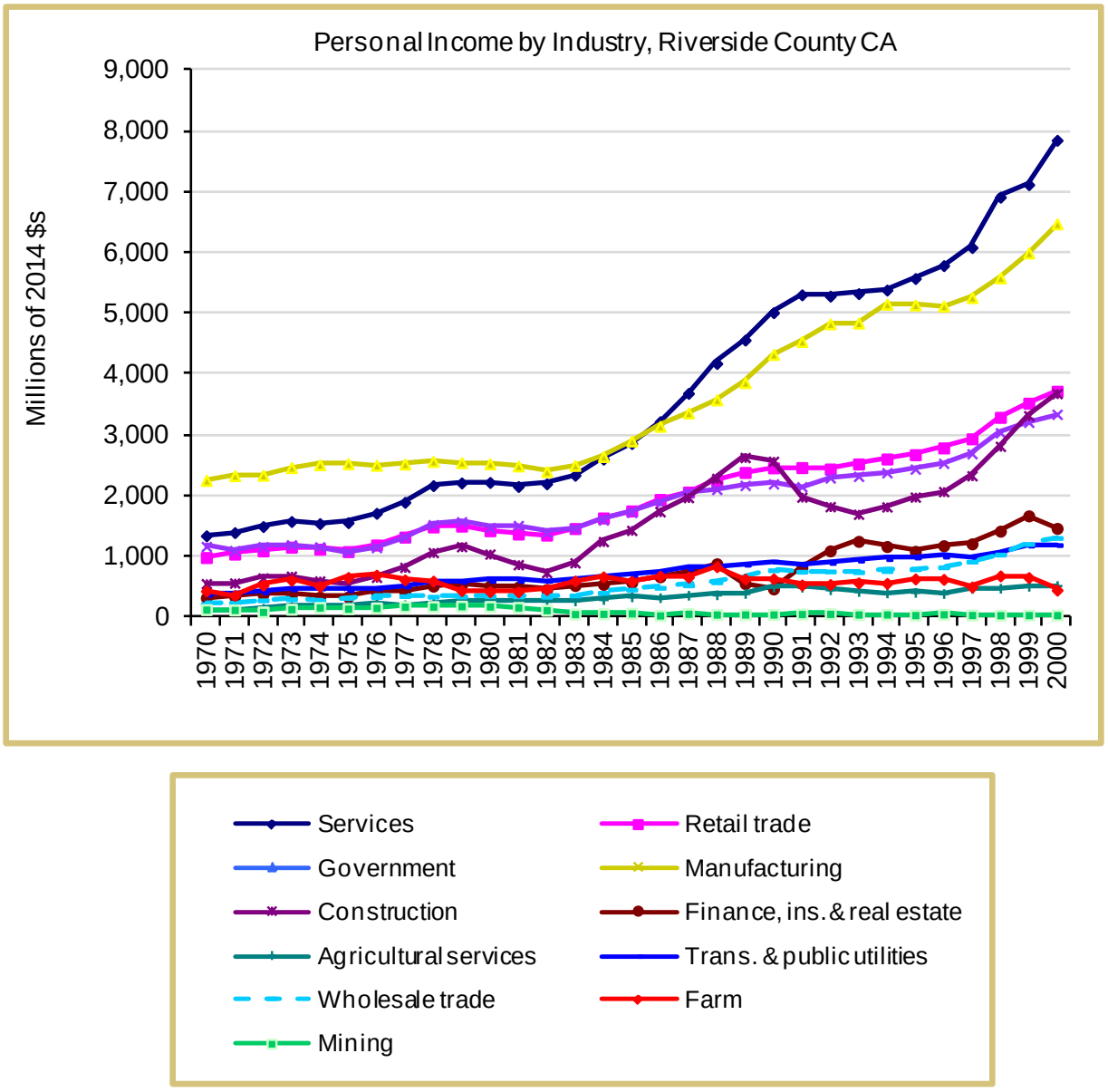


Figure B9. Riverside County Personal Income Labor Earnings Trends, 1970-2000.

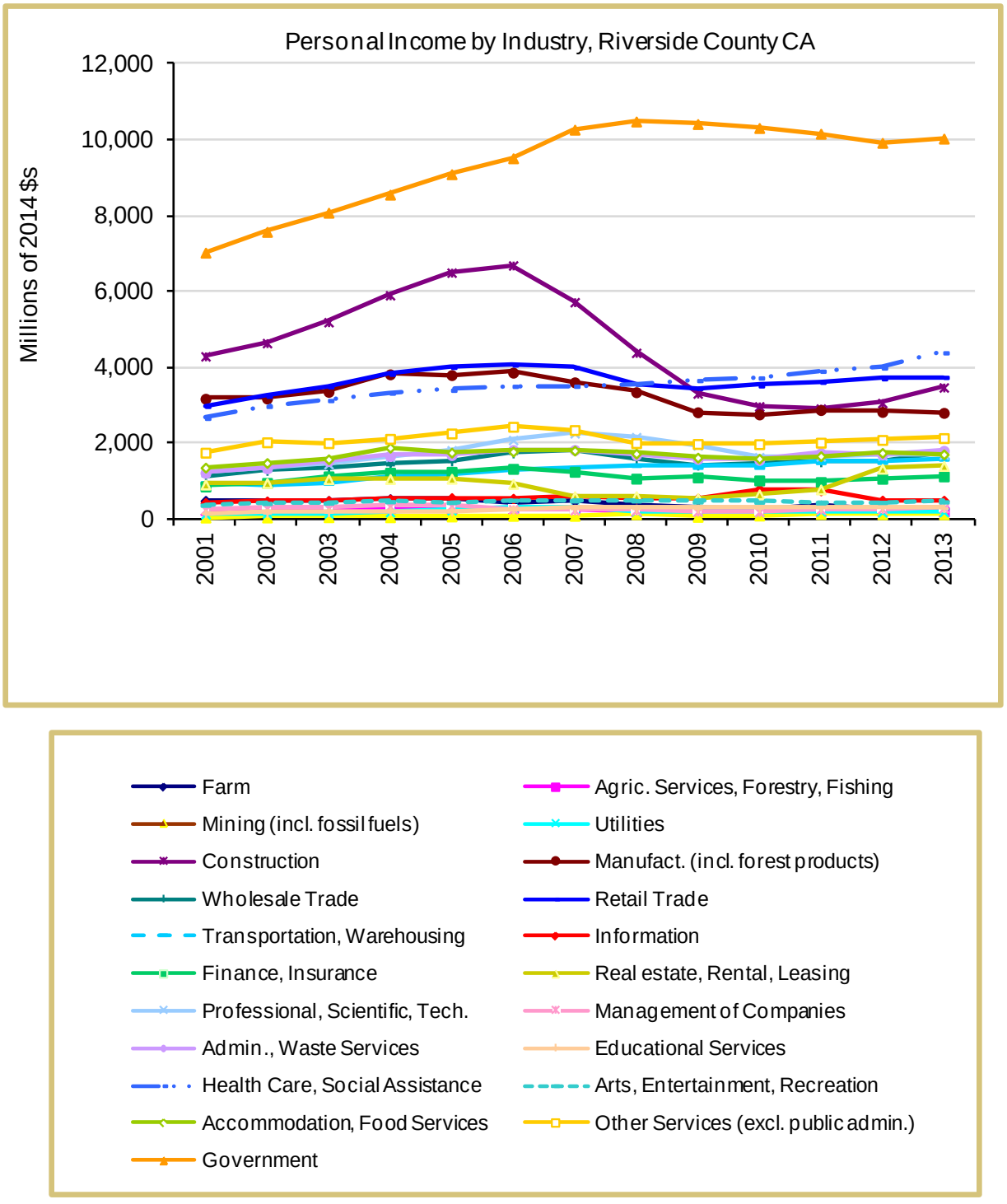


Figure B10. Riverside County Personal Income Labor Earnings Trends, 2001-2013.

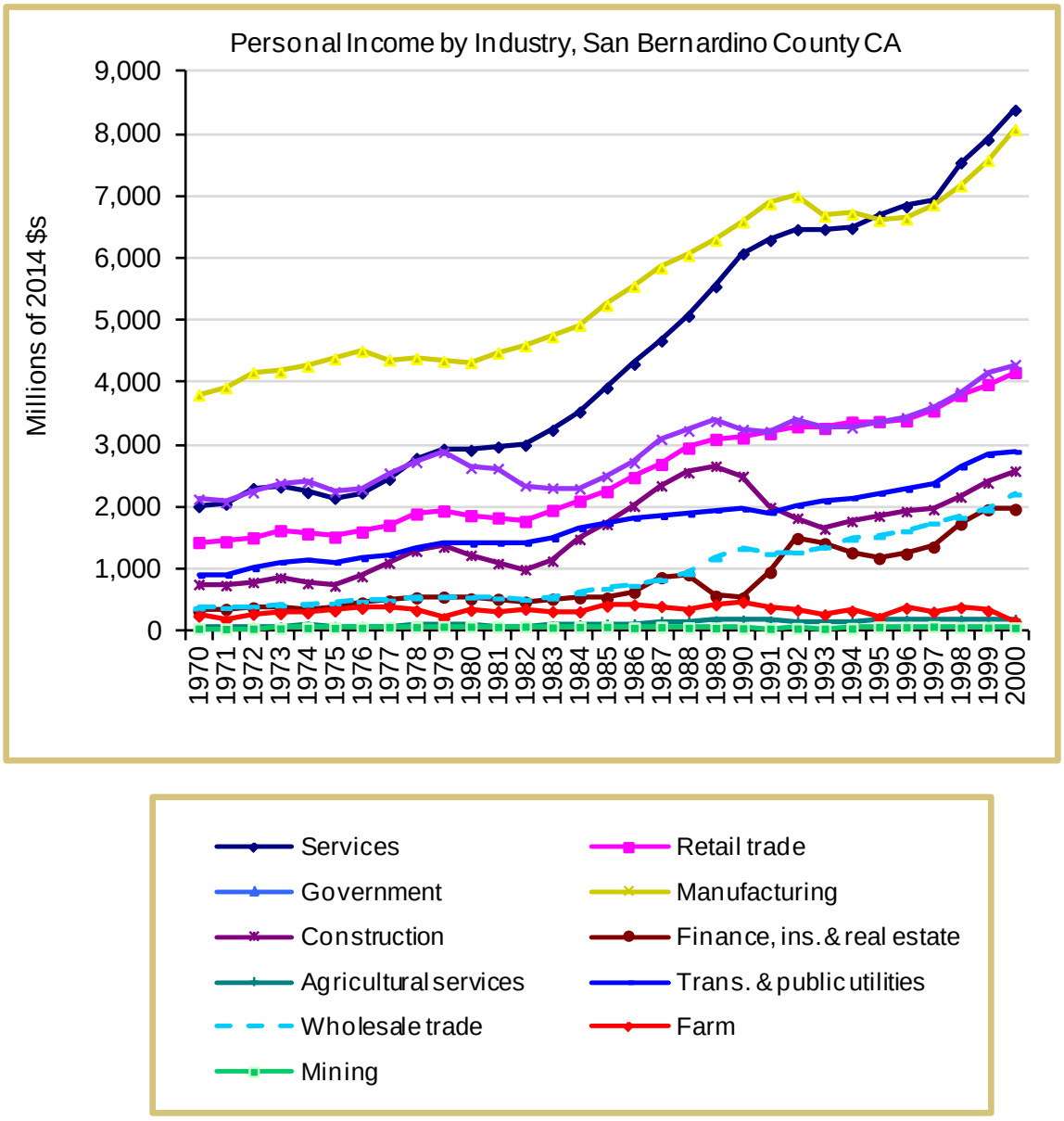


Figure B11. San Bernardino County Personal Income Labor Earnings Trends, 1970-2000.

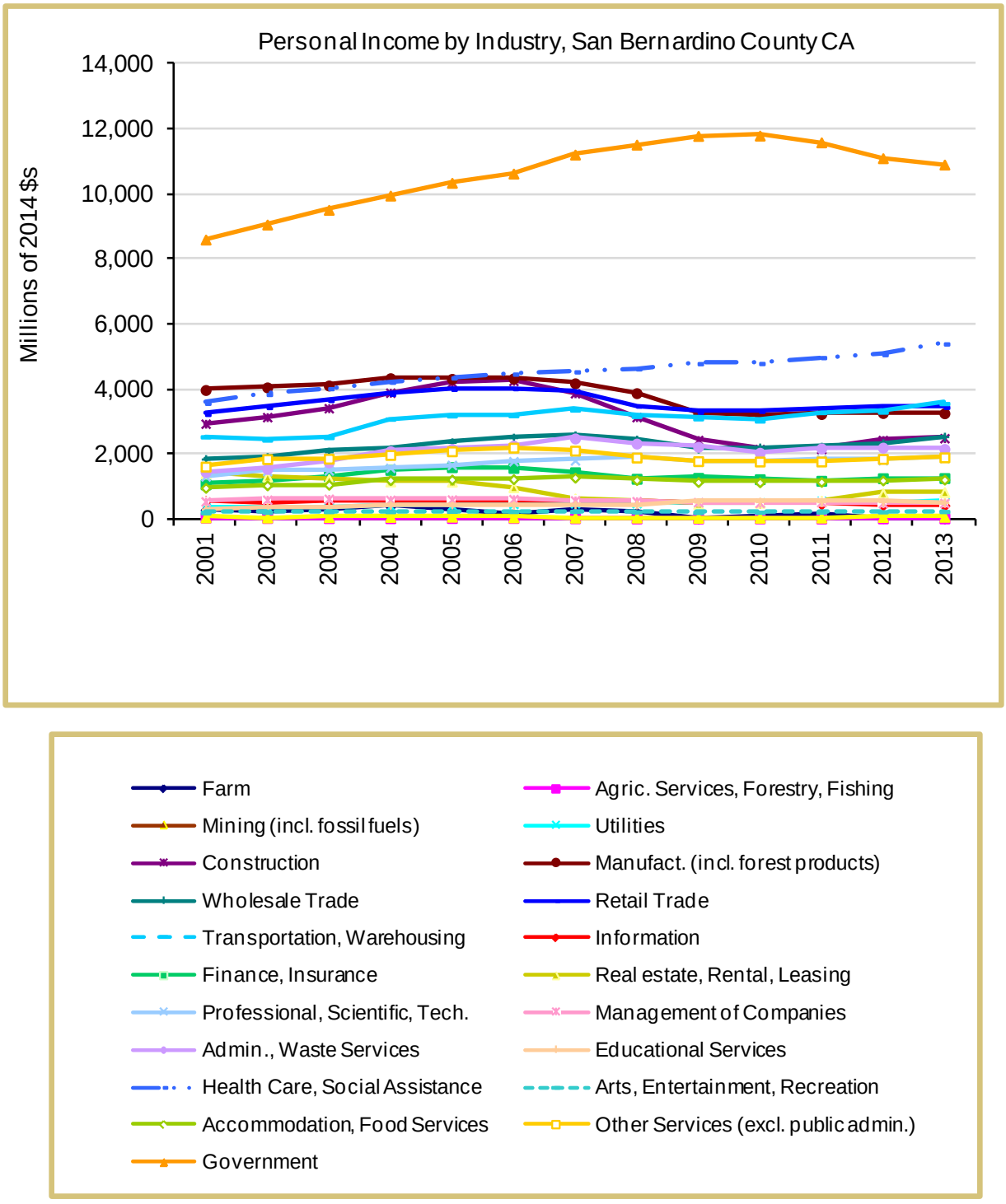


Figure B12. San Bernardino County Personal Income Labor Earnings Trends, 2001-2013.

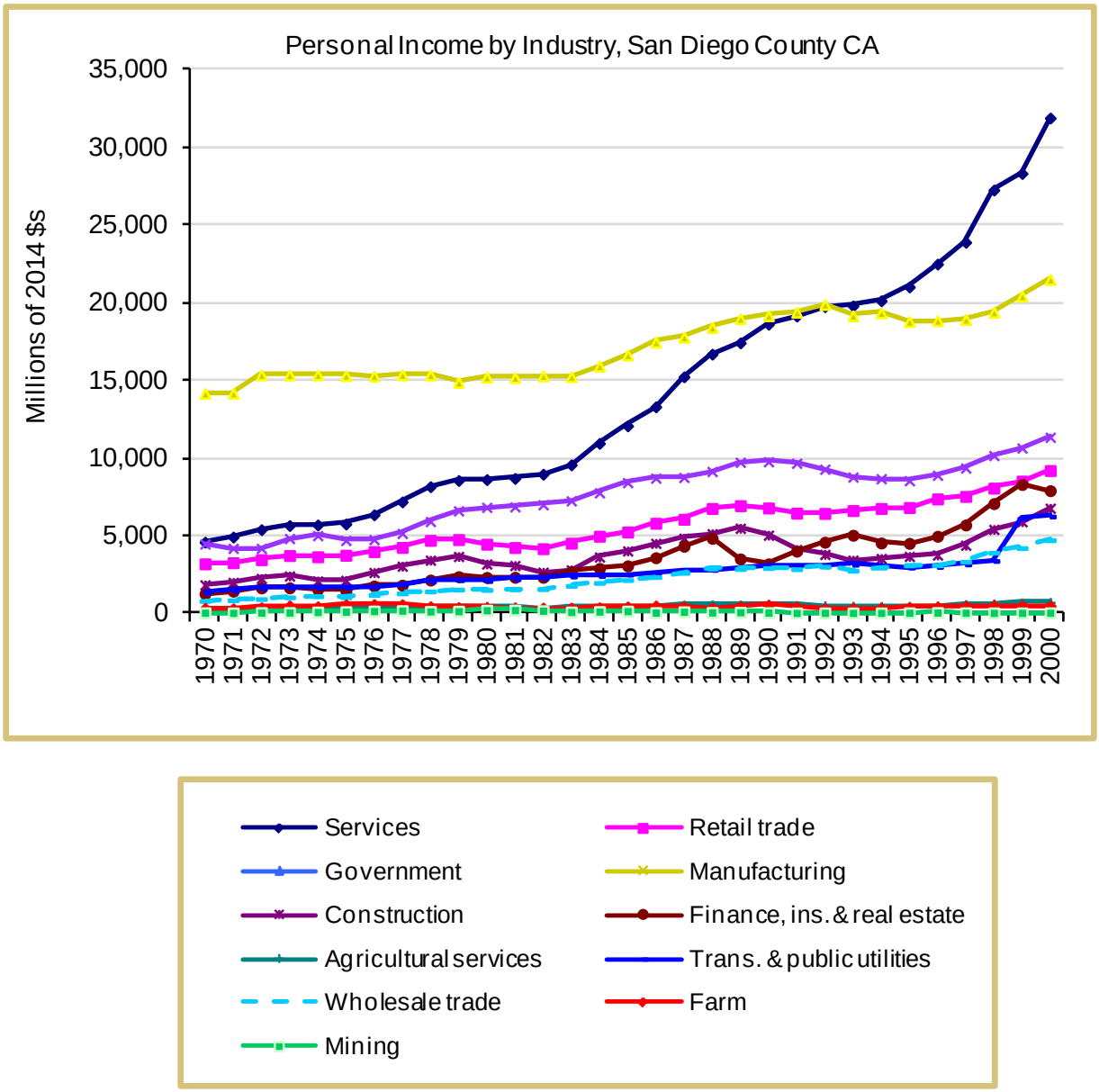


Figure B13. San Diego County Personal Income Labor Earnings Trends, 1970-2000.

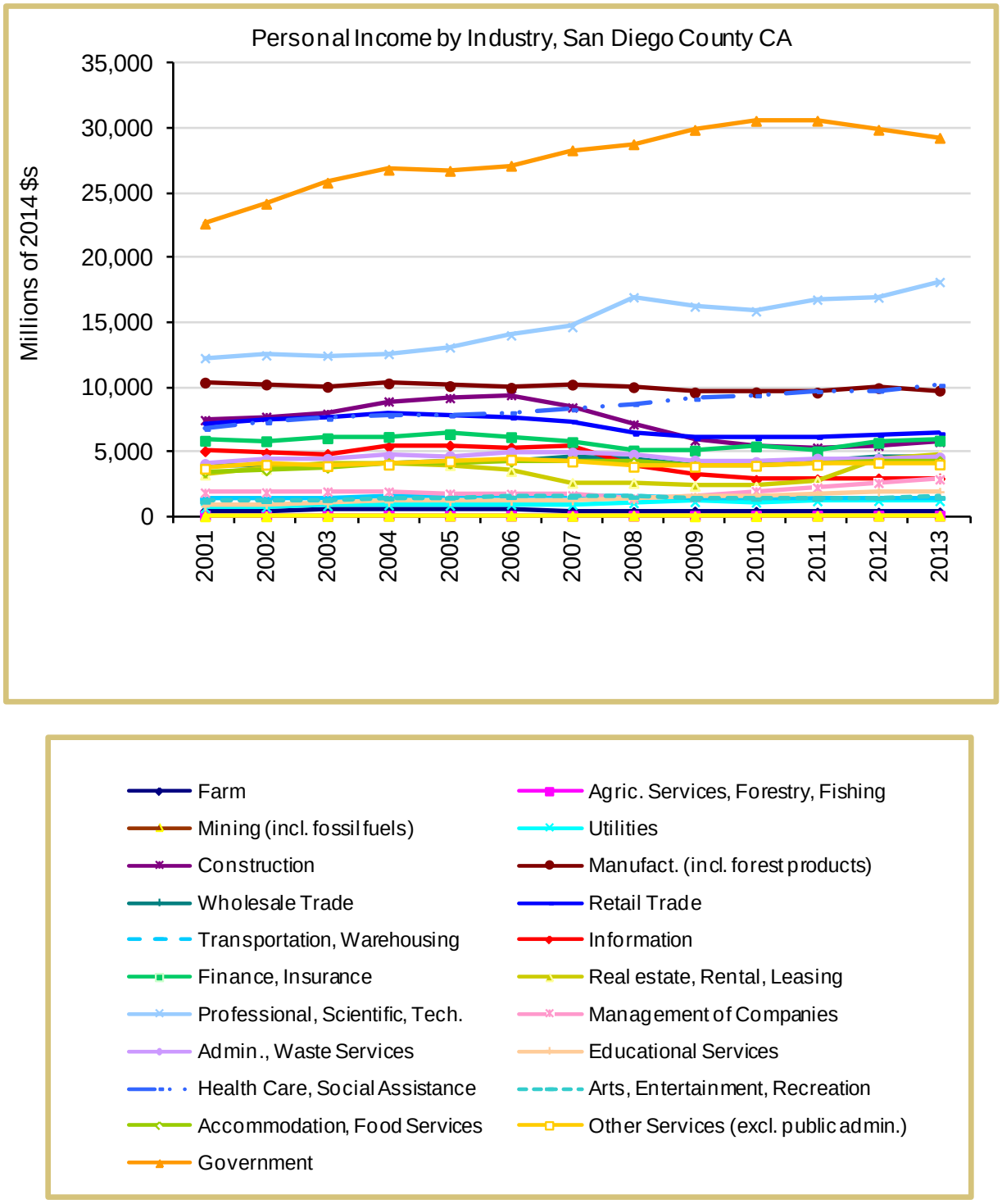


Figure B14. San Diego County Personal Income Labor Earnings Trends, 2001-2013.

Income Sources

To get a better idea of which sectors were contributing to employment and income, the income sources for each of the seven counties were examined over the period 1969 – 2013. Sectors were classed using the categories shown in Table B1 below by grouping data available from the Bureau of Economic Analysis (BEA). Note that this data source does not disaggregate oil and gas income sources from other mining activities.

INCOME SOURCE CATEGORIES
Non-labor Income
Services and Professional
Government
Construction
Manufacturing
Farming
Mining, Oil & Gas
Transportation & Utilities
Ag Services, Forestry & Fishing

Table B1. Income Source categories used to derive Figures B15 – B21. *Source:* Derivations from US Department of Commerce, Bureau of Economic Analysis, Bureau of Economic Analysis, Regional Economic Accounts.

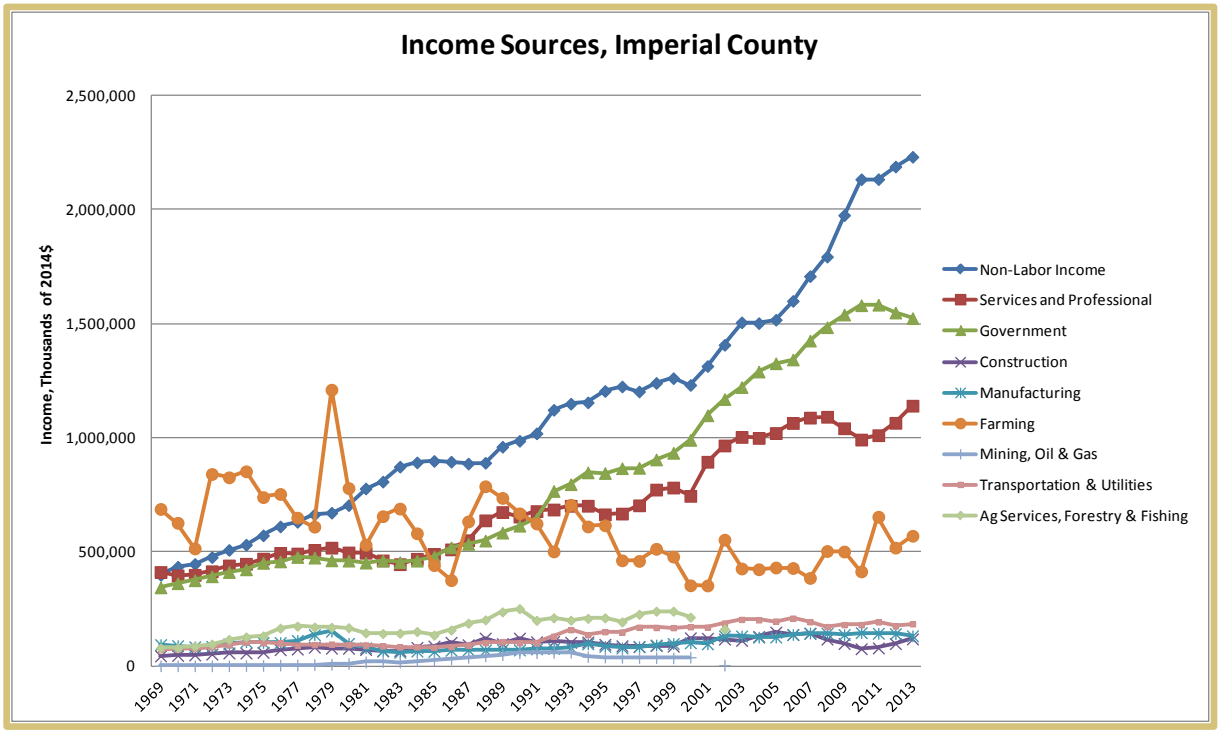


Figure B15. Income sources for Imperial County, 1969-2013. *Source:* Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s.

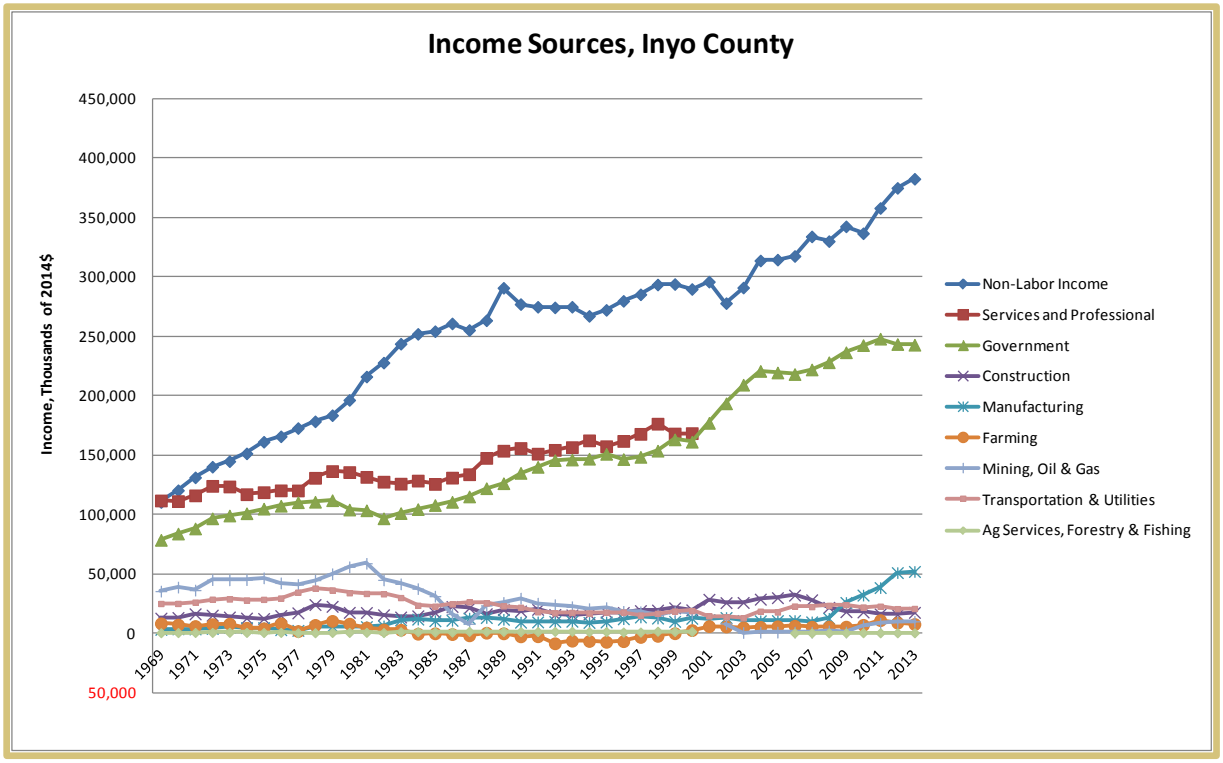


Figure B16. Income sources for Inyo County, 1969-2013. *Source:* Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s.

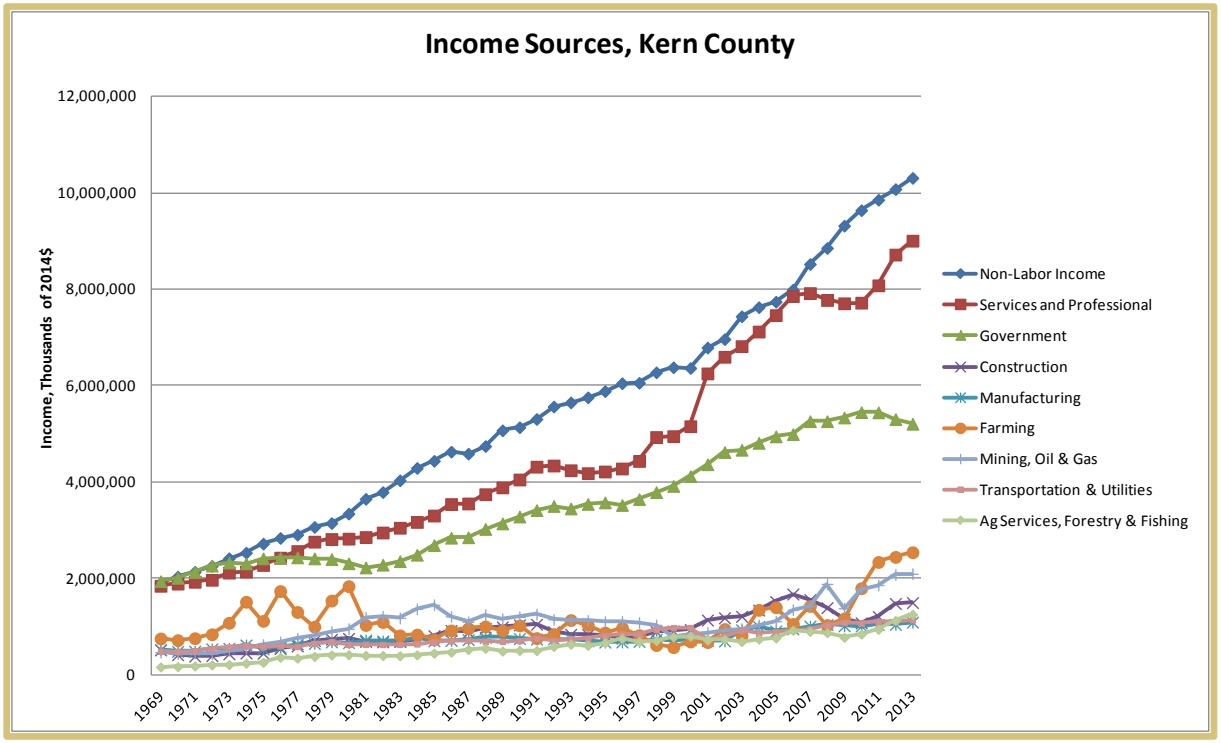


Figure B17. Income sources for Kern County, 1969-2013. *Source:* Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s.

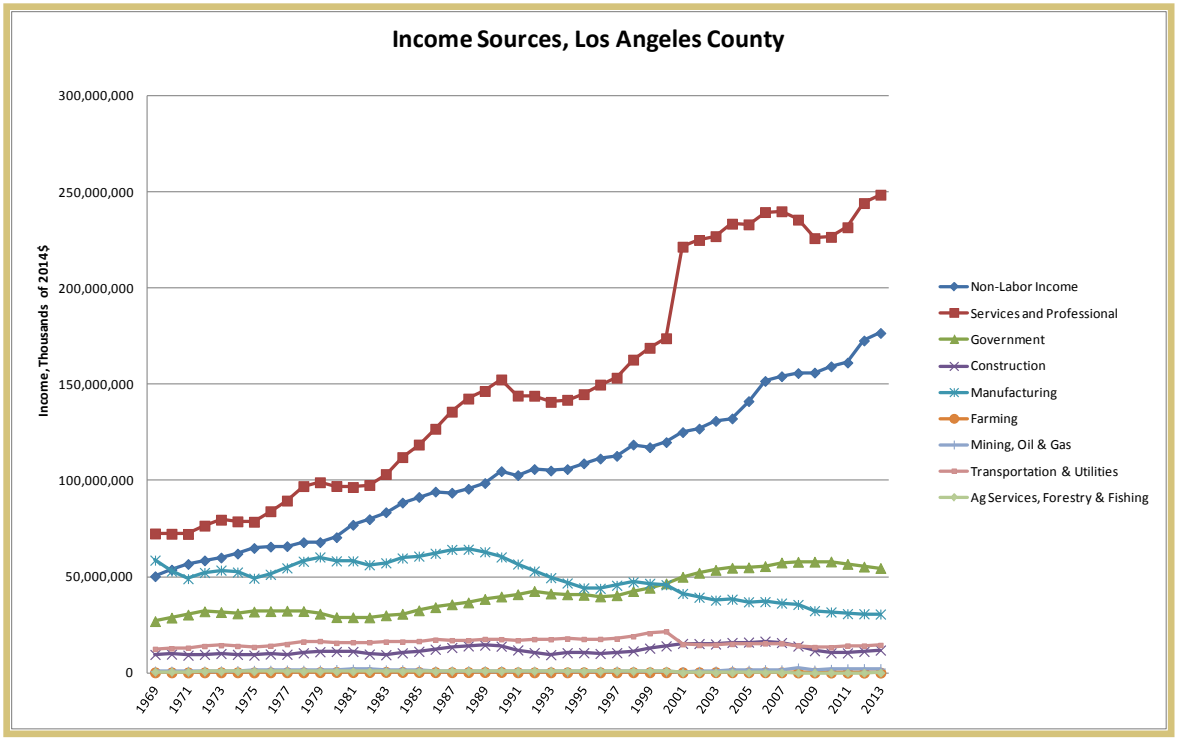


Figure B18. Income sources for Los Angeles County, 1969-2013. *Source*: Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s.

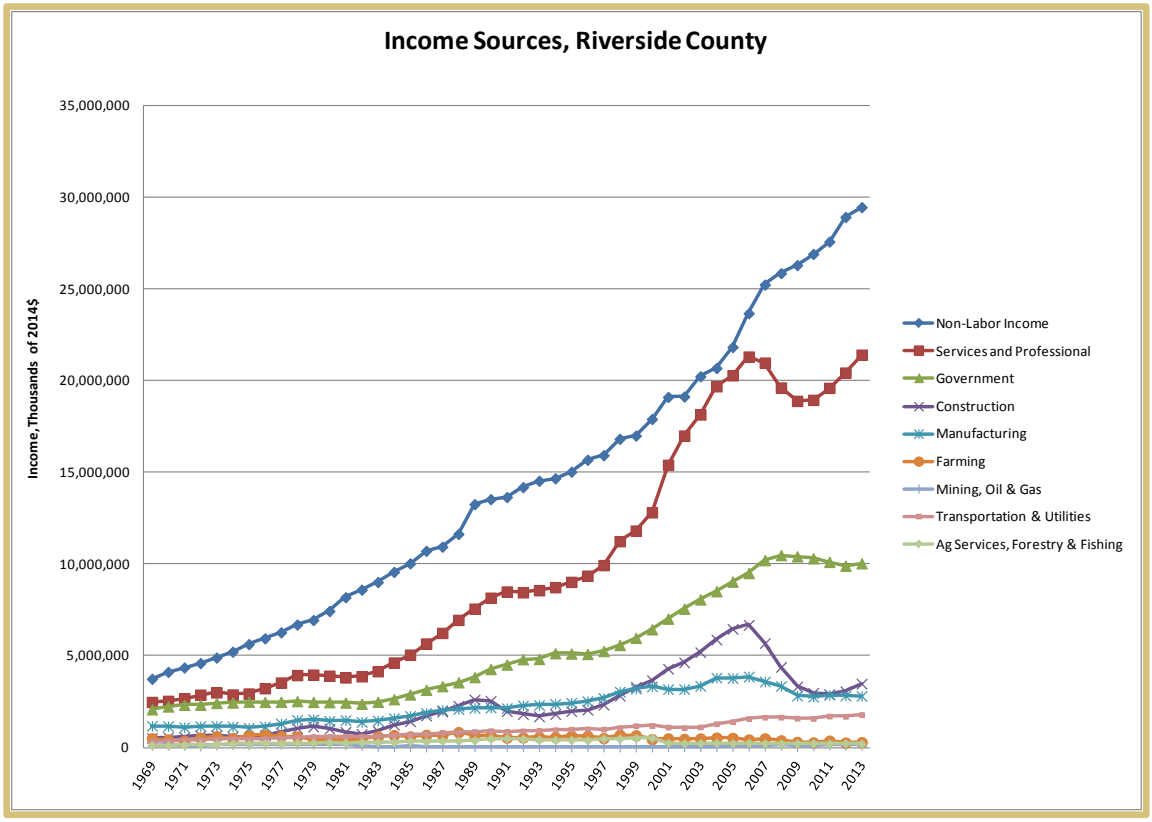


Figure B19. Income sources for Riverside County, 1969-2013. *Source*: Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s.

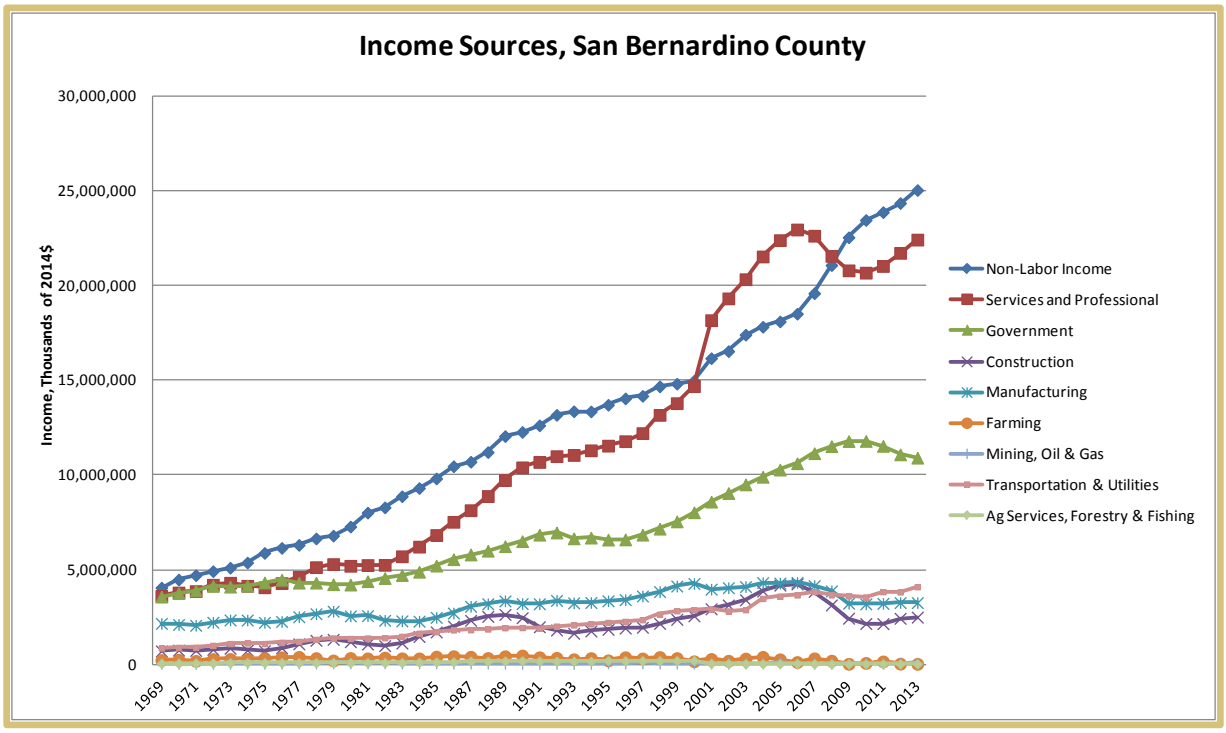


Figure B20. Income sources for San Bernardino County, 1969-2013. *Source*: Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s.

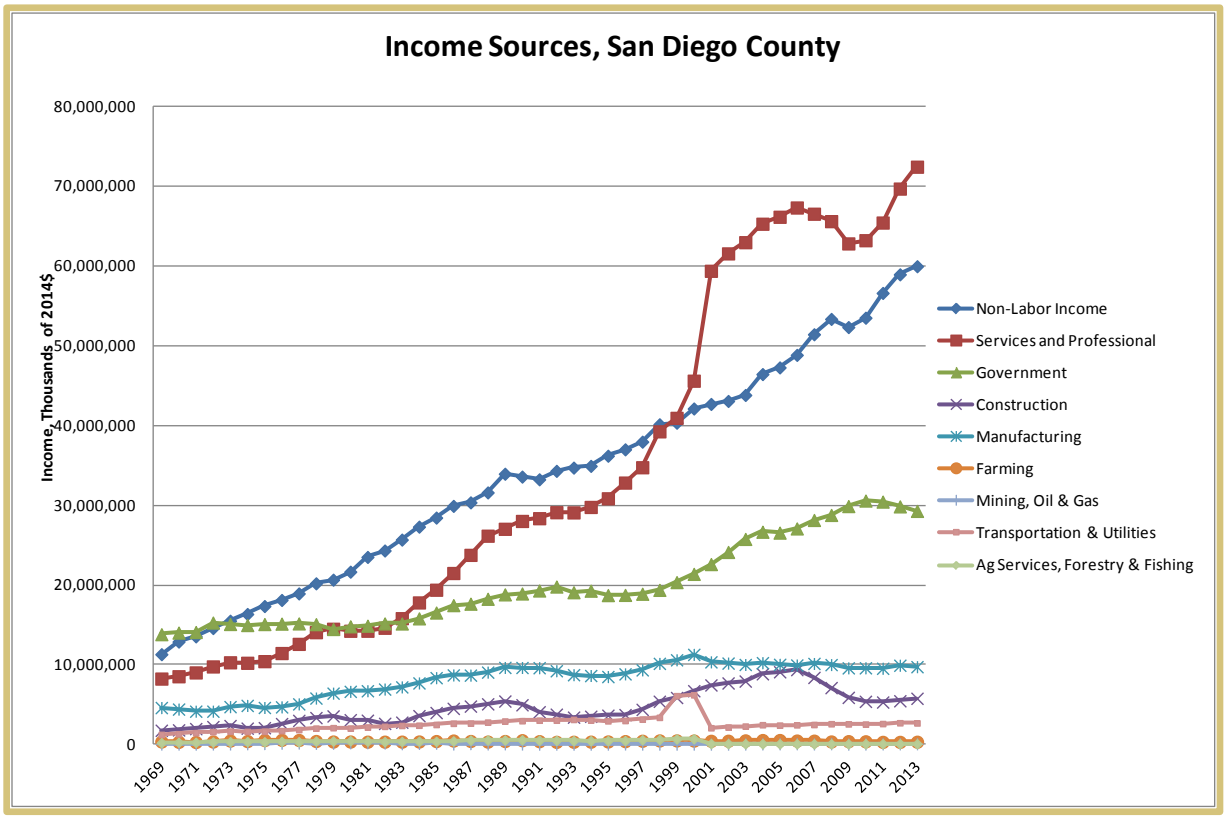


Figure B21. Income sources for San Diego County, 1969-2013. *Source*: Bureau of Economic Analysis, Regional Economic Accounts, Table CA5, adjusted for 2014$s

Appendix C. Data and Methods for GIS Data Analysis

Spatial data used in this report came from a variety of sources. This section describes the origin and processing steps executed on each data set.

Study Area: Given the large size, complete polygon and extensive GIS data developed for the DRECP, we decided to use the DRECP as the primary study area. All GIS data was clipped and processed to this boundary.

Terminology and references used in this analysis included:

High, medium and low density of active mining claims

Low Active Mining Claim Density: less than 18 active claims per section
Medium Active Mining Claim Density: between 18 and 46 active claims per section
High Active Mining Claim Density: greater than 46 active claims per section

High-potential mineral zones

High Potential Mineral Zones are areas with existing or historic mineral activity and an increased likelihood of future mineral development. From the DRECP EIS analysis, http://www.drecp.org/draftdrecp.

Known mineralization

Based on Mineral Resources Data System dataset. http://mrdata.usgs.gov/mrds/

High value

Materials with a high unit value.

Significant deposit

Large tonnage and/or high-grade mineral deposit.

Mining claim data

Originates from the Bureau of Land Management's Land & Mineral Legacy Rehost 2000 System (LR2000 System), which is updated daily and mapped at the section level. http://www.blm.gov/lr2000/

Mineral Occurrences: These data came from two original sources: the Mineral Resources Data System (http://mrdata.usgs.gov/mrds/) and the California Bureau of Mines and Geology. Both data sets are similar in format and content, describing individual mineral occurrences at several thousand locations across the study area. Each point is associated with up to three different minerals, which were parsed into thematic layers and mapped.

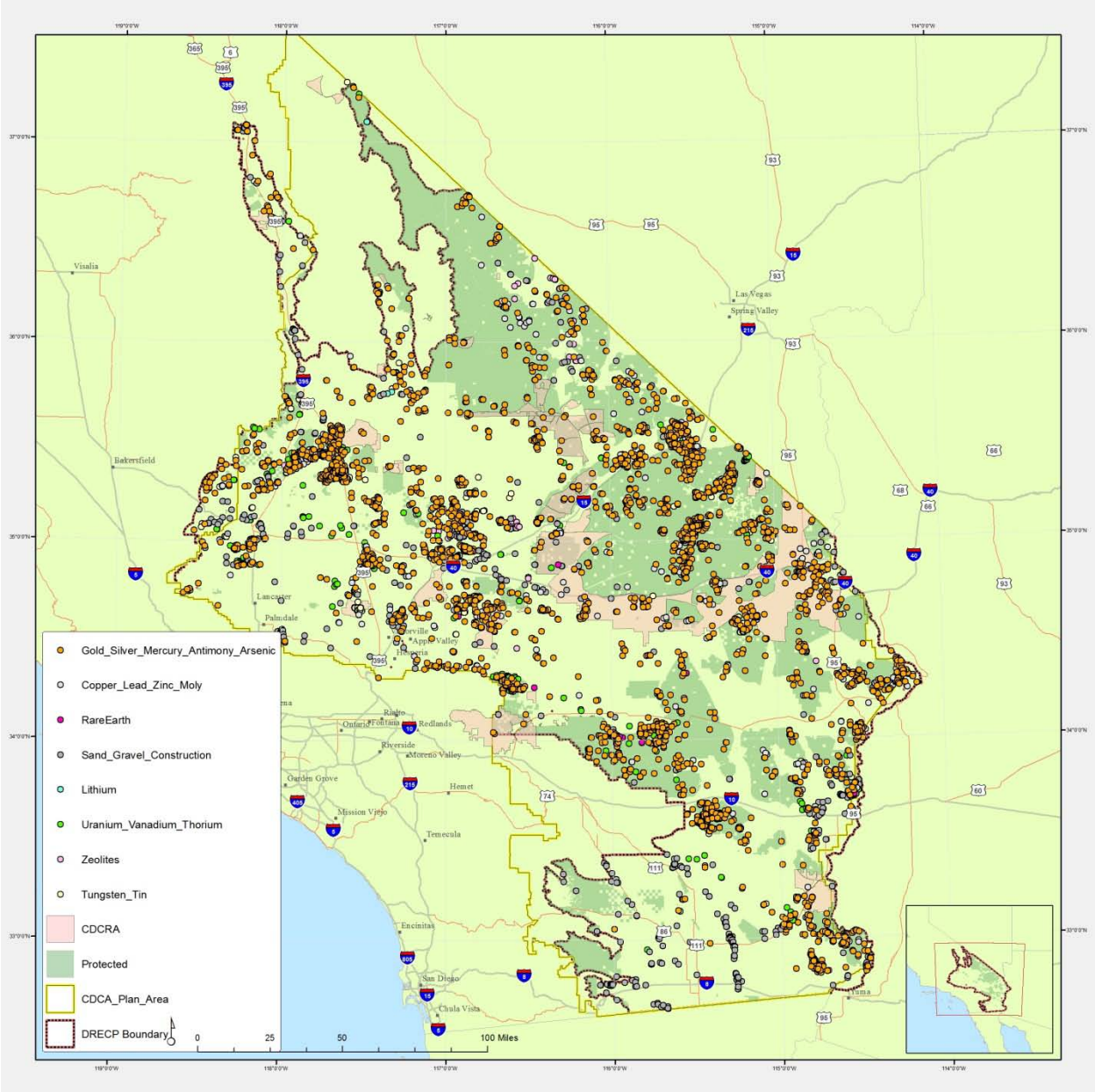


Figure C1. Mineral Occurrences.

Active Mining Claims: The BLM maintains an up-to-date database of active mining claims in their LR2000 system (http://www.blm.gov/lr2000/). The LR2000 was queried for "Active Claims" for each of the counties within the study area and the results were mapped at the section level (the resolution of most of the LR2000 data). Data was symbolized to represent the number of active claims per section. The highest density of mining claims (over 100 claims per section) occur in the Castle Mountains area.

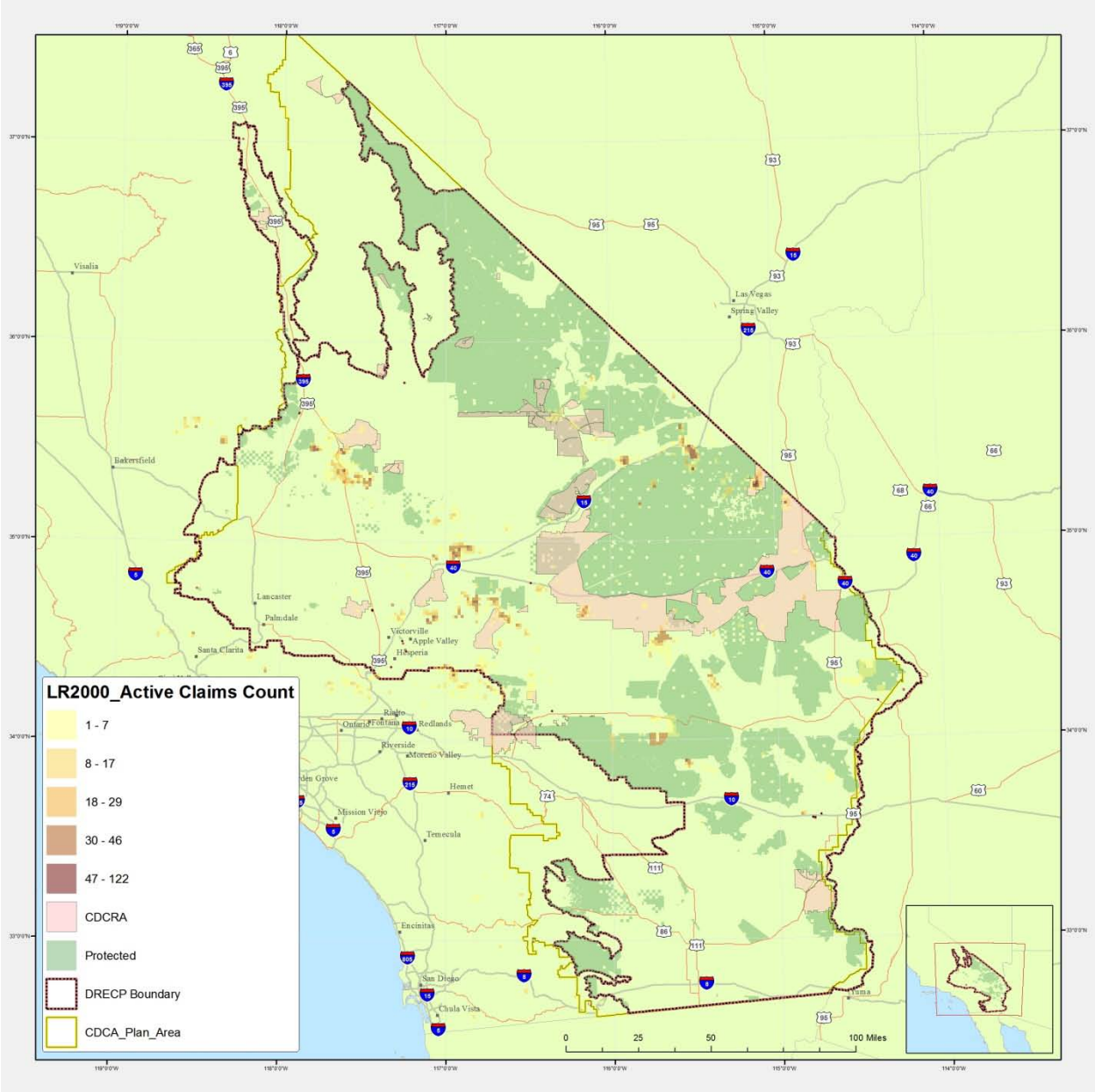


Figure C2. Active Mining Claims.

High Potential Mineral Locations: "High Priority Minerals" data were created for the DRECP draft EIS, and are described in Appendix R1.15 of that document. Unfortunately, we were not granted access to the GIS shapefiles, so we digitized these data from the PDFs contained in the EIS. The description of these data is contained in Volume III.15.2.3 of the report:

> "High-potential mineral areas are lands with existing and/or historic mining activity and a reasonable probability of future mineral resource development. Within the Plan Area, specific geographic areas have been defined as areas with the potential for recoverable high-priority and high-potential mineral resources, including rare earth element areas, as identified in BLM's California Geology, Energy, and Mineral Resource GIS Data (2013)."

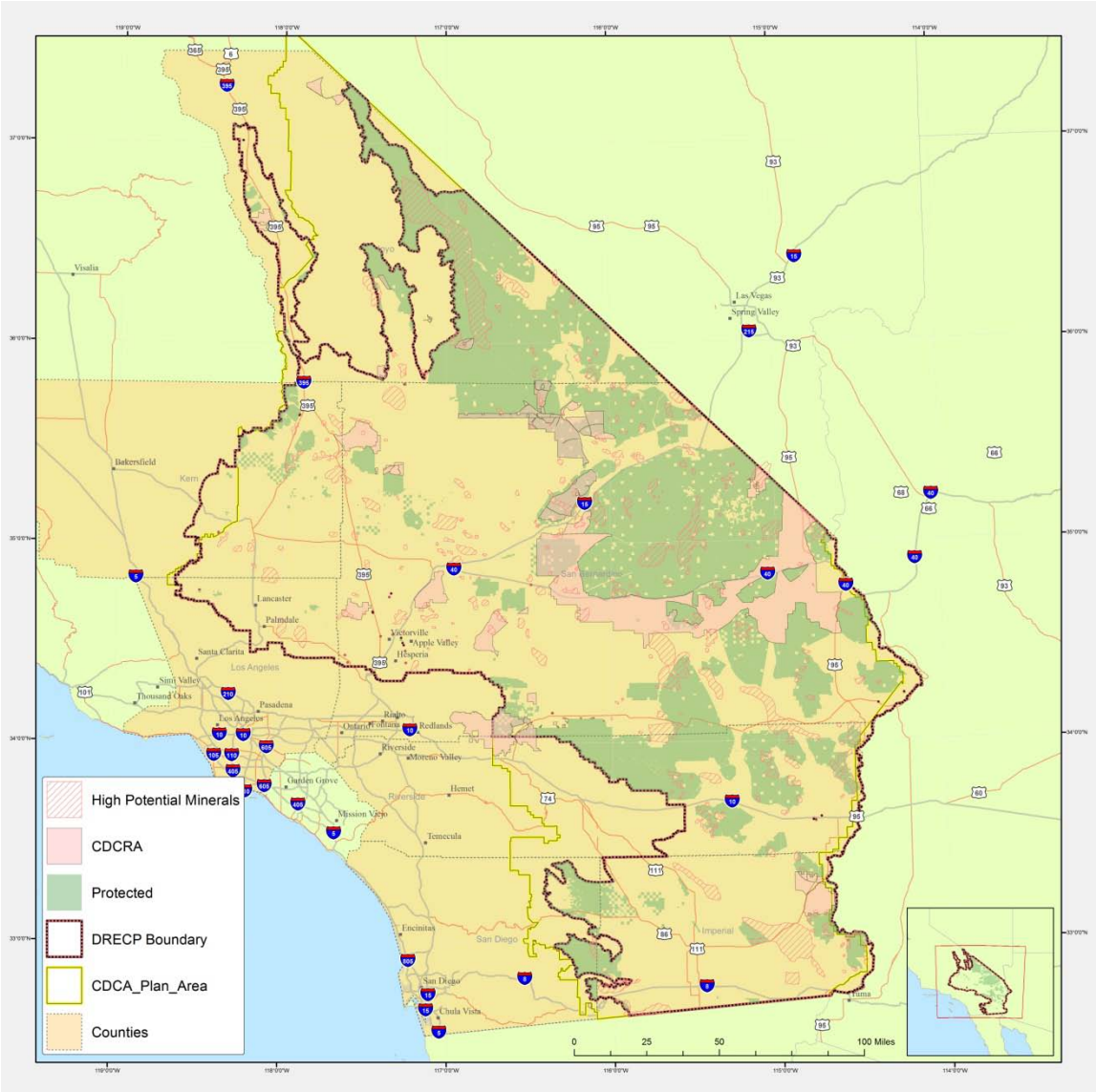


Figure C3. High Potential Mineral Locations.

High Priority Mining Operations: Similar to "High Potential Mineral Locations" these data were derived from the DRECP DEIS, and include the mining operations considered "High Priority" within the study area.

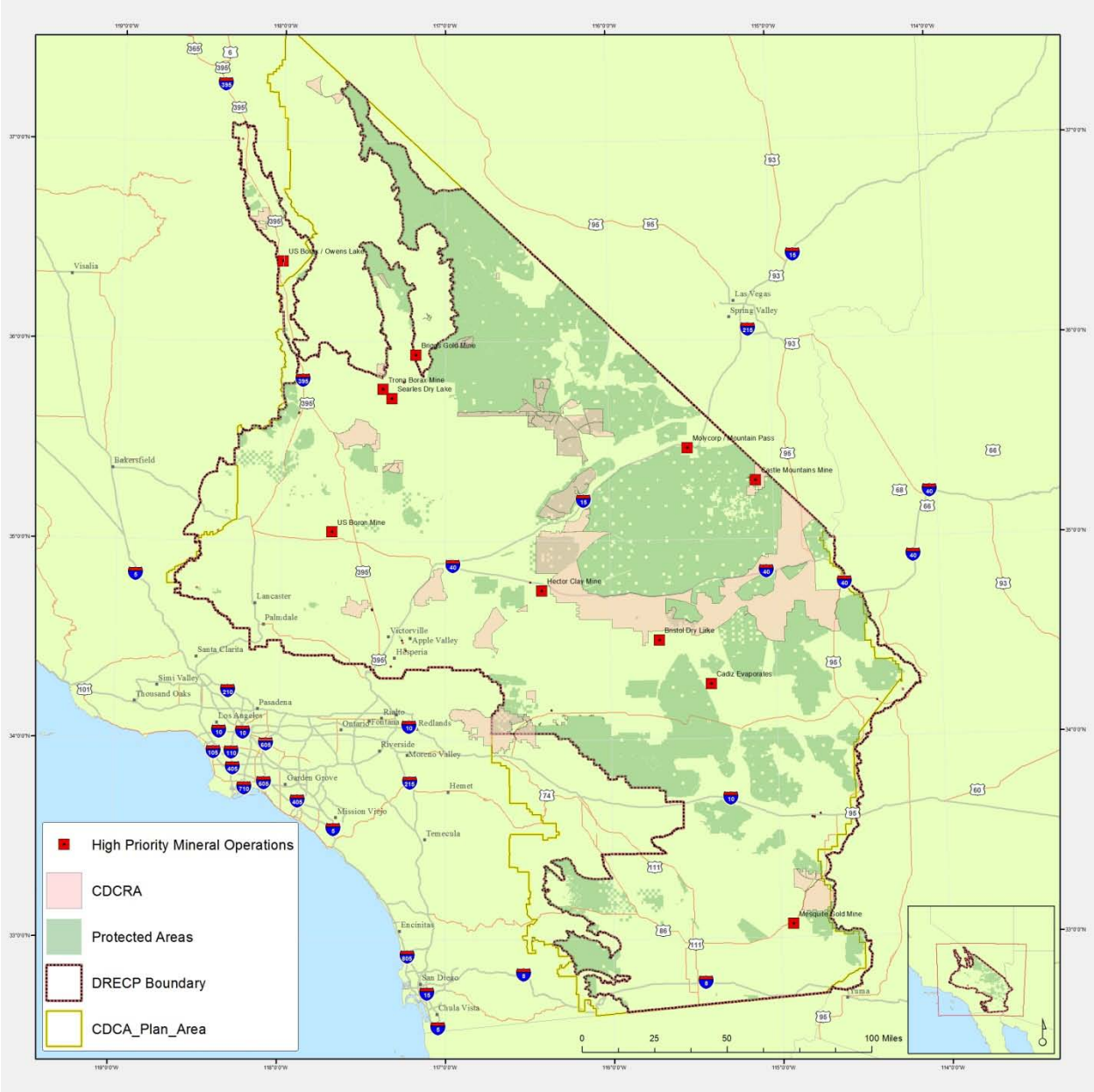


Figure C4. High Priority Mining Operations.

MSHA Mines:

The Mine Safety and Health Administration (MSHA) is a division of the US Department of Labor MSHA is a division of the US Department of Labor charged with protecting miners' safety and health. Data reported by mining operations are compiled by MSHA and are accessible through the Open Government Initiative Data Portal (http://www.msha.gov/OpenGovernmentData/OGIMSHA.asp). Location information in the *mines.txt* dataset, accessed June 2015, was used to generate a GIS shapefile containing the data associated with each mining location. The *mines.txt* dataset also contained information on employment and commodity type which was used in mapping analyses. Some modification and cleanup of the data locations was necessary to generate the GIS data; Google Earth and Internet searches were used to verify locations of some of the mining operations.

Figure C5. Mine Safety and Health Administration Mines.

Concurrent Mineral Potential: This layer was produced by buffering the *Mineral Occurrences* data by 500 meters, and overlaying it with the *Active Mining Claims* data and the *High Potential Mineral* Locations data. Locations where all three layers coincided became the *Concurrent Mineral Potential* layer, which describes areas where multiple indicators of mineral activity and potential coexist.

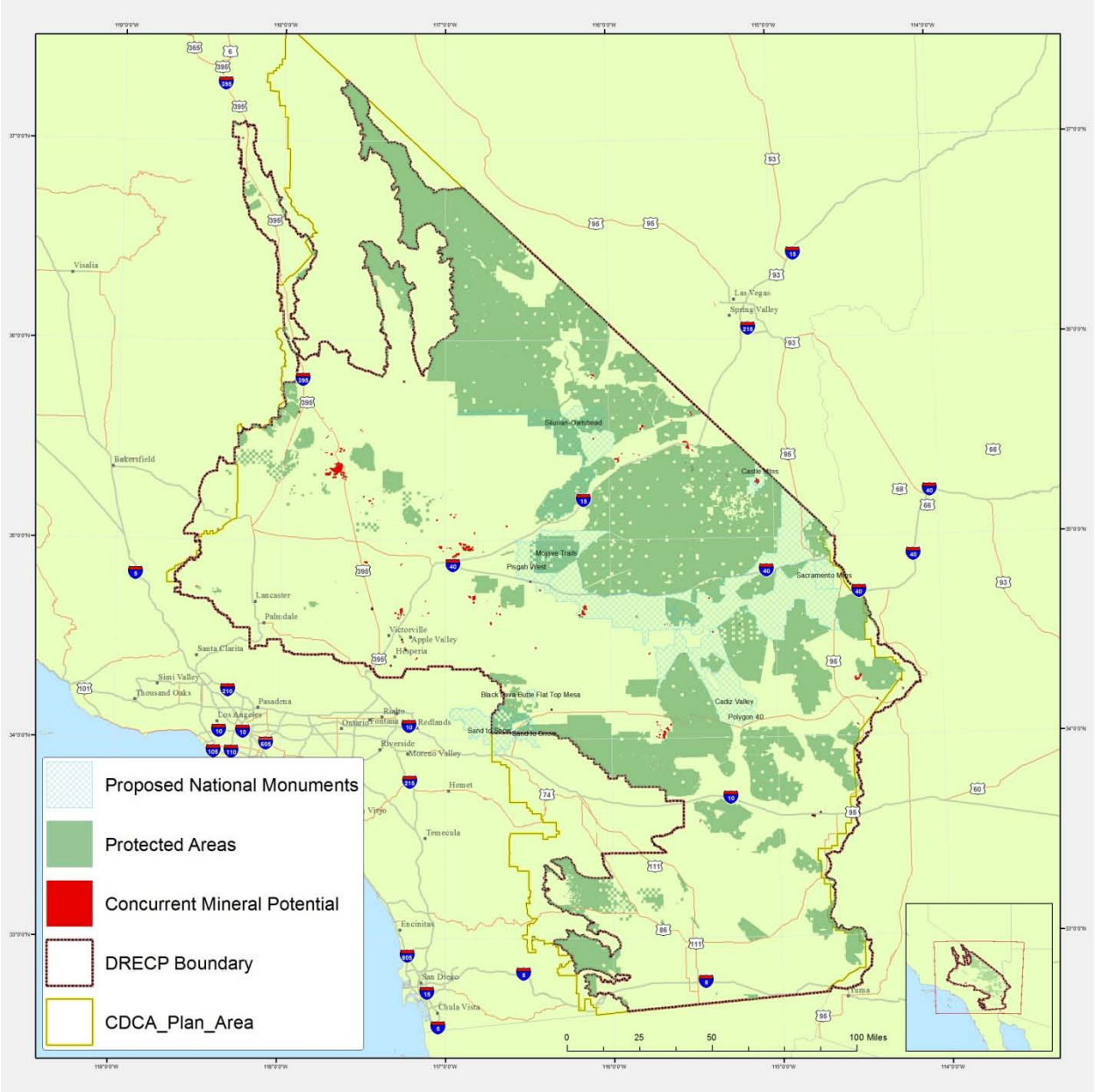


Figure C6. Concurrent Mineral Potential

Appendix D. The California Desert's Top 5 Mining Operations

The region's top five mining operations employ between 1,696 and 1,786 employees (based on the most recent reporting by mine ownership), approximately 40% of the mining sector's total workforce in the desert. This underscores that a relatively few operations comprise the bulk of the economic impacts to the regional economy.

The contributions, direct and indirect, made by mining to the economies of the desert counties are focused on a relatively few operations and resources. Table D1 summarizes characteristics of the top 5 mining operations, based on persons employed, using information from the Mine Safety and Health Administration and data reported by the mine owners as part of annual reports or publicly available data on their websites. These top 3 mining operations include the nation's only rare earth elements mine in Mountain Pass, the large boron operations in Boron, and a gold mine in Imperial County. The Mountain Pass mine is scheduled to close operations in October 2015.

The next 7 top employers are all cement plants that report employment between 100 and 200 persons, and, except for the Black Mountain Quarry in Apple Valley, are named for their location in the California desert: Mojave Plant and Quarry, Black Mountain Quarry, Victorville Cement Plant, Lebec Cement Plant, Tehachapi Plant, Lucerne Valley Plant and Quarry, and Maricopa Plant.

Reminder that the numbers contained here are based on MSHA-reported data. Earlier in the report (Tables 1 and 2) data collected by the US Census Bureau County Business Patterns for mining employment was also reported. Table 3 in the report compares the two sources for mining employment data to each other, for reference.

Mine Name	*Boron Operations*	*Mt Pass Mine & Mill*	*Mesquite Mine*	*Cushenbury Plant*	*Oro Grande Quarry*
Owner	Rio Tinto Group	Molycorp Inc	New Gold Inc	Mitsubishi Corp	Martin Marietta Materials Inc**
Primary Material	Boron Minerals	Rare Earths Ore	Gold Ore	Cement	Cement
Employees	750-800	380-420*	255	174	137
Estimated Mine Life	45 - 70 years (estimates vary in 2010-2014 reports)	30+ years(2013 estimate)	8 years + residual leach (2015 website)	120 years with South Pit approval (2012 estimate)	41 years (2008 TXI estimate)
Year Reserves End	2050 - 2080	2043	2023	2132	2056
Contribution to Economy as Reported by Owner	Annual: $150 million in local goods and services, $4.5 million local taxes; more than $100,000 to support local community organizations (Rio Tinto)	$108 million dollars in state revenues from corporate and worker income tax and applicable severance taxes; $4.5 billion in increased economic development	Local expenditures reported for 2011 of $40 million includes both Yuma County, AZ and Imperial County, CA	$1.3 million per year in property taxes to San Bernardino County; $15 million per year in employee salaries; $ 20 million is spent each year with High Desert suppliers for materials and services.	*Report not available*
Location	Boron	Primm	Brawley	Lucerne Valley	Oro Grande
County	Kern	San Bernardino	Imperial	San Bernardino	San Bernardino
Status	Active	*Closing Oct. 2015, bankruptcy filing	Active	Active	**Active, reportedly being acquired by Taiheiyo Cement
MSHA Mine ID	400743	402542	404614	400157	400011

Table D1. Top 5 mines by persons employed in the California Desert. *Sources:* Corporate websites, MSHA, NCPA (http://www.ncpa.org/pdfs/st348.pdf).

Appendix E. Geographic Distribution of Mining Employment

While county-level analyses such as those presented earlier in this report provide a perspective on mining employment, local and regional resource planning necessitates an understanding of the specific areas where mining employment occurs. When visualized on a map, relatively compact areas of concentrated mining employment become prominent, allowing for the potential to adjust proposed boundaries for conservation proposals that would address impacts to current and potentially future mining activities.

To better understand current mining operations in the desert area beyond the top employers (see Appendix D), Mine Safety and Health Administration (MSHA) data were used to look more closely at the locations that recently reported employment to MSHA. Mines considered "active" for this mapping exercise were those reported to MSHA as "active", "intermittent", or "temporarily idled." Reported operations were mapped in a GIS to display the following characteristics of mining employment, shown in Figures E1 – E3:

- Class of commodity reported for each MSHA location that reported employment (Figure E1). *Of the 167 mines indicated on the map, the vast majority (101) are sand and gravel operations. Other commodities are stone (33), non-metal (25), metal (7) and rare earth elements (1). The rare earth elements (REE) mine at Mountain Pass is indicated as both a metal and REE on the map. The Mountain Pass mine is scheduled for non-operation in October 2015. The commodities of the five largest employers are non-metal (boron), metal (gold and REE) and stone (cement).*
- Employees reported at each mine or plant to MSHA, classed using Jenks natural breaks method (Figure E2). *The preponderance of mines employ smaller numbers of employees. The number of mines (in parentheses) associated with each class of employees is as follows: 1 – 15 employees (124); 16-62 employees (28); 63-146 employees (11); 147-420 employees (2); and 421 – 987 employees (1, the borax mine in Boron).*
- Names of mines that reported more than 25 employees to MSHA (Figure E3). *Of the 166 mines reporting employment to MSHA, 35 of the mines (21%) provide jobs for 25 or more persons.*

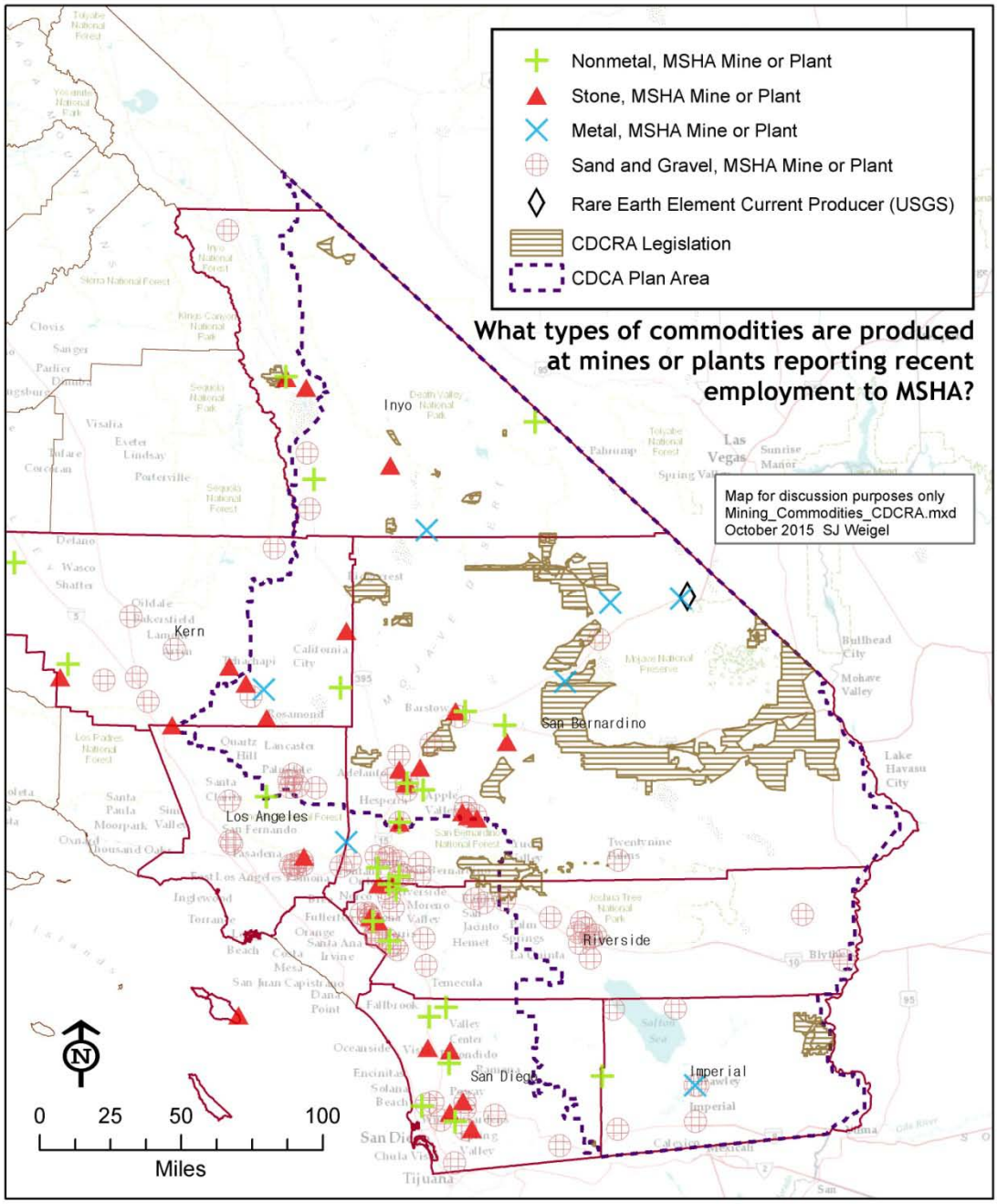
While the associated economic benefits of mining activity accrues and is reported at the level of the county, these activities are concentrated primarily in the desert areas within these 7 counties. For that reason, US Census Bureau census tracts were used to approximate the desert region (as defined by the California Desert Protection Act) so as to look more closely at activity in the desert portions of the 7 counties. Figures E4 – E5 focus on MSHA mines and mining employment in the desert census tracts in each county. These maps illustrate:

- Locations of MSHA mines reporting recent employment, by desert census tract (Figure E4). *Of MSHA reporting mines, approximately half of the mines 49% (81 of 166) are located in*

desert census tracts. Breakdown of mine locations by county indicated on map. There are many gravel operations outside of the desert areas, providing aggregate needed for construction projects.

- Numbers of employees reported to MSHA, by desert census tract (Figure E5). *In contrast to the fairly equal distribution of mine operations in desert and non-desert locations, almost three-quarters (72%) of mining employment occurs in desert census tract portion of desert counties.*

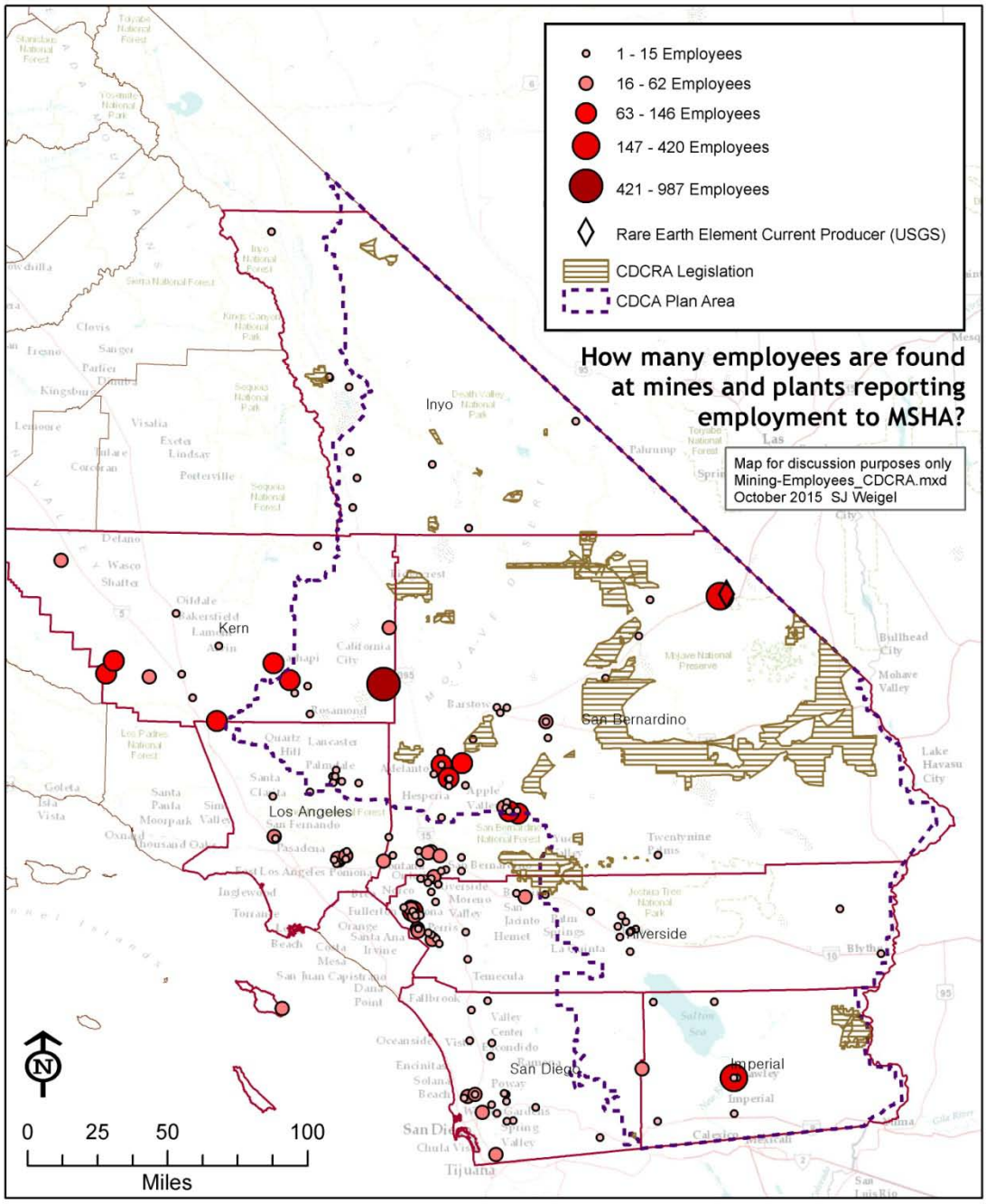
1. Locations of MSHA Active, Intermittent or Temporarily Idled Mines Reporting Employee Numbers to the Mine Safety and Health Administration (MSHA, US Dept. of Labor). *Classed by type of commodity.*
2. U.S.G.S. Rare Earth Element Current Producer Mine (Molycorp-Mountain Pass).



Data Sources: MSHA data from Mines.txt dataset, U.S. Department of Labor, Mine Safety and Health Admininstration, accessed June 2015. Rare Earth Elements Mines from USGS.

Figure E1. Mining commodities produced at plants reporting recent employment to MSHA.

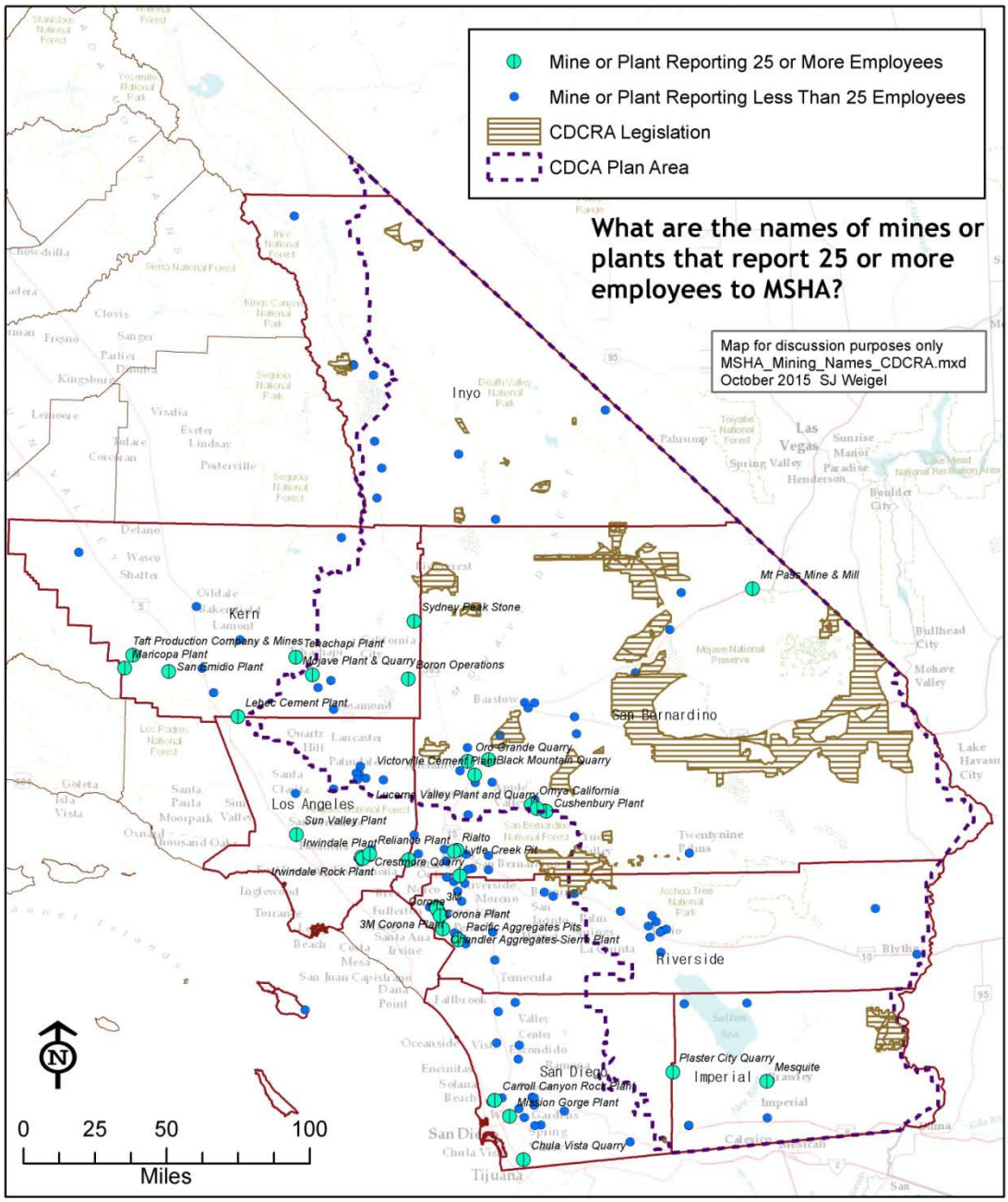
1. Locations of MSHA Active, Intermittent or Temporarily Idled Mines Reporting Employee Numbers to the Mine Safety and Health Administration (MSHA, US Departent of Labor). *Classed by number of employees.*
2. USGS Rare Earth Element Current Producer Mine (Molycorp-Mountain Pass)



Data Sources: MSHA employment numbers from U.S. Department of Labor, Mine Safety and Health Admininstration, Mines.txt data set. Data accessed June 2015. Rare Earth Elements Mines from USGS.

Figure E2. Employees at mines and plants reporting recent employment to MSHA.

Locations of MSHA Active, Intermittent or Temporarily Idled Mines Reporting 25 or More Employees to the Mine Safety and Health Administration (MSHA, US Dept. of Labor)



Data Sources: MSHA data from Mines.txt dataset, U.S. Department of Labor, Mine Safety and Health Admininstration, Data accessed June 2015.

Figure E3. Names of mines reporting over 25 employees to MSHA.

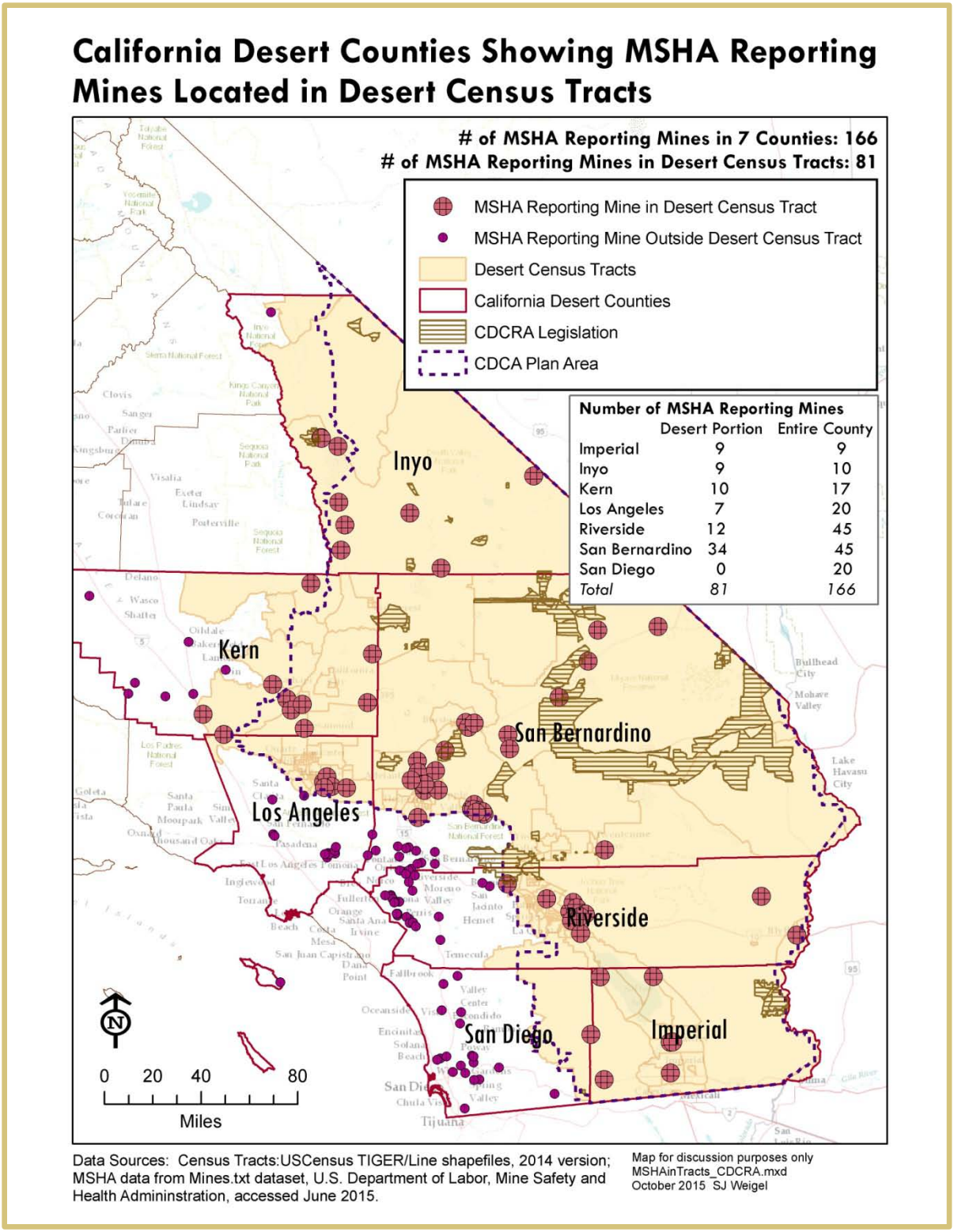


Figure E4. Locations of MSHA mines reporting recent employment, in desert and non-desert census tracts. Of MSHA reporting mines, 49% are located in desert census tracts. Breakdown of mine locations by county indicated on map.

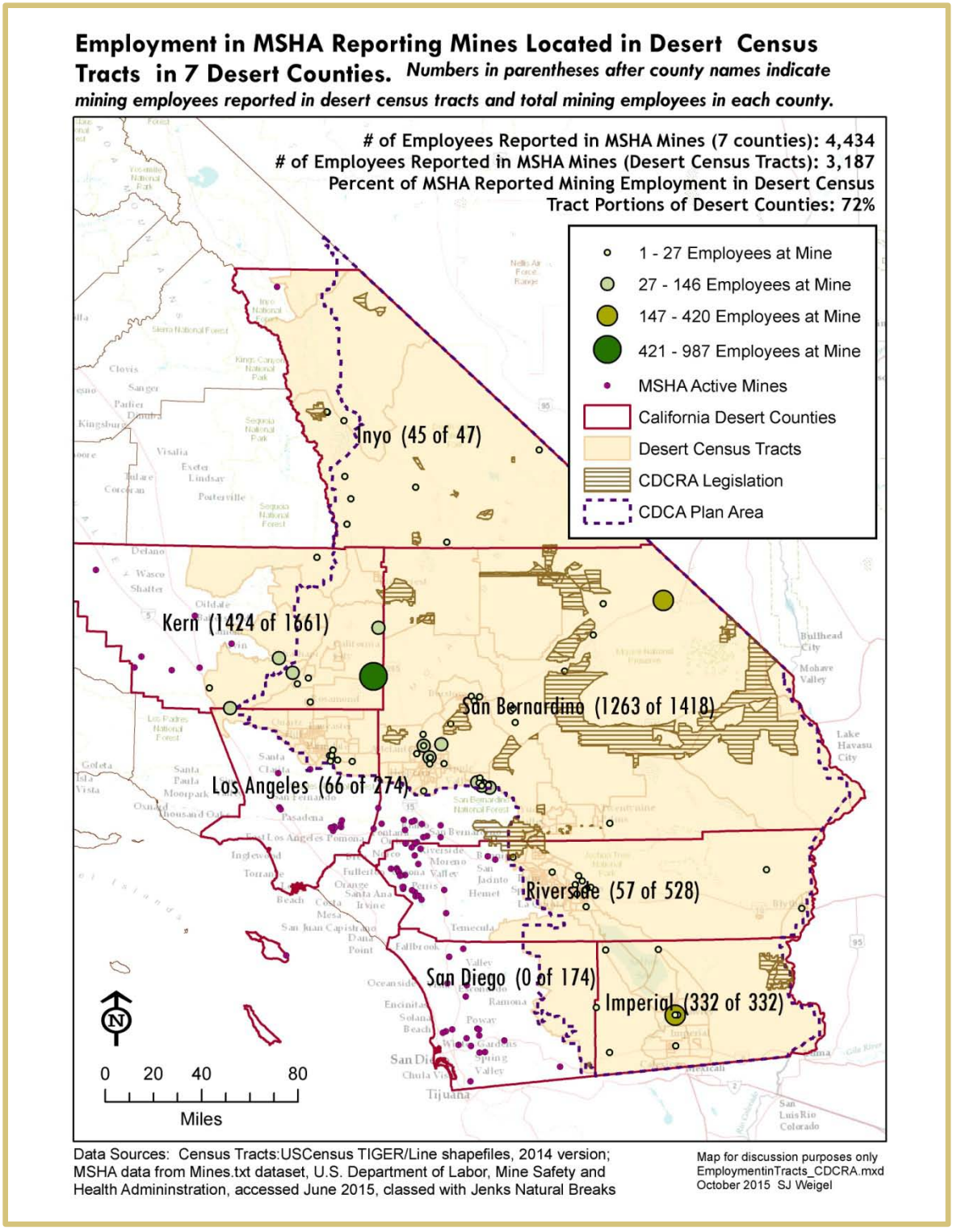


Figure E5. Employment in MSHA mines reporting recent employment in desert census tracts. Seventy-two percent of mining employment occurs in desert census tracts across the seven counties. Numbers in parentheses indicate numbers of employees reported in desert census tracts, of total mining employees in that county.