

Study of Geographical Differences in California Workers' Compensation Claim Costs

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Notice

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About the Workers' Compensation Insurance Rating Bureau of California

For 100 years, the WCIRB has been a trusted, objective and integral component of the California workers' compensation system.

As a licensed rating organization and the California Insurance Commissioner's designated statistical agent, the WCIRB performs a number of functions, including collection of premium and loss data on every workers' compensation insurance policy, examination of policy documents, inspections of insured businesses, and test audits of insurer payroll audits and claims classification. This data is used to advise the Insurance Commissioner and other stakeholders of the costs of providing workers' compensation benefits.

The WCIRB is a California unincorporated, private, nonprofit association comprised of all companies licensed to transact workers' compensation insurance in California, and has over 400 member companies. No state money is used to fund its operations.

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Executive Summary

The purpose of this study is to utilize several informational sources to assess regional differences in California workers' compensation claim frequency and severity during a particular period (for policies incepting during the July 1, 2012 through June 30, 2013 period). This study reflects a reasonable approximation of reported claims and payrolls by region within California during this period, but not a precise segregation of those components on a risk-by-risk basis. Nor does the study suggest whether the regional differences identified in the study have existed at similar levels in the past, or will persist into the future. As a result, while the study provides important insights into regional differences within the state, it does not provide a basis to reflect such differences in the advisory pure premium rates developed by the WCIRB for proposal to the Insurance Commissioner.

The study documents significant differences among California regions. After controlling for wage level differences and industrial mix, significantly higher frequencies are found in the Los Angeles region relative to statewide levels. Lower claim frequencies are found in the Silicon Valley and San Francisco Bay Area.

Regional average claim cost, or severity, differences at the early claim maturity level reflected in the WCIRB study are significantly more muted than frequency differences. Severities tend to be higher in the Central Valley and most of the more urban coastal areas and lower in the more remote, rural areas of the state.

Basis of Analysis

While the WCIRB's unit statistical data lacks refined geographical information, WCIRB staff developed a dataset that allows estimates of the incidence of exposures and claims by classification and region. The dataset was developed by linking the WCIRB's unit statistical and medical transactional datasets with external data. The external data was used to control for regional wage differentials, industrial mix and the number of workers at each location. WCIRB staff developed geographic regions that reflect high degrees of provider commonality while at the same time being robust, credible and independent of the claim cost measures under study. A mapping of nine-digit zip codes to the study regions is available in the [Research and Analysis](#) section of the WCIRB website (www.wcirb.com). The attached Technical Appendix describes in greater detail the methodologies used in the study.

This first enriched dataset comprises only approximately one policy year of data and is therefore only a snapshot in time—for this study, fiscal policy year July 1, 2012 through June 30, 2013. Future datasets will enable the WCIRB to monitor changes in regional claim costs over time as the WCIRB builds on this work.

Results

This study is based on unit statistical first report data for policies incepting July 1, 2012 through June 30, 2013. This fiscal policy year of data was linked with the WCIRB's medical transactional data and with Dun and Bradstreet's Hoover's (Hoover's) data. The Hoover's data was as of January 5, 2015. The Hoover's data corresponding to the unit statistical period was not available. The temporal mismatch between these datasets is not immaterial but expected to improve in future studies as contemporaneous data becomes available. The Hoover's data was used to geolocate exposures by classification. The WCIRB's medical transactional data was used to geolocate claims. The methods used in this study are discussed in greater detail in the Technical Appendix.

Exhibit 1 provides a map of the regions developed by WCIRB staff. A mapping of nine digit zip codes to the study regions is available in the [Research and Analysis](#) section of the WCIRB website (www.wcirb.com).

Exhibits 2 and 3 show indemnity and total claim frequency relative to statewide, respectively. The expected statewide frequencies were developed at a classification level. Claim frequencies for the Los Angeles area are higher than the statewide average while claim frequencies for the Bay Area are lower, even after controlling for industrial mix and wage level differentials. The information underlying the maps in Exhibits 2 and 3, and all maps presented, is included in the Technical Appendix.

Exhibit 4 shows incurred indemnity severity on indemnity claims relative to statewide. These indemnity severities are at first report level and are not necessarily the indemnity severities ultimately expected as claims mature. Exhibit 5 shows the median injured worker's average weekly wage for the geolocated claims. Higher wages tend to prevail in California's Los Angeles and San Francisco Bay Area urban centers. The indemnity severities have not been adjusted to reflect regional wage differentials.

Exhibit 6 shows the incurred medical severity for indemnity claims, controlled for classification mix, relative to statewide. As with the indemnity severities, these medical severities are at first report level and are not necessarily the severities ultimately expected as claims mature.

Exhibit 7 shows the share of claims that are cumulative trauma or occupational disease by region.

Conditions and Limitations

The WCIRB has completed its study of geographical differences based primarily on reported unit statistical payroll and claim costs, medical transactions and wage information for policies incepting between July 1, 2012 and June 30, 2013 and reflects approximately 90% of the insurance market. In reviewing this information, the following should be noted:

1. The study reflects a reasonable approximation of reported claims and payrolls by region within California during the study period, but not a precise segregation of those components on a risk-by-risk basis. Nor does the study suggest whether the regional differences identified in the study have existed at similar levels in the past, or will persist into the future. As a result, the study does not provide a basis to reflect such differences in the advisory pure premium rates developed by the WCIRB for proposal to the Insurance Commissioner.
2. This report reflects a compilation of individual insurer submissions of data to the WCIRB. While the individual insurer data submissions are regularly checked for consistency and comparability with other data submitted by the insurer as well as with data submitted by other insurers, the source information underlying each insurer's data submission is not verified by the WCIRB. Similarly, the external sources of information relied upon by the WCIRB in the study were accepted without audit.
3. The claim and loss information shown in the study reflects information at early maturity levels. Development patterns may differ across regions and it is possible that, in particular, severity differences at an ultimate level may differ from those based on early maturity levels.
4. The information shown represents statewide and regional summaries based on the amounts reported by insurers writing workers' compensation insurance in California. The results for any individual insurer can differ significantly from the average of all insurers. An individual insurer's results are related to its underwriting, book of business, claims and reserving practices, as well as the nature of its reinsurance arrangements.

Exhibit 1: Geographic Regions

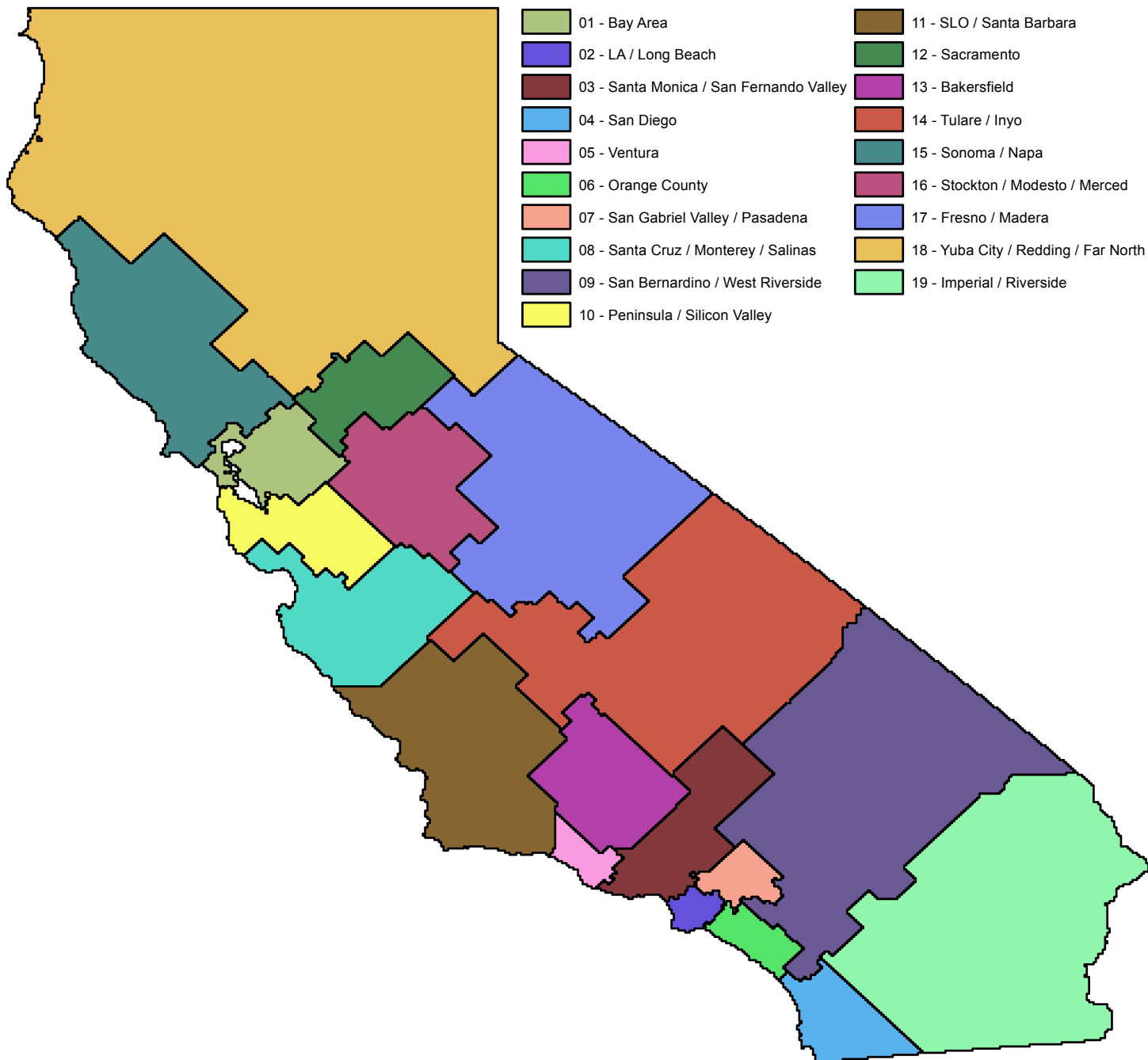
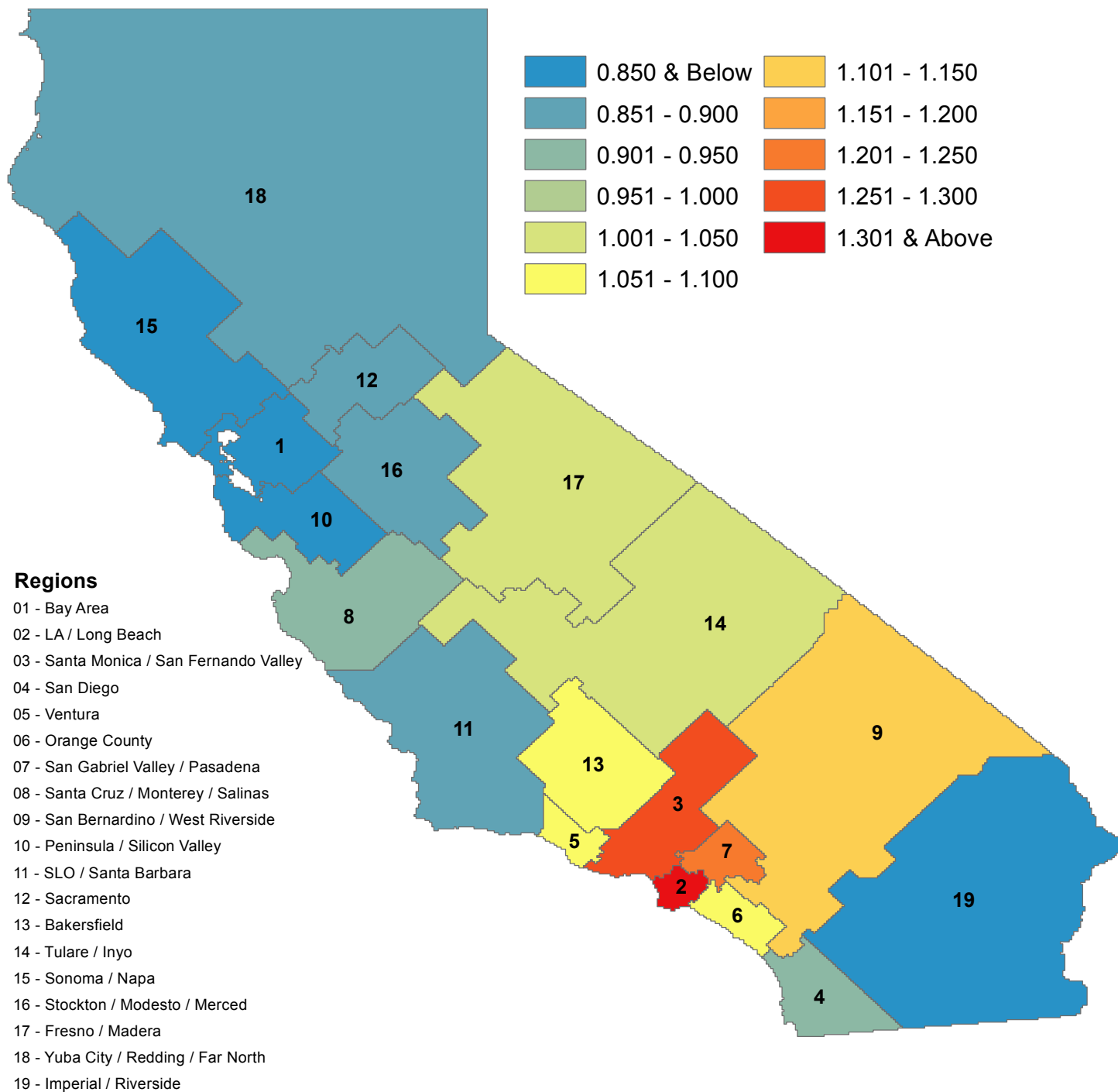
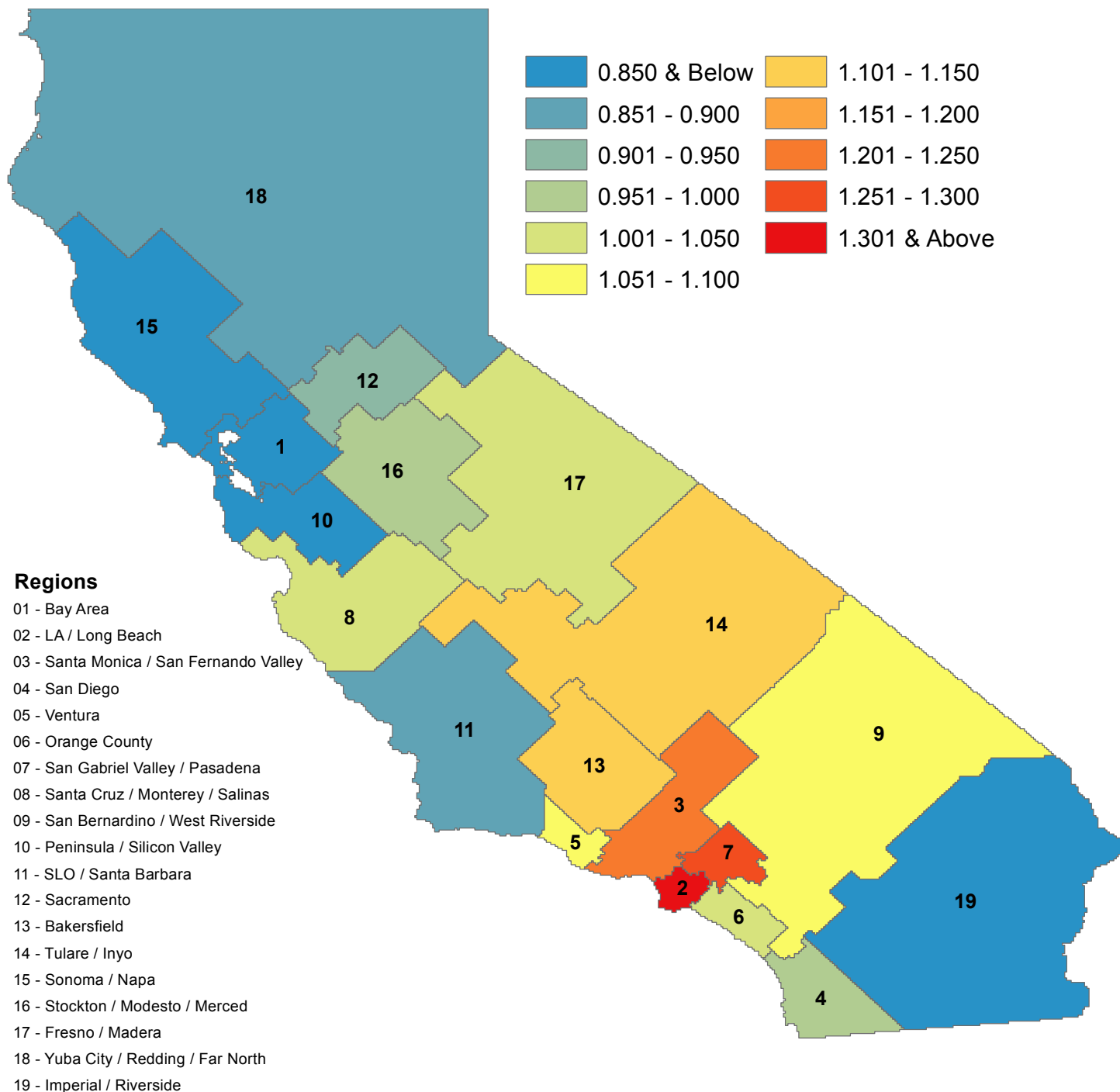


Exhibit 2: Indemnity Frequency Relative to Statewide Controlled for Class Mix - at First Report Level



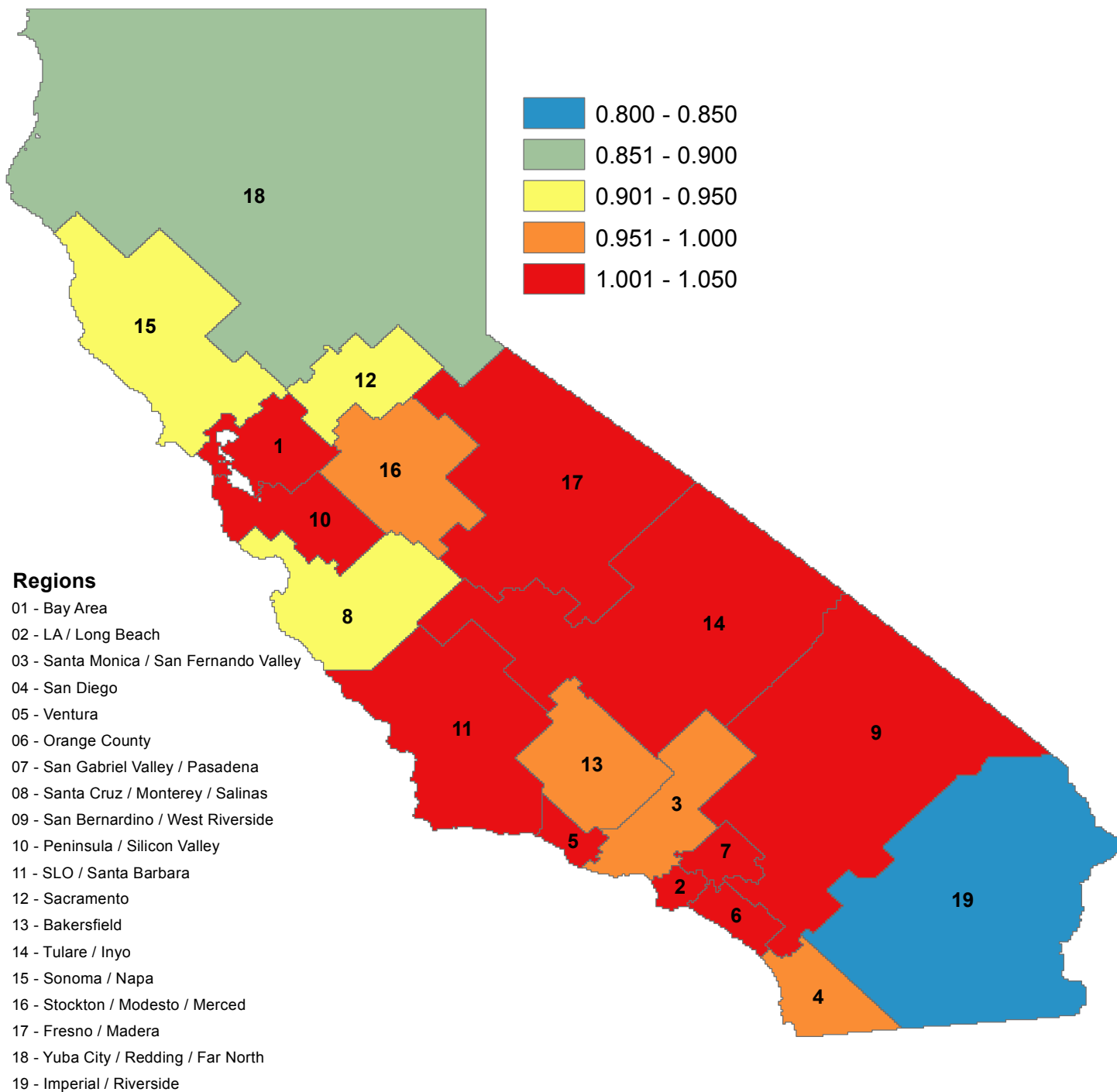
Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Exhibit 3: Total Frequency Relative to Statewide Controlled for Class Mix - at First Report Level



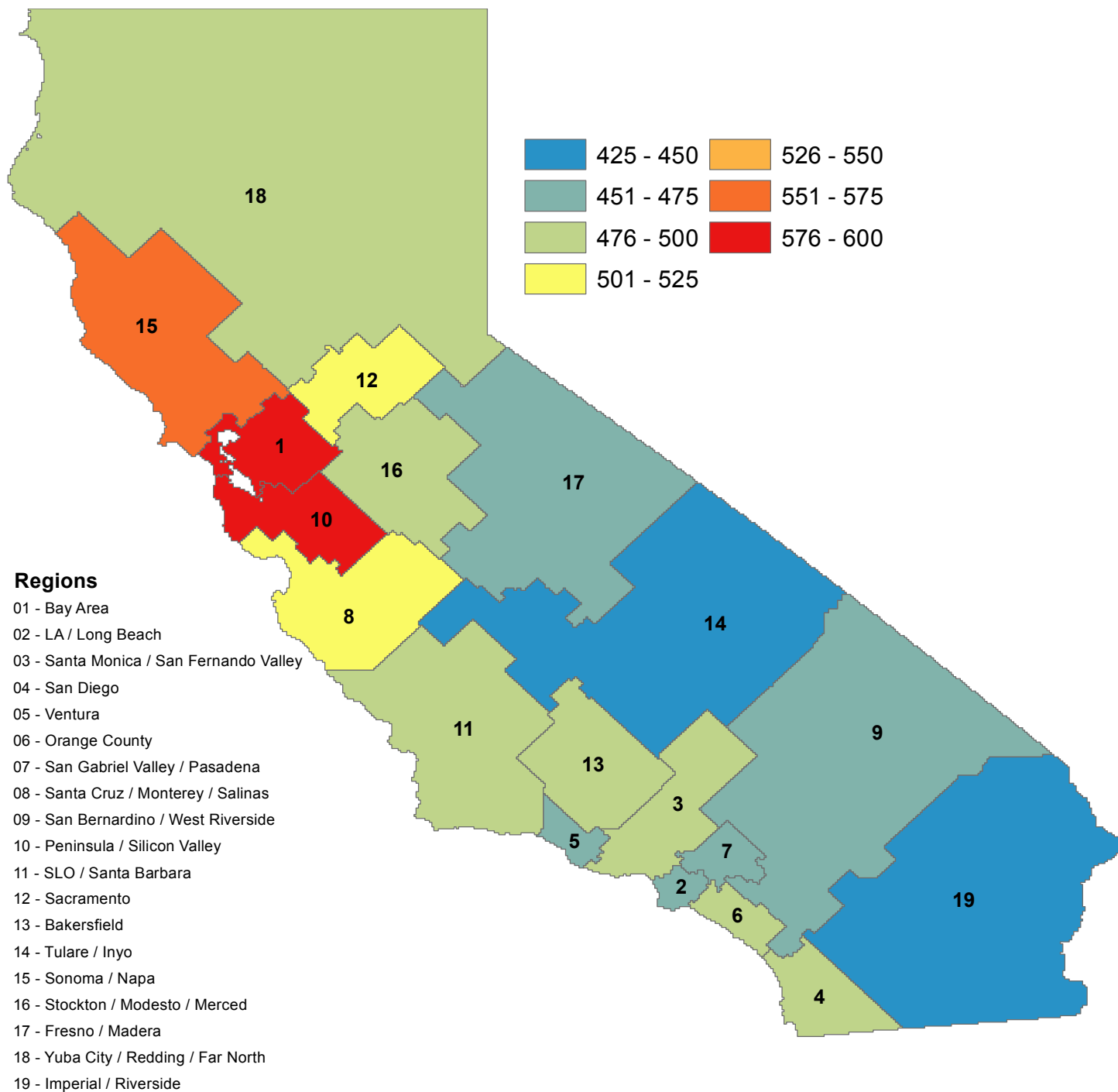
Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Exhibit 4: Incurred Indemnity on Indemnity Claims Relative to Statewide Controlled for Class Mix - at First Report Level



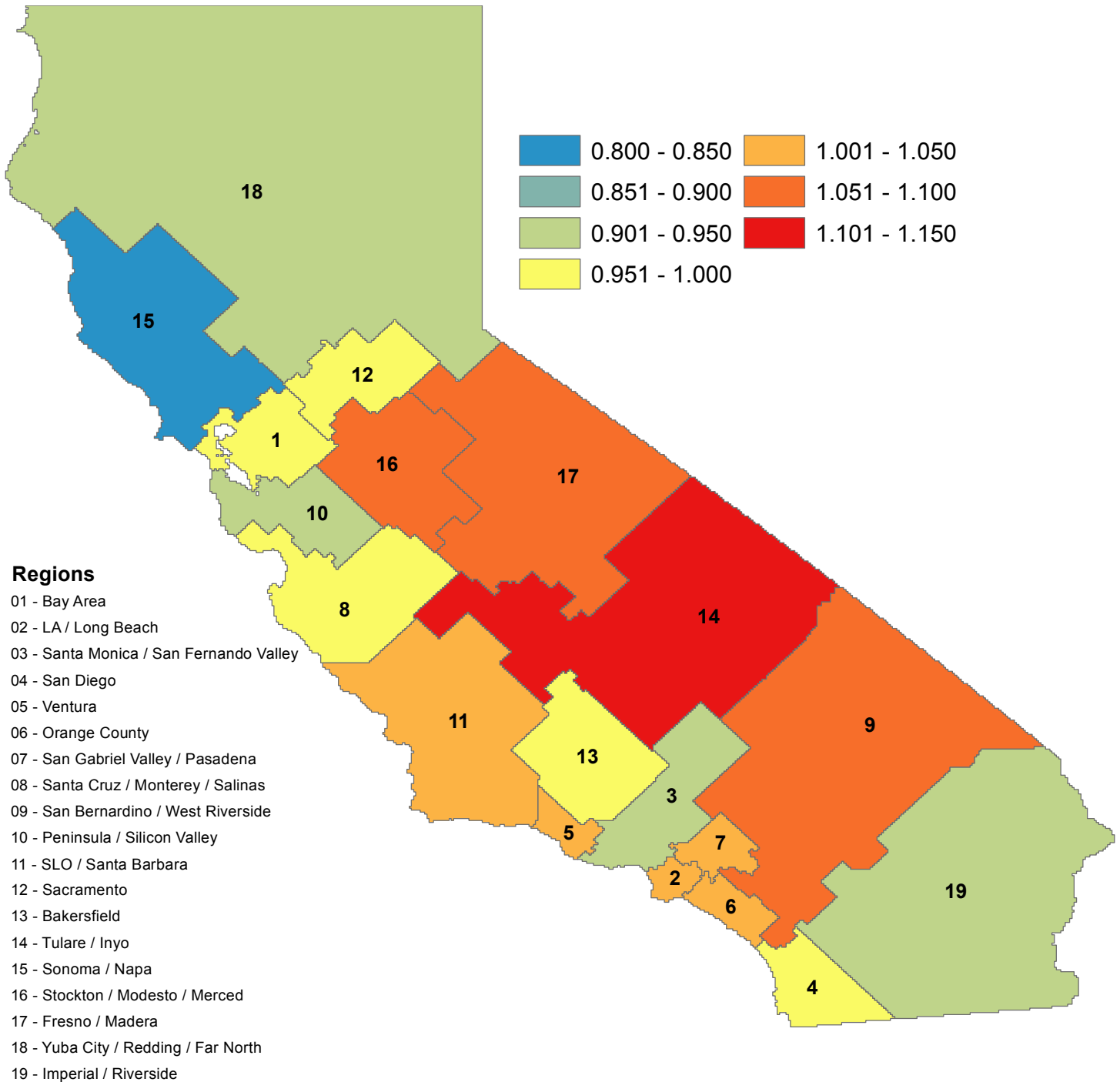
Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Exhibit 5: Median Injured Worker's Average Weekly Wage



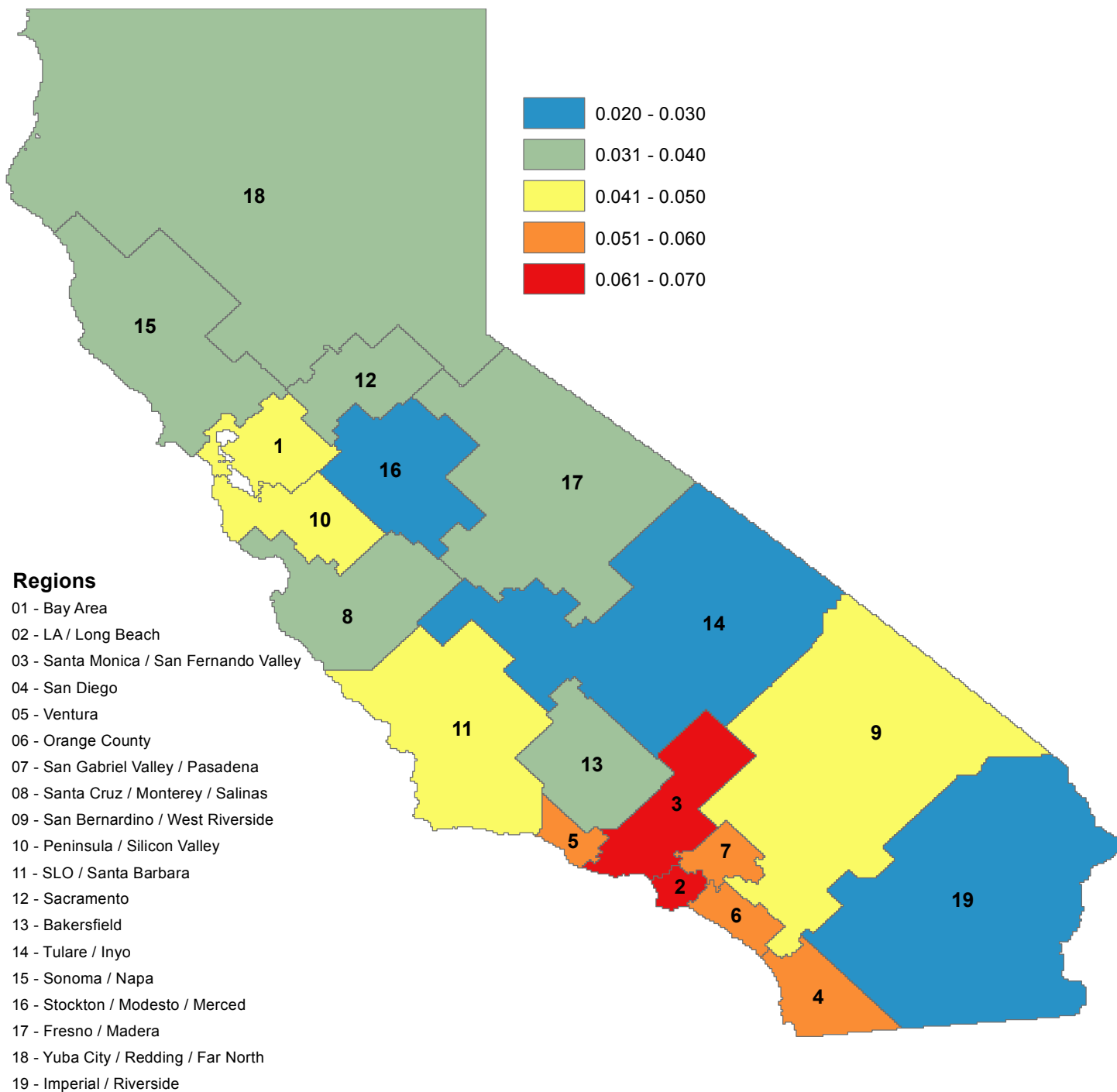
Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Exhibit 6: Incurred Medical on Indemnity Claims Relative to Statewide Controlled for Class Mix - at First Report Level



Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Exhibit 7: Cumulative Injury & Occupational Disease Claims As a Share of Total Claims - at First Report Level



Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Technical Appendix

Increasing anecdotal evidence of geographical differences in California workers' compensation claim costs led WCIRB staff to develop a database that could provide refined estimates of regional claim frequency and other claim cost differentials. This new database resolves two problems with unit statistical report (USR) data, which does not provide geographic information for exposures or claims.

The first problem is determining the appropriate allocation of USR exposures by classification to geographic locations. This problem was resolved by linking the WCIRB's USR data to Hoover's data, which provides information on employer locations, the industries at each location, and estimates of the number of employees at each location. The second problem is determining the appropriate allocation of claims to geographic location. This problem was resolved by using the geographic information for select data available in the WCIRB's medical data call (MDC). The resulting triple-linked database—USR, MDC and Hoover's—provided an enriched database that allowed for more refined analyses of geographical differences across California.

In addition to the three primary data sources used to form the triple-linked database, WCIRB staff utilized the following sources:

- WCIRB policy and inspection report data (for names and addresses)
- Occupational Employment Survey (to develop regional wage adjustments)
- Self-Insurance Rosters of the Division of Workers Compensation's Self Insurance Program

Methods of Linkage—USR to Hoover's

Multiple methods were used to link USR and Hoover's data. Linkages were established using employer names (including owner/proprietor, Doing Business As, and parent company names), addresses, and Federal Employer Identification Numbers. A protocol was established among linkage methods to avoid ambiguity. Ambiguously matched data was excluded from this study.

There is a temporal mismatch between the WCIRB's July 1, 2012 through June 30, 2013 fiscal policy year of USR data and the Hoover's data, which was as of January 5, 2015. This mismatch was not immaterial. Hoover's identifies newly founded employer locations. Approximately 6% of Hoover's records were identified as founded *after* the USR inception dates included in the study. A comparable share of USR data is likely associated with employers that went out of business between the study period and the timing of the Hoover's data capture. Additionally, employers move, which can prevent matching on employer addresses. In spite of these obstacles, staff was able to develop a credible database that represented approximately 75% of the target fiscal policy year of data. The missing data was evaluated for its potential to bias regional differentials and no significant biases were found. Over time, the availability of contemporaneous Hoover's and USR data will ameliorate many of these problems and allow for enhanced USR-Hoover's match rates.

In parallel with linking the USR and Hoover's data, WCIRB staff also matched Hoover's data to the self insurance rosters published by the California Division of Workers' Compensation's Self Insurance Program. Self-insured employers identified in the Hoover's data were then able to be excluded from matching with USR data to increase the overall quality of the matching.

Methods of Linkage—USR to MDC

The USR data was linked with MDC data using policy and claim number matching. While more straightforward, the linkages between these datasets are not complete. Not all insurers participate in MDC. For the study period, approximately 10% of insured data was not in MDC because the insurer did not participate in MDC. Because this study was done at an employer level, the data for employers with policies of insurers both in and out of MDC was excluded. (For this reason, future studies anticipate conducting the analysis at a policy level.) Further, only claims that were *medically active and for which*

Technical Appendix

data was submitted to MDC are available in MDC. USR claims for which there were no medical payments captured in MDC will not be available to match with MDC. Settlements paid directly to injured workers, for example, typically would not be captured in MDC.

Geolocating Exposures

Exposures were allocated to locations recognizing regional wage differentials (developed from the Occupational Employment Survey) and the relative number of employees estimated by Hoover's to be at each location. Each classification's exposures were allocated to locations using the industry at the location provided by Hoover's.

Geolocating Claims

Claims were allocated to locations at which the claim's classification had exposure allocated. Claims were located to the nearest appropriate location by calculating the location of each claim's 'center of medical services' determined from select MDC observations. Not all MDC observations were used to geolocate claims. Based on a study of single-location employers, WCIRB staff developed a hierarchy of MDC features based on whether they provided good, acceptable or poor geolocating information. Only MDC features that provided good or acceptable geolocating information were used in the study. The average number of MDC observations used to geolocate a successfully located claim was 14. The average number of MDC observations for these claims was 40; so, on average, 35% of MDC observations were used to geolocate.

Identifying Optimal Geographic Units of Analysis

While initial analyses utilized geospatial clustering (hot spot) analysis of target claim measures and similar methods, these methods might not identify geographic units that would be robust over time. Instead, a market area approach to identify economically cohesive geographical units was used. To identify economically cohesive geographical units, staff examined the "correlation" of providers among geographic units. The idea is that geographies utilizing common providers form a natural geographic unit.

To identify economically cohesive geographical units, WCIRB staff first identified the minimum number of claims required in a geographic unit for reasonably stable results. A selection of 130 claims was made based on reviewing the clustering patterns for geographical units with greater claim volumes and identifying the volumes below which the ability to detect previously identified and stable clusters deteriorated. The average geolocated claim's number of MDC observations used to geolocate claims was 14, so the expected number of geolocating MDC observations for a geographic unit with 130 claims was 1,820.

Staff then developed a customized raster (grid) for the state for which each cell had at least 130 claims. Cells varied in geographic area as required to include at least 130 claims. Cells smaller than 1.3mi² in geographic area but with more than 130 claims were not subdivided. The provider "correlation" matrix for the raster was then calculated. If two geographic units had half of the providers in common, then the "correlation" between the two units was 0.50. The provider "correlations" range between zero and unity. The statewide average provider "correlation" across the raster was 0.12.

Unity less the provider "correlation" was used as a measure of dissimilarity between geographic units. Cluster analysis was then performed using this measure of dissimilarity with the Ward's 2D linkage criterion. The cluster analysis algorithm first divides the state into two clusters such that the dissimilarity within the clusters is minimized. This process is repeated iteratively for each division until a desired number of clusters or some other stopping criteria is reached. WCIRB staff evaluated a range of clusters and selected 19 as striking a good balance between robustness in the geographic units' results and the level of refinement. The average provider "correlation" for the selected 19 geographic regions is 0.40.

Technical Appendix

Tables

The following tables provide the data underlying the exhibit maps.

- Table 1 provides the data underlying Exhibits 2 and 3.
- Table 2 provides the data underlying Exhibits 4 through 7.

A mapping of U.S. Postal Service nine-digit zip codes to the study regions is available in the [Research and Analysis](#) section of the WCIRB website (www.wcirb.com). Note that an accurate mapping requires the use of the nine-digit, or zip plus 4, codes. Regions are not uniquely identified at the five-digit zip code level and five-digit zip codes may map to multiple regions.

Table 1: Data Underlying Exhibits 2 and 3

Cluster	Region	Relative to Statewide Frequency	
		Indemnity Claims	Total Claims
1	Bay Area	0.788	0.756
2	LA / Long Beach	1.365	1.345
3	Santa Monica / San Fernando Valley	1.267	1.203
4	San Diego	0.938	0.982
5	Ventura	1.072	1.095
6	Orange County	1.080	1.028
7	San Gabriel Valley / Pasadena	1.217	1.267
8	Santa Cruz / Monterey / Salinas	0.932	1.040
9	San Bernardino / West Riverside	1.114	1.092
10	Peninsula / Silicon Valley	0.595	0.616
11	SLO / Santa Barbara	0.887	0.852
12	Sacramento	0.877	0.921
13	Bakersfield	1.078	1.132
14	Tulare / Inyo	1.047	1.121
15	Sonoma / Napa	0.773	0.760
16	Stockton / Modesto / Merced	0.875	0.980
17	Fresno / Madera	1.035	1.030
18	Yuba City / Redding / Far North	0.858	0.881
19	Imperial / Riverside	0.829	0.788
Total	Statewide	1.000	1.000

Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.

Table 2: Data Underlying Exhibits 4 through 7

Cluster	Region	Relative to Statewide		Median Injured Worker's Average Weekly Wage	Cumulative Injury & Occupational Disease Claims Share of Total Claims
		Incurred Indemnity on Indemnity Claims	Incurred Medical Claims* on Indemnity Claims		
1	Bay Area	1.046	0.999	591	0.044
2	LA / Long Beach	1.035	1.015	460	0.061
3	Santa Monica / San Fernando Valley	0.993	0.948	479	0.063
4	San Diego	0.971	0.982	498	0.055
5	Ventura	1.022	1.034	468	0.051
6	Orange County	1.045	1.046	480	0.054
7	San Gabriel Valley / Pasadena	1.004	1.014	460	0.050
8	Santa Cruz / Monterey / Salinas	0.930	0.981	510	0.033
9	San Bernardino / West Riverside	1.001	1.077	474	0.041
10	Peninsula / Silicon Valley	1.002	0.938	598	0.042
11	SLO / Santa Barbara	1.027	1.029	486	0.048
12	Sacramento	0.902	0.970	501	0.036
13	Bakersfield	0.951	0.970	480	0.031
14	Tulare / Inyo	1.024	1.124	427	0.022
15	Sonoma / Napa	0.908	0.829	554	0.038
16	Stockton / Modesto / Merced	0.979	1.086	499	0.029
17	Fresno / Madera	1.036	1.052	461	0.036
18	Yuba City / Redding / Far North	0.881	0.916	480	0.035
19	Imperial / Riverside	0.843	0.905	440	0.029
Total	Statewide	1.000	1.000	495	0.048

*Note: A single claim from the Tulare / Inyo region and a single claim from the LA / Long Beach region were each limited to \$5.5M of Incurred Medical.

Source: WCIRB unit statistical data, for policies incepting July 1, 2012 through June 30, 2013 at First Report.



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