

## San Diego Economy “Drought-Resistant,” With Exceptions

### KEY FINDINGS

- On average, non-agricultural private sector businesses in San Diego County **annually use 6,887 cubic feet (54,341 gallons) of water for each employee on their payroll.**
- **Water restrictions are unlikely to have a region-wide economic impact.** The industries in the region which have the greatest effect on San Diego’s gross domestic product largely use water for non-core business functions and water restrictions and cutbacks are likely to impose inconveniences rather than hardships.
- **Cutbacks will have a modest economic impact on a subset of industries:**
  - **Agriculture** is the industry most at risk. It uses 33.4 times more water (230,400 cubic feet) than the regional average. The sector employs less than one percent (0.9%) of all private sector workers (10,400 payroll workers as of March 2015) in the region and accounts for 0.4% of San Diego County’s GDP.
  - **An additional 37,400 workers are employed in four “water intensive” industries** (Brewers & Soft Drink Bottlers, Dry Cleaners and Laundry Services, Food Manufactures, General Construction). These firms use more than double the non-agricultural private sector average.
  - **Of special concern are the region’s high-tech and life science industries.** These industries both employ a significant number of workers (123,799) and use 45% more water on a per-employee basis than the rest of the private sector. While cutbacks are unlikely to significantly decrease employment, there may be individual businesses in the industries that have to make new investments in conservation measures.

## **INTRODUCTION**

On April 14, 2015 the board of the Metropolitan Water District of Southern California voted to reduce water delivery to member agencies, including the San Diego County Water Authority, by 15%. This followed a fourth consecutive dry winter and a very public press event where Governor Jerry Brown stood on a snowless Echo Summit where the final reading of the winter snowpack was scheduled to take place. As California experiences its fourth year of drought, some have voiced concern that the drought will have acted as a drag on the region's economy.

## **METHODS AND ANALYSIS**

In 2009 the U.S. Bureau of Reclamation released a report entitled "Water and Energy Efficiency Program for Commercial, Industrial, and Institutional Customer Classes in Southern California" (<http://www.usbr.gov/lc/socal/reports/weep/Vol1ExecSumm.pdf>) which analyzed the water bills of several thousand businesses in San Diego, Orange, and Los Angeles Counties. The report sorted these businesses according to their three-digit North American Industry Classification System (NAICS) codes. This hierarchical classification system sorts businesses into distinct categories according to their principal business activity. The three digit NAICS code level provides enough detail to draw conclusions about which businesses use water largely for outdoor landscaping, health, and hygiene and those which utilize water in core business activities.

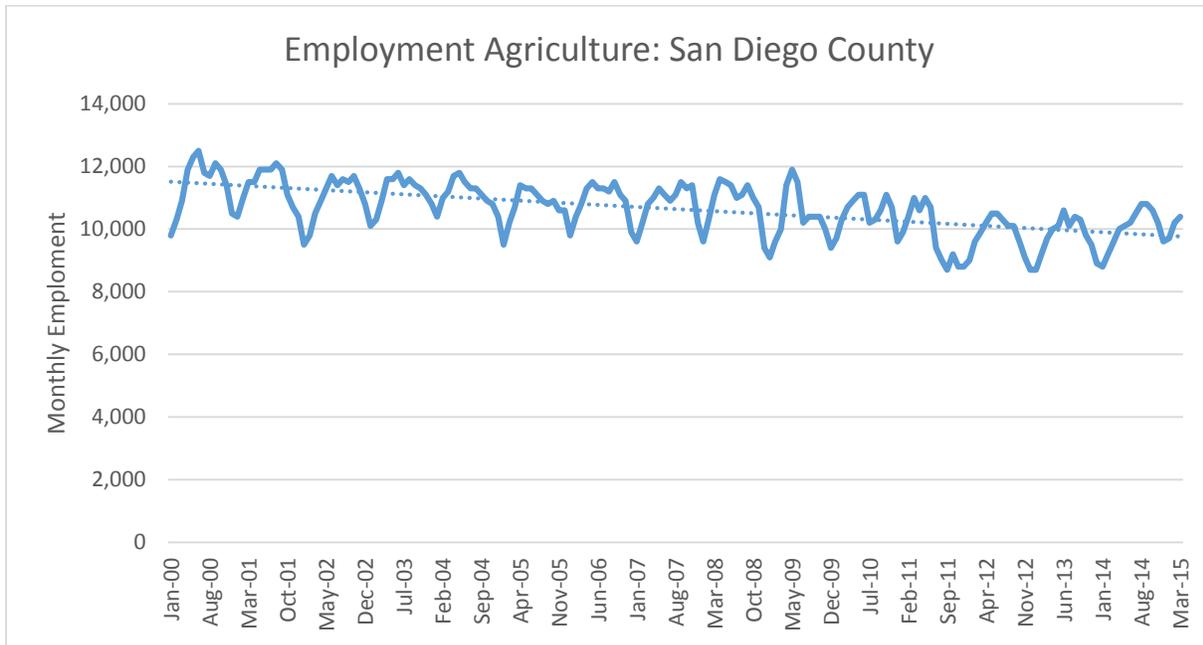
We augmented this data by obtaining industry-level employment data from the Quarterly Census of Employment and Wages (QCEW). This allowed us to calculate the amount of water used annually per employee in each of the NAICS categories. A key assumption we have to make is that that water use has not changed between when the data was collected in 2009 and today. While 2009 was also a dry year, to the extent to which industries have increased conservation efforts, this policy brief may overestimate water use.

We set aside industry categories in which the number of businesses examined in the 2009 report represented less than 25% of the total number of establishments in that industry in the region. We also did not include in our analysis any category in which average monthly employment during 2013 in San Diego County was less than 1,500 (all data is included in Appendix A). Finally, NAICS code 531 (Real Estate) was excluded from further analysis. The 2009 report indicated a very high per employee water use (224.7 HCF per employee) for this industry. A plausible explanation for this is that this NAICS code includes managers of office buildings and complexes and that the 2009 researchers assigned all the water used at these multi-tenant properties to the management firm. After these exclusions we were left with 60 industries in the dataset.

## **FINDINGS: AGRICULTURE**

According to the San Diego County Water Authority agricultural customers used 51,851 acre feet of water in 2013 and employed 9,800 workers. That equates to 2,304 HCF of water annually used per payroll employee in the agricultural industry. As noted below, that would mean the industry is 33.4 more times water intensive on a per employee basis than the average for the private sector as a whole and more than 11 times more water intensive than the next most intensive industry (brewers and soft drink beverage manufacturers use 223 HCF per employee per year) in the region.

The drought is creating challenges for this industry and it is likely that employment and earnings will drop as water becomes both scarcer and more expensive. According to the county agricultural report, the value of crops grown in San Diego has increased faster than the rate of inflation over the past five years. It suggests that farmers are switching toward higher value crops. In addition, recent news stories suggest that as restrictions have tightened and the cost of water has continued to increase, some farmers are decreasing the amount of acreage they have in production.<sup>i</sup> Both of these trends are likely to increase downward pressure on agricultural employment in the region, a trend that has been evident before the drought.



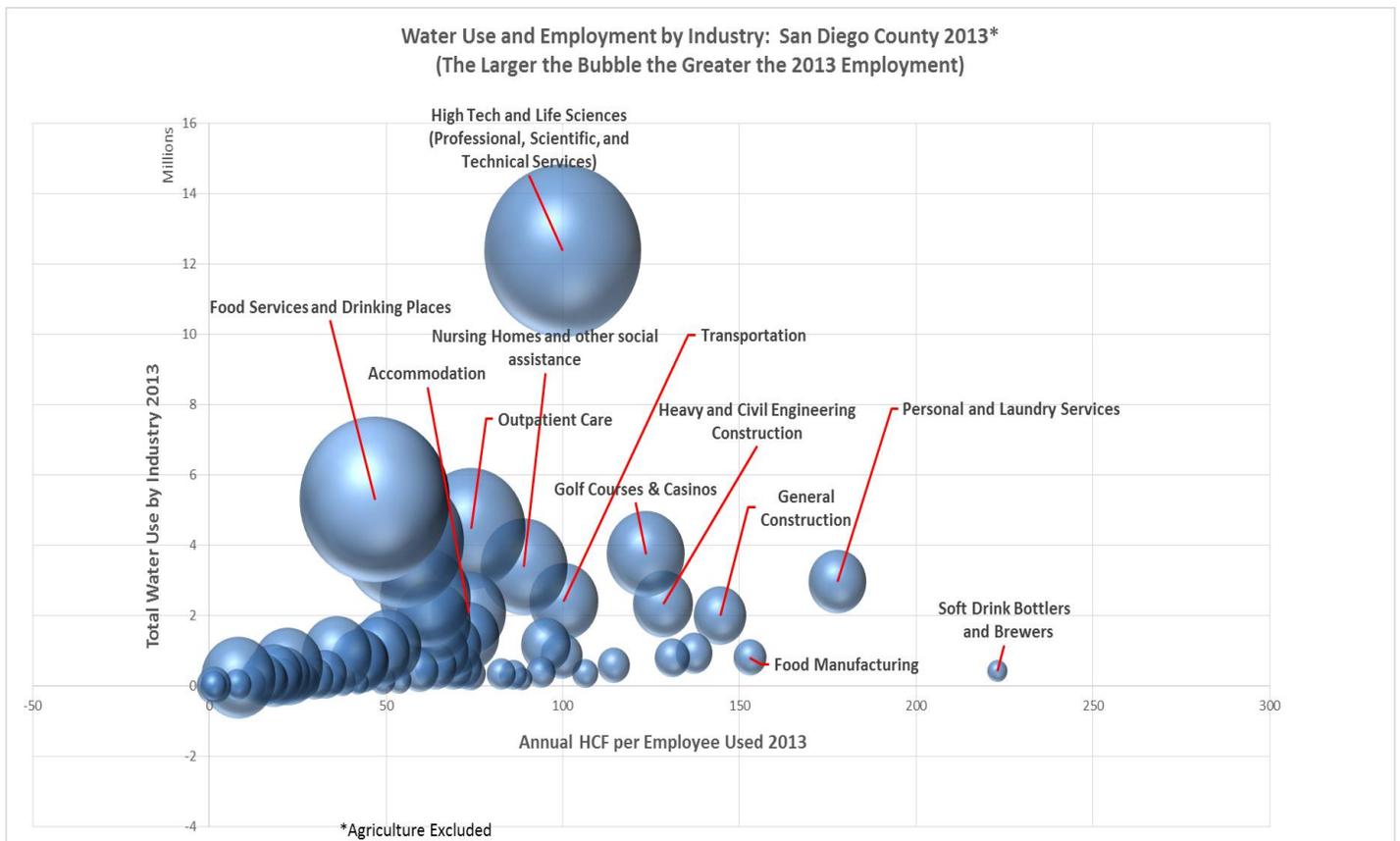
### FINDINGS: OTHER PRIVATE SECTOR USES

The annual average use per employee of the non-agricultural industries we examined is 68.9 hundred cubic feet (HCF). That equates to 141 gallons per employee per day. The least amount of water used per employee was by firms in the broadcasting industry, annually consuming a paltry 1.8 HCF per employee. Thirteen other industries, employing a total of 140,889 workers in 2013, annually use between 1.8 and 25.0 HCF. These include telecommunications (24.6 HCF per employee), Hospitals (23.7 HCF) and General Merchandise Stores (8.22 HCF).

On the other end of the scale is the beverage manufacturing industry (including brewing and soft drink bottlers) which consumes an annual average of 223 HCF per employee and the laundry service industry which uses 177.8 HCF per employee. Other high water users, as measured by the amount of water they use per worker, are the general construction industry (144.6 HCF per employee), golf courses & casinos (128.4 HCF) and nursing and residential care facilities (100.3 HCF). As with agriculture, some of these industries are making changes to minimize impacts, including increasing the use of reclaimed water, reducing outdoor landscaping and, where possible, recycling water to maximize its efficient use.<sup>ii</sup>

Professional, Scientific, and Technical Services (NAICS 541) is an industry worth specific mention. This industry category is large, employing 123,799 San Diegans in 2013 and which pays wages well above the regional private sector average. Firms in this industry use 99.98 HCF per employee per year – or a total of 12.4 million HCF in 2013. On a per employee basis, that level of water use is 45% higher than the average for the rest of the non-agricultural private sector. Some of this water is used for outdoor landscaping and mandatory cutbacks will have only minor disruptions. Some water, however, is more central to business processes, used in laboratories and industrial applications. Of particular concern is the important of water to the region’s life science industry which has voiced on a number of occasions that water cut backs would have a deleterious impact on their operations.

Figure 2 illustrates how water use varies in the region. The horizontal axis shows the amount of water used per employee. The vertical axis shows the total amount of water used by the industry. The bubbles illustrate the total 2013 employment of the industry. A way to think of this table is that along the vertical axis the table measures the *intensity* of water use and which industries might be targeted for increased conservation efforts. On the horizontal axis industries are sorted by the overall *productivity* of use - which industries use the most water per worker. The size of the bubbles give a rough measurer of the importance of the industries to the region’s overall economy. For example, firms in the Personal and Laundry services use a large amount of water on a per employee bases. The relatively small size of the industry, however, means that as a whole it doesn’t consume that much water or has a major contribution to overall regional employment. Conversely, while the food services and drinking places industry does not use much water on a per employee basis, the large size of that industry in our region means that the industry as a whole consumes a significant amount of water.



## **CONCLUSIONS**

Most press reports suggest that policy makers are hoping to reduce water consumption by 15% to 25%. We believe these conservation targets can be met without significant economic impact. 22 industries, employing 230,000 workers use, on average, less water than 43 HCF a year - the amount the City of San Diego estimates residential customers annually use.<sup>iii</sup> Another 19 industries, employing 483,000 workers use between 43HCF and 84 HCF per year. While conservation is likely to impose some challenges on businesses, it seems unlikely they would be so significant to business operations that it would noticeably impact regional employment.

Where mandatory cut backs are likely to be most felt is among the industries, employing about 50,000 workers who use more than 145 HCFs. For some of these businesses, such as laundry services, golf courses and car washes, significant water reductions and restrictions may require additional capital expenditures and changes in operations. For others, such as agriculture, water scarcity may require that acreage is taken out of production, negatively impacting employment.

## APPENDIX

NAICS Code	Industry	Annual Water use (HCF) per employee	Total Water Use (HCF) for Industry Sector 2013	Average Employment 2013
324	Petroleum and Coal Products Manufacturing	5529.3	575,042	104
213	Support Activities for Mining	1085.7	121,601	112
314	Textile Product Mills	572.5	317,144	554
313	Textile Mills	571.6	173,205	303
322	Paper Manufacturing	227.0	182,723	805
312	Beverage and Tobacco Product Manufacturing	223.0	415,406	1,863
211	Oil and Gas Extraction	211.2	4,435	21
491	Postal Service	192.4	10,392	54
812	Personal and Laundry Services	177.8	2,956,026	16,630
311	Food Manufacturing	152.9	797,735	5,217
236	Construction of Buildings	144.5	1,992,385	13,785
451	Sporting Goods, Hobby, Book, and Music Stores	137.1	923,556	6,734
237	Heavy and Civil Engineering Construction	131.0	796,398	6,078
713	Amusement, Gambling, and Recreation Industries	128.4	2,325,606	18,118
611	Educational Services	123.5	3,743,360	30,312
484	Truck Transportation	114.4	575,548	5,033
326	Plastics and Rubber Products Manufacturing	106.5	346,283	3,253
623	Nursing and Residential Care Facilities	100.3	2,400,015	23,933
541	Professional, Scientific, and Technical Services	100.0	12,377,775	123,799
523	Securities, Commodity Contracts, and Other Financial In	99.7	857,637	8,600
811	Repair and Maintenance	95.2	1,153,593	12,112
711	Performing Arts, Spectator Sports, and Related Industri	93.9	375,518	4,000
624	Social Assistance	89.0	3,382,932	37,997
512	Motion Picture and Sound Recording Industries	88.5	187,443	2,118
315	Apparel Manufacturing	86.6	99,381	1,148
712	Museums, Historical Sites, and Similar Institutions	86.0	309,686	3,601
488	Support Activities for Transportation	82.6	333,030	4,033
621	Ambulatory Health Care Services	74.1	4,466,215	60,311
447	Gasoline Stations	73.9	333,438	4,513
721	Accommodation	73.4	2,070,743	28,219
522	Credit Intermediation and Related Activities	73.2	1,400,947	19,146
325	Chemical Manufacturing	71.7	528,539	7,368
221	Utilities	69.0	471,802	6,833
424	Merchant Wholesalers, Nondurable Goods	68.9	1,130,827	16,409
813	Religious, Grantmaking, Civic, Professional, and Simila	65.7	967,422	14,727
453	Miscellaneous Store Retailers	64.1	558,482	8,713
327	Nonmetallic Mineral Product Manufacturing	63.4	85,576	1,350
445	Food and Beverage Stores	63.3	1,795,277	28,380
481	Air Transportation	62.1	90,206	1,453
238	Specialty Trade Contractors	61.2	2,493,729	40,759
332	Fabricated Metal Product Manufacturing	59.5	420,424	7,066
518	Internet Service Providers, Web Search Portals, and Dat	55.5	49,937	900
561	Administrative and Support Services	54.8	4,118,475	75,180
323	Printing and Related Support Activities	53.7	157,645	2,938
493	Warehousing and Storage	50.9	72,635	1,428
423	Merchant Wholesalers, Durable Goods	50.5	1,123,396	22,243
562	Waste Management and Remediation Services	49.0	164,507	3,354
551	Management of Companies and Enterprises	47.9	962,194	20,103
722	Food Services and Drinking Places	46.8	5,294,945	113,061
487	Scenic and Sightseeing Transportation	44.2	28,629	647
524	Insurance Carriers and Related Activities	42.7	705,797	16,538
448	Clothing and Clothing Accessories Stores	42.4	700,298	16,510
335	Electrical Equipment, Appliance, and Component Manufact	42.1	94,274	2,239
331	Primary Metal Manufacturing	39.3	33,901	862
454	Nonstore Retailers	37.7	127,112	3,376
334	Computer and Electronic Product Manufacturing	36.0	881,660	24,457
519	Other Information Services	35.4	65,576	1,851
444	Building Material and Garden Equipment and Supplies Dea	32.7	322,388	9,853
533	Lessors of Nonfinancial Intangible Assets (except Copyr	31.5	5,543	176
511	Publishing Industries (except Internet)	29.7	214,249	7,218
337	Furniture and Related Product Manufacturing	28.3	47,856	1,694
442	Furniture and Home Furnishings Stores	26.7	134,789	5,040
517	Telecommunications	24.6	206,790	8,394
443	Electronics and Appliance Stores	23.7	124,943	5,262
622	Hospitals	22.2	548,641	24,739
336	Transportation Equipment Manufacturing	21.1	289,993	13,720
333	Machinery Manufacturing	20.0	165,828	8,272
441	Motor Vehicle and Parts Dealers	18.3	296,354	16,209
316	Leather and Allied Product Manufacturing	17.6	4,550	259
446	Health and Personal Care Stores	16.7	137,033	8,214
339	Miscellaneous Manufacturing	15.3	161,865	10,557
532	Rental and Leasing Services	11.5	55,799	4,836
485	Transit and Ground Passenger Transportation	9.2	665	72
452	General Merchandise Stores	8.2	226,485	27,543
492	Couriers and Messengers	8.0	31,657	3,933
212	Mining (except Oil and Gas)	7.9	2,120	270
321	Wood Product Manufacturing	6.9	2,888	416
425	Wholesale Electronic Markets and Agents and Brokers	1.4	7,882	5,766
515	Broadcasting (except Internet)	1.3	4,441	3,444
	<b>TOTAL</b>	<b>xx</b>	<b>72,121,222</b>	<b>1,047,138</b>
	Average Per Employee Water Use	<b>68.87</b>		

## ENDNOTES

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<sup>i</sup> . <http://www.kpbs.org/news/2015/mar/20/san-diego-farmers-struggling-survive-prolonged-dro/>

<sup>ii</sup> . See for example, <http://www.cbs8.com/story/28944730/olivenhain-municipal-water-district-going-green>

<sup>iii</sup> . <http://www.sandiego.gov/water/conservation/kids/funfacts.shtml>