

SANDAG info

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Traded Industry Clusters in the San Diego Region



Action Sports Manufacturing
Advanced Precision Manufacturing
Aerospace, Navigation, and Maritime Technologies
Apparel Manufacturing
Biomedical Devices and Products
Biotechnology and Pharmaceuticals
Cleantech
Entertainment and Hospitality
Fruits and Vegetables
Horticulture
Information and Communications Technologies
Publishing and Marketing
Specialty Foods and Microbreweries

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TRADED INDUSTRY CLUSTERS IN THE SAN DIEGO REGION

Introduction

Traded industry clusters are groups of interrelated, export-oriented industries that bring new money into the region. Industries within an industry cluster have business transactions with one another, and thus are interdependent. Cluster companies often participate in local industry associations, fostering collaboration and the exchange of knowledge. Companies within a cluster also compete with each other for market share, which drives innovation and productivity.

Companies within clusters tend to be among the region's leaders in research and development funding, patent awards, and other key indicators of innovation. Many of the clusters also pay high wages, although some do not. All clusters are economic drivers for the region because they are export-oriented.

San Diego's regional traded clusters were first identified as a result of the 1998 Regional Economic Prosperity Strategy (REPS), which was developed to address the recession and economic restructuring of the early 1990s. Originally, the clusters were determined by a committee of local industry and economics experts. The current method relies both upon committee input and a methodology based on sound principles and practices that can be replicated for other regions, minimizing the subjectivity of the committee-based approach. (See Appendix A for detailed methodology.)

Industry clusters are different from traditional sector employment because the clusters focus on specialized industries as well as buyer and supplier linkages that are unique to a region's economy. Viewing the regional economy through the perspective of clusters is important when describing the fast-paced, international economy of today. Elected officials, planners, and local residents want information about biotechnology and cleantech, for example. It is not possible to obtain this level of detail using traditional industry sector reporting.

Industry cluster analysis is a useful tool to look deeply at the structure of the economy and help determine what direction it will take in the future. As technology and industries change, new cluster groups may come into existence. One of the objectives of this update is to try to identify shifts or new industry cluster formation so the regional economy can adapt and grow. Staying current on the economic drivers of the region can help policymakers with decisions and the allocation of public resources. For instance, workforce development agencies build on the industry clusters by identifying occupations that are typically found in the clusters and developing workforce training around them. Another strategy includes developing regional infrastructure and nurturing the region's physical advantages, such as research and academic institutes and San Diego's deep sea port, in conjunction with industry clusters to support the long term competitiveness of the region.

The cluster definitions in this update were reviewed in depth by a Technical Advisory Group composed of individuals from both the public and private sectors. These individuals offered a wide variety of perspectives and included economic and workforce development, academic, and industry representatives. This is the fourth cluster study published by SANDAG since 1998. This report focuses on the new economic drivers, how those drivers have changed over time, and how they may continue to change in coming years.

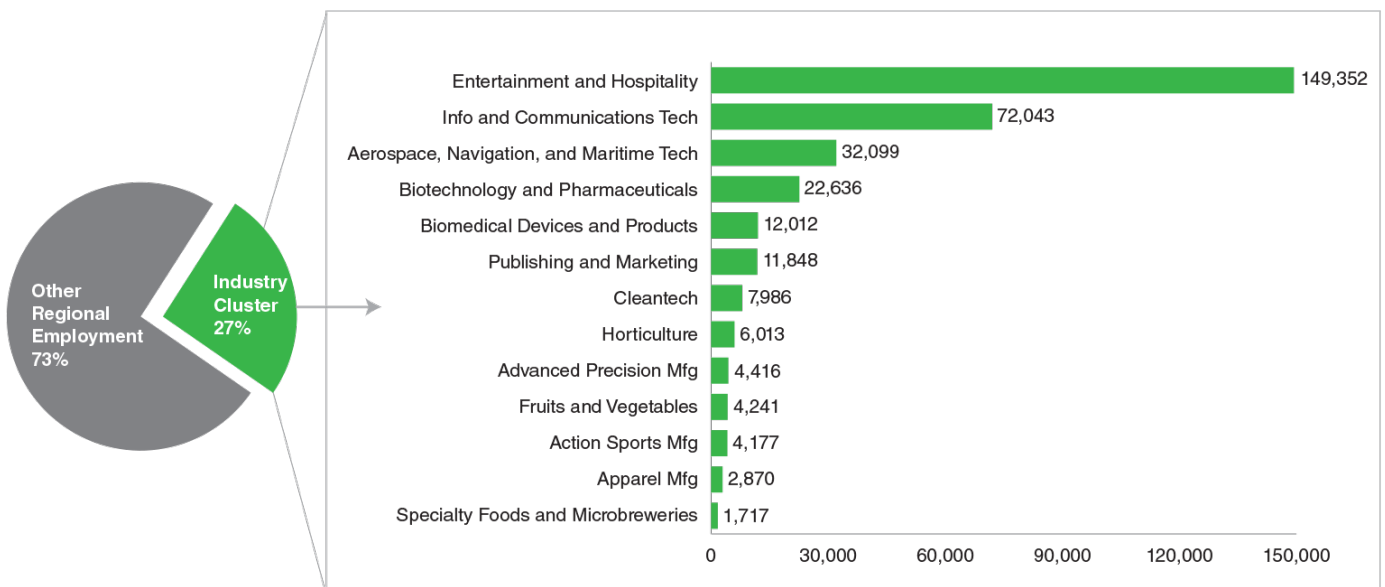
Overview of Traded Industry Clusters in the San Diego Region

The San Diego region has 13 industry clusters with a total of 331,410 local jobs in 2010. These cluster jobs represent 27 percent of the region’s total employment. On average, industry cluster jobs pay higher wages (\$56,000) than the regional average (\$50,700). (See Figure 1 and Table 1.)

The smallest industry cluster in the San Diego region by employment is Specialty Foods and Microbreweries, with 1,717 jobs. The largest is Entertainment and Hospitality, with 149,352 jobs.

The Entertainment and Hospitality cluster has the lowest annual average wage at \$21,800. The highest paying cluster is Biotechnology and Pharmaceuticals, with an annual average wage of about \$107,000, followed by Biomedical Devices and Products and Information and Communications Technologies (ICT) with annual wages of \$99,500 and \$94,400, respectively. In 2010, eight industry clusters had annual average wages that were higher than the regional average. (See Table 1.)

Figure 1
Traded Industry Cluster Employment, 2010



Source: SANDAG, Current Employment Inventory (2010).

Table 1
Traded Industry Cluster Employment and Wages, 2008-2010

	2008	2009	2010	2008-2010		
	Emp.	Emp.	Emp.	Wages	Gain/Loss	% Change
Action Sports Mfg.	4,561	4,378	4,177	\$65,300	-384	-8%
Advanced Precision Mfg.	4,692	4,544	4,416	\$51,800	-276	-6%
Aerospace, Navigation, and Maritime Tech.	30,998	30,794	32,099	\$79,300	1,101	4%
Apparel Mfg.	3,297	2,909	2,870	\$30,400	-427	-13%
Biomedical Devices and Products	9,901	9,886	12,012	\$99,500	2,111	21%
Biotechnology and Pharmaceuticals	18,868	19,598	22,636	\$107,000	3,768	20%
Cleantech	7,314	7,570	7,986	\$87,400	671	9%
Entertainment and Hospitality	149,654	148,839	149,352	\$21,800	-302	0%
Fruits and Vegetables	4,649	4,031	4,241	\$26,900	-408	-9%
Horticulture	6,765	5,961	6,013	\$29,100	-752	-11%
Info. and Communications Tech.	73,976	72,750	72,043	\$94,400	-1,932	-3%
Publishing and Marketing	13,328	12,216	11,848	\$56,600	-1,480	-11%
Specialty Foods and Microbreweries	1,844	1,695	1,717	\$43,500	-127	-7%
TRADED INDUSTRY CLUSTER TOTAL	329,847	325,171	331,410	\$56,000	1,563	0.5%
REGIONAL TOTAL	1,309,300	1,240,900	1,233,300	\$50,700	-76,000	-6%

Source: SANDAG, Current Employment Inventory (2010).

Definition of Traded Industry Clusters in the San Diego Region

The following section provides a description of all 13 traded industry clusters in the San Diego Region. It discusses cluster employment trends, annual average wages, and additional unique and interesting facts about each industry cluster. (Appendix B - Traded Industry Cluster Definitions lists the industries in each cluster, the total cluster employment, and the average annual wage.) In addition to the 13 industry clusters, this section also includes a brief discussion on the uniformed military cluster, which plays an important role in the San Diego regional economy.

Action Sports Manufacturing

Since the last industry cluster study, Recreational Goods was renamed Action Sports Manufacturing to reflect the changing composition of the cluster. With a high concentration of golf club, surfboard, diving, and other recreational goods manufacturing in the region, it is clear that this industry is a highly export-oriented economic driver. This cluster also is strongly associated with sporting and recreational goods wholesalers.

Based on the vast amounts of sunshine, close proximity to the ocean, and the lifestyle of southern California, the Action Sports Manufacturing cluster has been a steady presence in the region.

Companies in the Action Sports Manufacturing cluster obtained substantially more federal government procurement funding in 2010 than in previous years, with almost \$600,000 of procurement funding going to companies in this cluster.

The Action Sports Manufacturing cluster has 4,177 jobs. The average wage in this cluster is approximately \$65,300.

Advanced Precision Manufacturing

The Advanced Precision Manufacturing cluster is a newly established cluster that supports the region's metalworking and machine manufacturing operations. This cluster acts as an innovation hub between other industry clusters, such as Aerospace, Navigation, and Maritime Technologies, ICT, Cleantech, and Biomedical Devices and Products by integrating state-of-the-art technologies with customized product development to meet the needs of those clusters. Part of the success of this cluster stems from using these precision manufacturing suppliers as innovators across different clusters to bolster creativity and productivity.

Federal government procurement contracts in areas such as precision manufacturing are on the rise. Companies in the Advanced Precision Manufacturing cluster in San Diego received more than \$25.3 million of government procurement funds in 2010, nearly double the amount of funding in 2008.

The Advanced Precision Manufacturing cluster has 4,416 jobs. The average wage in this cluster is approximately \$51,800.

Aerospace, Navigation, and Maritime Technologies

Given San Diego's historically strong military presence, the region has a thriving Aerospace, Navigation, and Maritime Technologies cluster. Because of the evolving nature of the cluster, the definition has been expanded to include more than just defense and transportation-related companies as previously reported. Industries in this cluster perform manufacturing, logistics and operations, and consulting-related services that include aerospace, navigation, maritime, security, and shipbuilding-associated products.

Firms in this cluster also compete for a variety of contracts. For example, federal government procurement contracts are awarded to both private companies and government organizations in San Diego. In 2010, organizations in this cluster won approximately \$3.4 billion in federal government procurement contracts, making it the cluster with the largest share of federal government procurement funds in the region.

The Aerospace, Navigation, and Maritime Technologies cluster has 32,099 jobs. The average wage in this cluster is approximately \$79,300.

Apparel Manufacturing

The newly established Apparel Manufacturing industry cluster includes companies that mostly produce clothing and apparel for action sports and military-related operations. This cluster also includes other industries such as screen printing, leather goods, and canvas manufacturing that use similar manufacturing processes.

Apparel Manufacturing is prevalent in surrounding regions, such as in Baja California and Los Angeles, but contracts continue to be awarded in San Diego as well. Companies in the Apparel Manufacturing cluster were awarded nearly \$10 million dollars of federal government procurement contracts in 2010.

The Apparel Manufacturing cluster has 2,870 jobs. The average wage in this cluster is approximately \$30,400.

Biomedical Devices and Products

The Biomedical Devices and Products industry cluster consists primarily of firms producing surgical, medical, dental, optical, and ophthalmic devices and products as well as laboratory applications. It also includes firms conducting research and development activities. Most of the companies in this cluster consist of middle to smaller sized companies.

Total federal government procurement funds awarded to companies in this cluster nearly doubled between 2008 and 2010, with about \$80 million dollars awarded. This cluster also received about \$72 million of venture capital (VC) dollars in 2011. Biomedical Devices and Products continue to be an important driver of innovation in the regional economy.

The Biomedical Devices and Products cluster has 12,012 jobs. The average wage in this cluster is approximately \$99,500. The number of jobs in the Biomedical Devices and Products cluster grew by 21 percent between 2008 and 2010, reflecting the largest percent growth of any cluster during this time period.

Biotechnology and Pharmaceuticals

The Biotech and Pharmaceuticals cluster primarily consists of research and development industries in fields related to chemical and biological technologies. This cluster also includes the manufacturing of medicinal and diagnostic substances. It generally consists of middle to smaller sized companies as well as world-renowned research institutes.

This Biotech and Pharmaceuticals cluster is currently a major regional economic driver with strong job growth and funding. In 2010, San Diego region's institutions (both public and private) received approximately \$824 million in funding from the National Institutes of Health (NIH).¹ The organizations that received the largest NIH funding in the region included the University of California, San Diego (UCSD) (nearly \$391 million) and Scripps Research Institute (nearly \$209 million). Nearly half of all VC flowing into the region over the past few years funded Biotechnology companies. These organizations can serve as a springboard for technological and entrepreneurial business development that helps to transform innovative ideas into viable products.

The Biotechnology and Pharmaceuticals cluster has 22,636 jobs. The average wage in this cluster is approximately \$107,000, making it the industry cluster with the highest average wage in the region.

¹ National Institutes of Health (NIH) grants, http://report.nih.gov/award/trends/State_Congressional/StateDetail.cfm?State=CALIFORNIA&Lon=-119.270203&Lat=37.271832, accessed November 28, 2011

Recent trends show this cluster added the most jobs between 2008 and 2010 (3,768), recording the largest absolute growth out of any other cluster in the region.

Cleantech

Due to the move toward more renewable energy products and services, this industry cluster has evolved from the Environmental Technology to the Cleantech industry cluster. Industries included in this cluster perform processes such as industrial products and semiconductor manufacturing (for solar panels); research and development; testing; and industrial and instrument manufacturing, as well as design, environmental, and technical consulting services. Firms included in this cluster specialize in energy efficiency (e.g., battery technologies, solar panels and related products, fuel efficient automobiles, and testing equipment); clean energy generation (e.g., solar engineering, management and consulting services, and biofuels/biodiesel); and energy storage (e.g., battery technologies, biomass, biofuels, and smart electricity).

San Diego Cleantech companies are leveraging unique local opportunities offered by entities such as the San Diego Center for Algae Biotechnology at the University of California San Diego (UCSD), the Jobs Accelerator Project at San Diego State University, and clean energy initiatives by the U.S. Department of Defense.

The Cleantech cluster has 7,986 jobs. The average wage in this cluster is approximately \$87,400.

Entertainment and Hospitality

San Diego has an international reputation as a tourist and convention center destination. Visitors are not only drawn to the region's great amenities, natural resources, and weather but also popular entertainment and attractions. In previous reports, Travel and Hospitality and Entertainment and Amusement were reported as separate clusters. Because of their strong interrelationship, these clusters have merged into one Entertainment and Hospitality cluster. Local hotel, transportation services, and restaurants, which accommodate the region's visitors, account for the bulk of the travel and hospitality portion of the cluster, while world famous museums and zoos serve as major entertainment attractions. Other entertainment attractions for the region include recreational activities, such as theme parks, golf courses and country clubs, athletic events, race tracks, theatres, and numerous artists and performers.

Overall, the Entertainment and Hospitality cluster brings many visitors and spending from outside the region. More than 31 million visitors came to San Diego County in 2011. Of these, approximately 16 million visitors stayed overnight and spent approximately \$6.7 billion in the region. Overnight visitors spent, on average, \$124 per day, resulting in \$424 total trip spending per visitor.²

The Entertainment and Hospitality cluster has 149,352 jobs and is the largest industry cluster by employment in the region. The average wage in this cluster is approximately \$21,800. This lower wage is partly the result of part time employees, many of whom are just entering the workforce or are employed by more than one firm.

² San Diego Convention and Visitors Bureau. 2011, <http://www.sandiego.org/industry-research.aspx>

Fruits and Vegetables

Regional specialties in the Fruits and Vegetables cluster include citrus (e.g., oranges, lemons, limes) and other fruits and vegetables, such as avocados, tomatoes, and strawberries. This cluster also includes farming production activities, such as soil preparation and planting, as well as related farm management services, support activities, and postharvest activities. Wineries also emerged in this industry cluster, and share an important relationship with core industries in this cluster. While in some parts of California, fruits and vegetables are destined for food processing plants, in San Diego, virtually all of the fruits and vegetables grown in the region have a high dollar value and therefore go to the fresh produce market.

According to the 2010 Crop Statistics & Annual Report the region has:

"6,687 farms, more than any other county in the United States. 68% of San Diego County farms are 1-9 acres. Nearly 27% of farms in San Diego County are operated by women. The high cost of water and land make farming in San Diego County expensive and encourages growers to raise products with a high dollar value per acre. San Diego produces the highest dollar value per acre of any county in California!"³

The Fruits and Vegetables cluster has 4,241 jobs. The average wage in this cluster is approximately \$26,900.

Horticulture

The horticulture industry cluster includes nursery, tree, and floriculture production in the region. Those, along with their supporting service industries such as merchant wholesalers, mushroom production, and other food crops grown under cover, make up the Horticulture cluster.

The combination of research funding with regional specialties in horticulture and fruits and vegetables will help this industry cluster continue to prosper. University research has become more prevalent in plant sciences and is influencing the cluster. For instance, universities such as the UCSD are now performing research in such areas as seedless fruit and flower control, control of crop fungal disease, and pollen collection and analysis.⁴ Furthermore, according to the 2010 Crop Statistics & Annual Report, the total value of nursery and cut flower products in 2010 was more than \$1.1 billion.⁵ These statistics provide compelling evidence that this cluster is a solid driver in the regional economy.

The Horticulture cluster has 6,013 jobs. The average wage in this cluster is approximately \$29,100.

³ 2010 Crop Statistics & Annual Report, http://www.sdcounty.ca.gov/awm/crop_statistics.html

⁴ UCSD Technology Transfer Office Web site, <http://invent.ucsd.edu/technology/>, accessed on November 16, 2011

⁵ 2010 Crop Statistics & Annual Report, http://www.sdcounty.ca.gov/awm/crop_statistics.html

Information and Communications Technologies (ICT)

The ICT industry cluster includes communications, computer and electronics, and software industries. These industries, reported separately in previous cluster reports, have strong interconnections resulting in the emergence of the new ICT cluster. Firms in this cluster specialize in manufacturing radio and television broadcasting and wireless communication equipment, audio and video equipment, semiconductors and associated products, computer and electronic components, and other communications equipment manufacturing. Likewise, many service-related industries support this cluster including engineering, custom computer programming, and software. Many companies in this cluster work on government and defense contracts as well as private commercial projects. Although this cluster contains many large globally recognized communications companies, it also includes a large number of smaller companies.

Although total employment in the ICT cluster declined between 2008 and 2010, some of its subsectors did expand. For instance, Research and Development, Testing Laboratories, and Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing have shown consistent employment growth since 2008. Custom Computer Programming Services and Software Publishers have also increased slightly in employment since 2008. Additionally, the amount of VC funding allocated for software firms increased in 2011, reaching \$111.6 million.

The ICT cluster has 72,043 jobs. The average wage in this cluster is approximately \$94,400.

Publishing and Marketing

This cluster includes traditional publishing activities such as book printing and newspaper and periodical publishing. Other areas that recently emerged in this cluster include music-related publishing, libraries and archiving, internet publishing, broadcasting, and other information services and Web search activities. Marketing-related companies are now part of the cluster because of the strong relationship between advertising, media, research, and public relations companies. Additionally, some firms in this cluster support publishing and marketing services for other clusters, such as the Entertainment and Hospitality and the ICT clusters.

The amount of federal government procurement funds awarded to Publishing and Marketing firms has grown substantially since 2008. About \$102 million was awarded to these firms in 2010 to areas such as internet publishing and marketing, web search portals, and military training manuals.

The Publishing and Marketing cluster has 11,848 jobs. The average wage in this cluster is approximately \$56,600.

Specialty Foods and Microbreweries

In part because of its geographic location, San Diego has regional specializations in the production of foods such as tortillas. Microbreweries recently emerged in this cluster and have shown increased job growth and production. Many food packaging industries are strongly interconnected with this cluster. For example weft knit fabric mills, sanitary food container manufacturing, and solid fiber and paperboard box manufacturing were identified as important buyers and suppliers.

According to the National Brewers Association, growth of the craft brewing industry in 2010 was 11 percent by volume and 12 percent by dollars at the same time that overall U.S. beer sales were

down an estimated 1.0 percent by volume.⁶ The San Diego region's award-winning microbreweries are in the vanguard of this brewing trend. San Diego's microbreweries produced over 85,300 barrels of beer in 2010.⁷

The Specialty Foods and Microbreweries cluster has 1,717 employees. The average wage for employees in this cluster is approximately \$43,500.

Uniformed Military

Uniformed military continues to play an important role in the San Diego region economy. San Diego's deep sea port and strategic location to Asia make it a prime spot for the military operations. The military is export-oriented because it brings in significantly more tax dollars than the region pays. However, unlike other clusters, the size and future growth of the military cannot be influenced by local policy. In addition, information available for the Uniformed Military cluster is more limited than for other clusters; thus, it is excluded from the detailed analysis. However, because of the importance of this sector, it is described generally in the "Importance of the Defense Sector" later in the publication.

The Uniformed Military employs approximately 100,000 people in the San Diego region.

Regional Traded Industry Cluster Trends

The following section discusses traded industry cluster trends for the region. It begins by describing cluster sizes, wages, and employment growth for the region as a whole. It then discusses the distribution of cluster jobs within the region by Major Statistical Areas (MSA). Finally, maps depicting cluster jobs by ZIP code are provided at the end of this section.

Cluster Size, Wages, and Growth

The bubble diagram, shown in Figure 2, depicts industry cluster sizes, wages, and employment growth. The dashed lines on the bubble diagram portray the 2010 annual average wage and employment growth between 2008 and 2010 for all industries across the region. It depicts that the region declined by 76,000 jobs, or 6 percent, during this time period. The average regional wage is \$50,700.

The dashed lines separate the diagram into quadrants. The quadrant on the upper right shows the industry clusters that are growing faster and exhibiting a higher annual average wage than all industries in the region. In contrast, the quadrant on the lower left shows industry clusters that are not growing as quickly as the regional average and are exhibiting lower than average wages. Bubbles are scaled based on total industry cluster employment, with the largest bubble, Entertainment and Hospitality, comprising 149,352 jobs and the smallest bubble, Specialty Foods and Microbreweries, comprising 1,717 jobs.

⁶ National Brewers Association, <http://www.brewersassociation.org/pages/business-tools/craft-brewing-statistics/facts> downloaded November 1, 2011.

⁷ "Barrel boom: San Diego's growing breweries. For local beer, this is a very good year", San Diego Union Tribune, June 17, 2011, number of barrels summed by SANDAG.

Overall, six industry clusters show wages and employment growth that are equal or higher than the regional averages. Both Biotechnology and Pharmaceuticals and Biomedical Devices and Products show the largest growth at approximately 20 percent and high wages above \$100,000 per year. The ICT cluster also shows high wages at approximately \$90,000 per year. This cluster is not growing as quickly as other clusters in the region, but it is the second largest in terms of the number of jobs. Both Cleantech and Aerospace, Navigation, and Maritime Technologies have high annual wages and positive job growth and Advanced Precision Manufacturing has a slightly higher average annual wage and the same growth rate as the region.

Action Sports Manufacturing and Publishing and Marketing are shown in the upper left quadrant. These industry clusters show high wages but lower growth rates than the region. In the lower left quadrant are Apparel Manufacturing, Horticulture, Fruits and Vegetables, and Specialty Foods and Microbreweries. These industries have larger rates of decline in employment between 2008 and 2010 and exhibit lower wages than the region. Employment in Entertainment and Hospitality is the only industry cluster in the lower right quadrant. Employment in this cluster held steady between 2008 and 2010. It has a lower wage than the region on average, partly due to the large number of part-time jobs in the cluster.

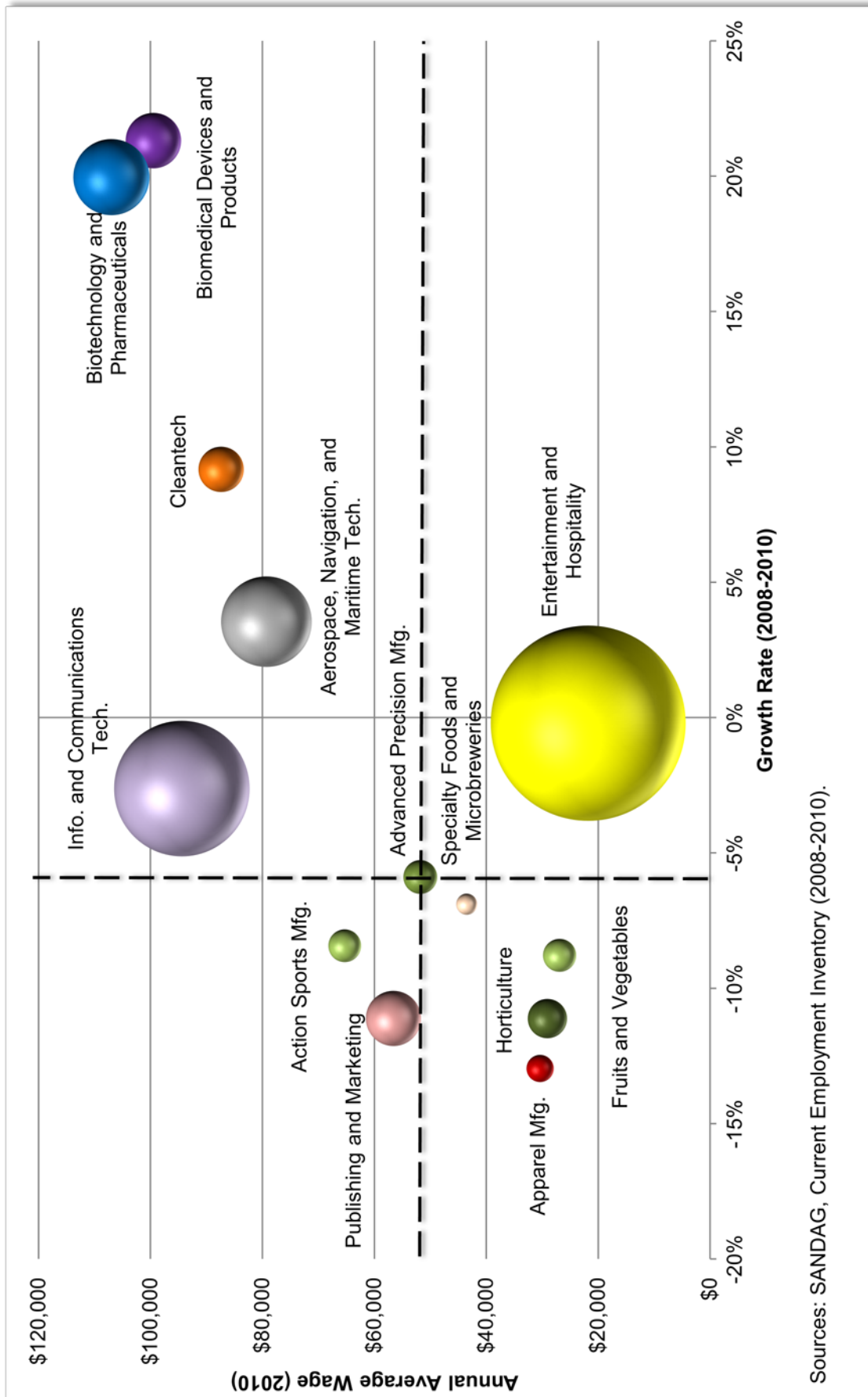
San Diego's Regional Economy

During the early 1990s, the San Diego region experienced a recession that resulted in significant loss of high-paying jobs. At the root of the local recession was the basic restructuring of the economy primarily due to the down-sizing of the region's defense industry. In 1993, the region's unemployment rate rose to 7.9 percent. The region experienced an overall employment loss of 19,500 jobs during the 1990 to 1993 time period.

Conversely, during the national recession of the early 2000s, the San Diego region continued to add jobs to the economy and the annual average unemployment rate rose to only 5.2 percent in 2002. This recession was largely categorized as a crash of the dot com bubble. The San Diego region was not as negatively affected by this recession as other parts of California, as it had less exposure to the dot com buildup in the previous decade.

The current economic downturn began in December 2007. Although this downturn officially ended in June 2009, unemployment rates continued to rise and reached an annual rate of 10.5 percent in 2010. The region experienced an overall loss of 76,000 jobs between 2008 and 2010. However, even during these difficult economic conditions, some sectors in the San Diego region continued to grow, including several that are among the region's traded industry clusters.

Figure 2
Industry Cluster Employment and Wages, 2008-2010

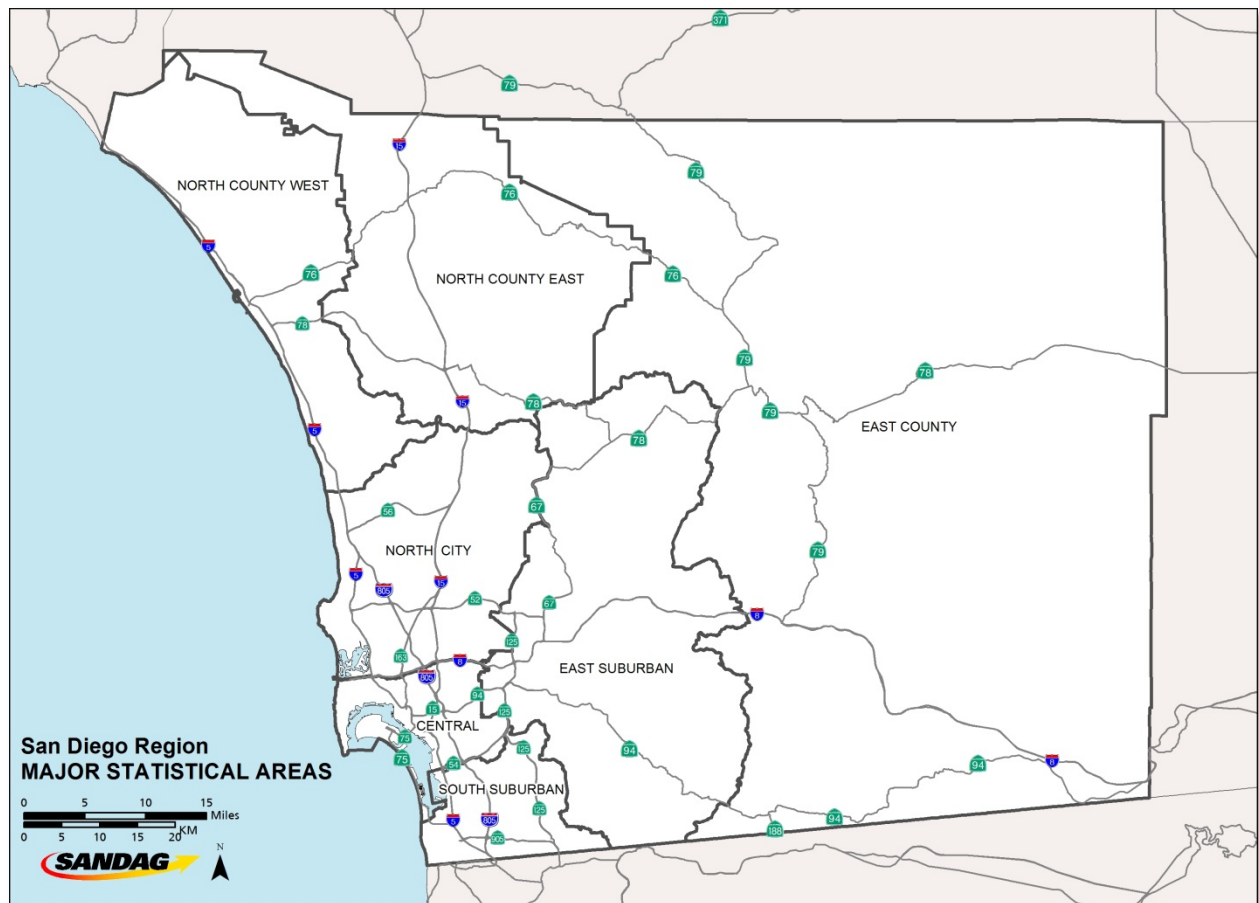


Sources: SANDAG, Current Employment Inventory (2008-2010).

Cluster Distribution by Major Statistical Area (MSA)

This subsection discusses the distribution of industry cluster jobs within the region. The San Diego Region is divided into seven MSAs: North County West, North County East, East County, East Suburban, South Suburban, Central, and North City. For the purposes of this study, North County East and East County were combined to maximize reporting and minimize data suppressed for confidentiality reasons. (See Figure 3 for a map of the MSAs.)

Figure 3
Major Statistical Area Locator Map



Employment records were compiled by industry cluster within each MSA to determine industry cluster employment in each MSA subregion. As shown in Table 2, nearly half of all of the industry cluster jobs are located in North City MSA. In particular, jobs in Biomedical Devices and Products, Biotechnology and Pharmaceuticals, ICT, and Cleantech tend to be concentrated in North City. Jobs in Aerospace, Navigation, and Maritime tend to be concentrated in both Central and North City MSAs. Advanced Precision Manufacturing shows a smaller number of jobs overall and were distributed relatively evenly throughout the region. Jobs in Specialty Food and Microbreweries tend to be concentrated in the combined area of North County East and East County as do jobs in Fruits and Vegetables and Horticulture.

Table 2
Traded Industry Cluster Jobs by Major Statistical Area, 2010

	Central	North City	South Suburban	East Suburban	North County West	North County East & East County	REGIONAL JOBS SHARE BY CLUSTER	REGIONAL TOTAL JOBS BY CLUSTER
Action Sports Mfg.	2.5%	17.8%	2.9%	2.1%	59.9%	14.8%	1.3%	4,177
Advanced Precision Mfg.	7.2%	20.9%	17.6%	23.4%	13.5%	17.4%	1.1%	4,416
Aerospace, Navigation, and Maritime Tech.	32.0%	42.9%	11.6%	5.7%	3.7%	4.0%	9.9%	32,099
Apparel Mfg.	17.2%	20.7%	13.5%	12.9%	16.9%	18.8%	0.9%	2,870
Biomedical Devices and Products	6.5%	57.5%	2.1%	0.8%	17.9%	15.3%	3.2%	12,012
Biotechnology and Pharmaceuticals	2.7%	73.6%	0.8%	1.5%	17.4%	4.0%	7.2%	22,636
Cleantech	13.8%	56.8%	1.3%	2.2%	17.3%	8.6%	2.3%	7,986
Entertainment and Hospitality	28.5%	33.8%	6.5%	8.0%	14.7%	8.6%	45.5%	149,352
Fruits and Vegetables	<1%	6.3%	2.7%	<3%	<34%	55.0%	1.4%	4,241
Horticulture	<1%	1.8%	<2%	1.4%	23.7%	70.3%	1.9%	6,013
Info. and Communications Tech. (ICT)	8.0%	72.0%	2.3%	3.6%	8.6%	5.6%	21.2%	72,043
Publishing and Marketing	11.7%	64.1%	2.4%	5.5%	10.1%	6.2%	3.8%	11,848
Specialty Foods and Microbreweries	6.4%	13.7%	<15%	<12%	<2%	51.3%	0.5%	1,717
SHARE IN MSA	19.3%	46.7%	5.4%	5.9%	13.5%	9.2%	100.0%	331,410

Source: SANDAG Current Employment Inventory (2010).

Notes: Some values are reported with "<" for confidentiality purposes. Percentages may not add due to rounding.

Cluster Distribution by Neighborhood (ZIP Code)

Maps for each cluster show 2010 employment for each industry cluster by ZIP code.⁸ The size of the bubble represents the number of jobs in a given ZIP code (bubbles may overlap). A large bubble could represent many small firms in one area or a small number of large firms. The industry cluster employment concentration maps are presented on the following pages and brief highlights are provided below.

- Action Sports Manufacturing is concentrated in the north coastal area, which is home to many surf board and golf club manufacturing companies.
- Advanced Precision Manufacturing is distributed widely throughout the region with many small firms. Some employment concentrations are seen in the eastern and southern areas of the region.
- Aerospace, Navigation, and Maritime cluster jobs are concentrated along the southern coastal areas, including the City of San Diego, National City, and Chula Vista.
- With Apparel Manufacturing, we see an even distribution of smaller and mid-sized firms around the region.
- The Biomedical Devices and Products cluster shows high employment concentrations around the Golden Triangle and in North County.
- The Biotechnology and Pharmaceuticals cluster shows a distribution similar to Biomedical Devices and Products, but has a larger number of jobs around the region.
- Jobs in the Cleantech cluster are distributed around North City and downtown San Diego, the Golden Triangle, and in North County.
- The Entertainment and Hospitality cluster shows a wide distribution of jobs throughout the region, mainly because of hotels and restaurants.
- Employment in the Fruits and Vegetables cluster is predominantly located in North County on either side of the Interstate 15 (I-15) corridor.
- Within the Horticulture cluster, jobs are clustered in northern coastal area.
- Information and Communications Technologies cluster jobs are concentrated in the central coastal area and also along the I-15 corridor.
- Publishing and Marketing jobs are located in the region's urban areas.
- Specialty Foods and Microbreweries, which is largely comprised of tortilla manufacturing and microbreweries, tends to be concentrated in the inland areas of the region.

⁸ Source: SANDAG Employment Inventory, InfoUSA, and Manta.com.

Figure 4
Action Sports Manufacturing

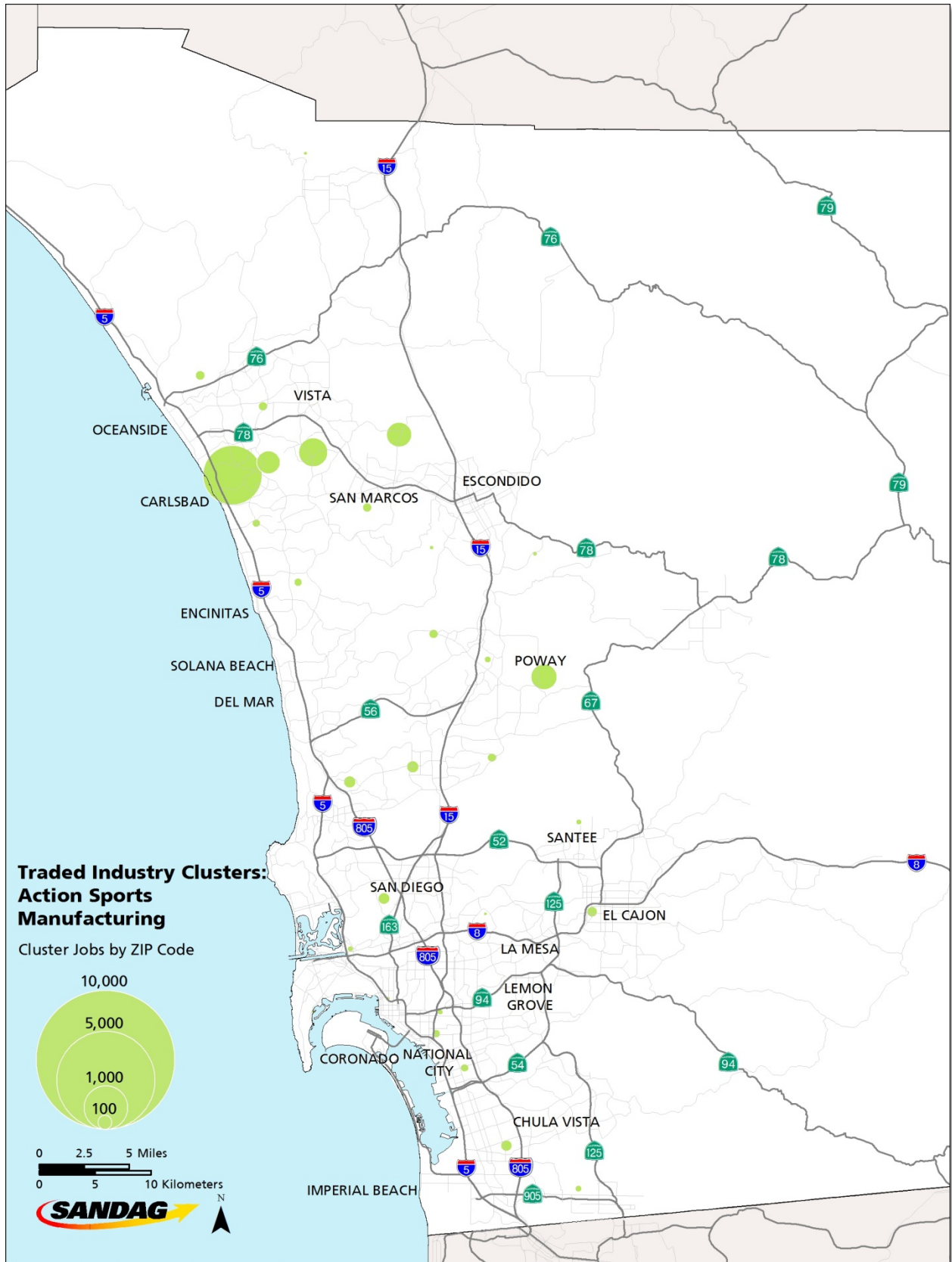


Figure 5
Advanced Precision Manufacturing

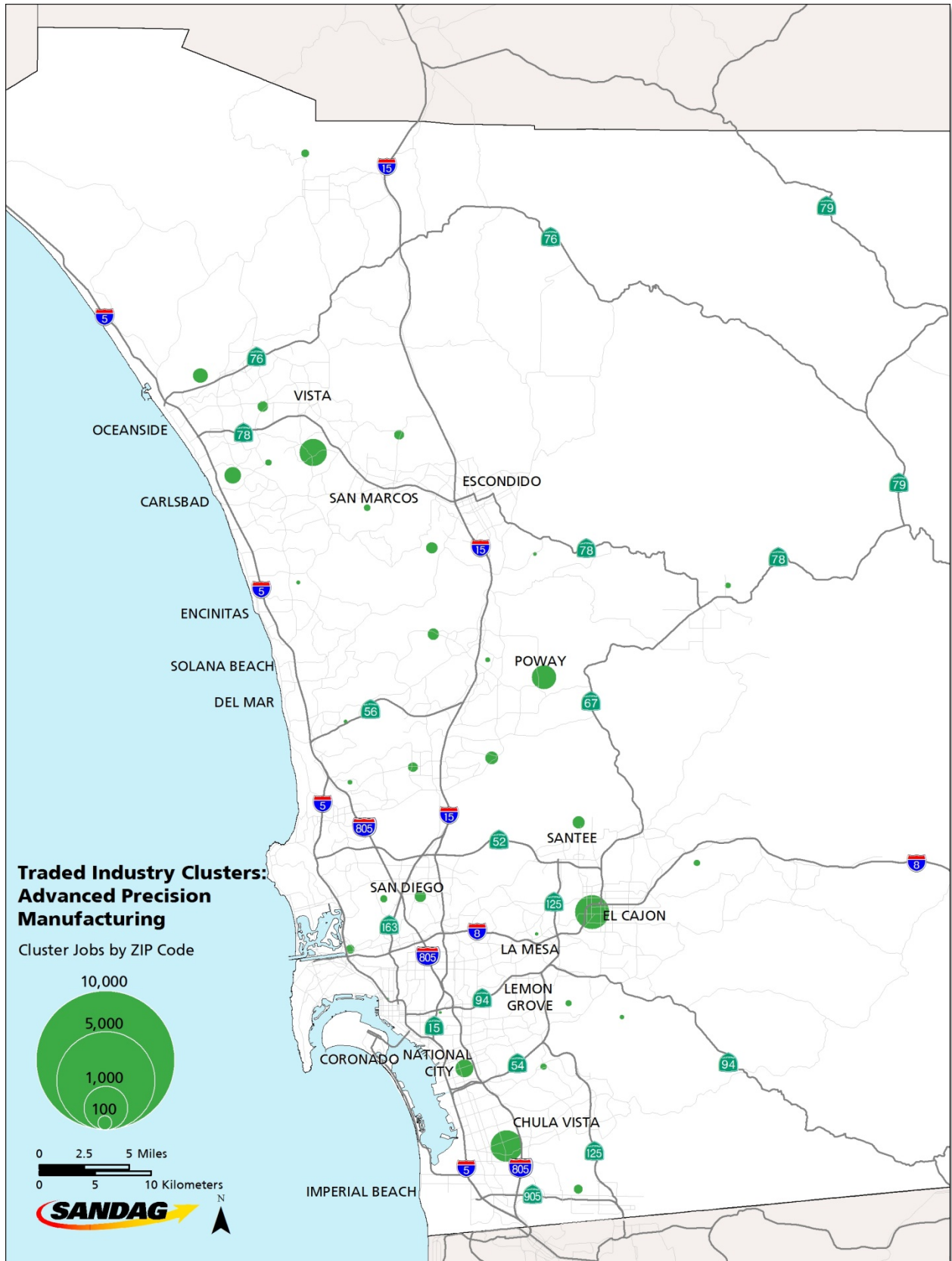


Figure 6
Aerospace, Navigation, and Maritime Technologies

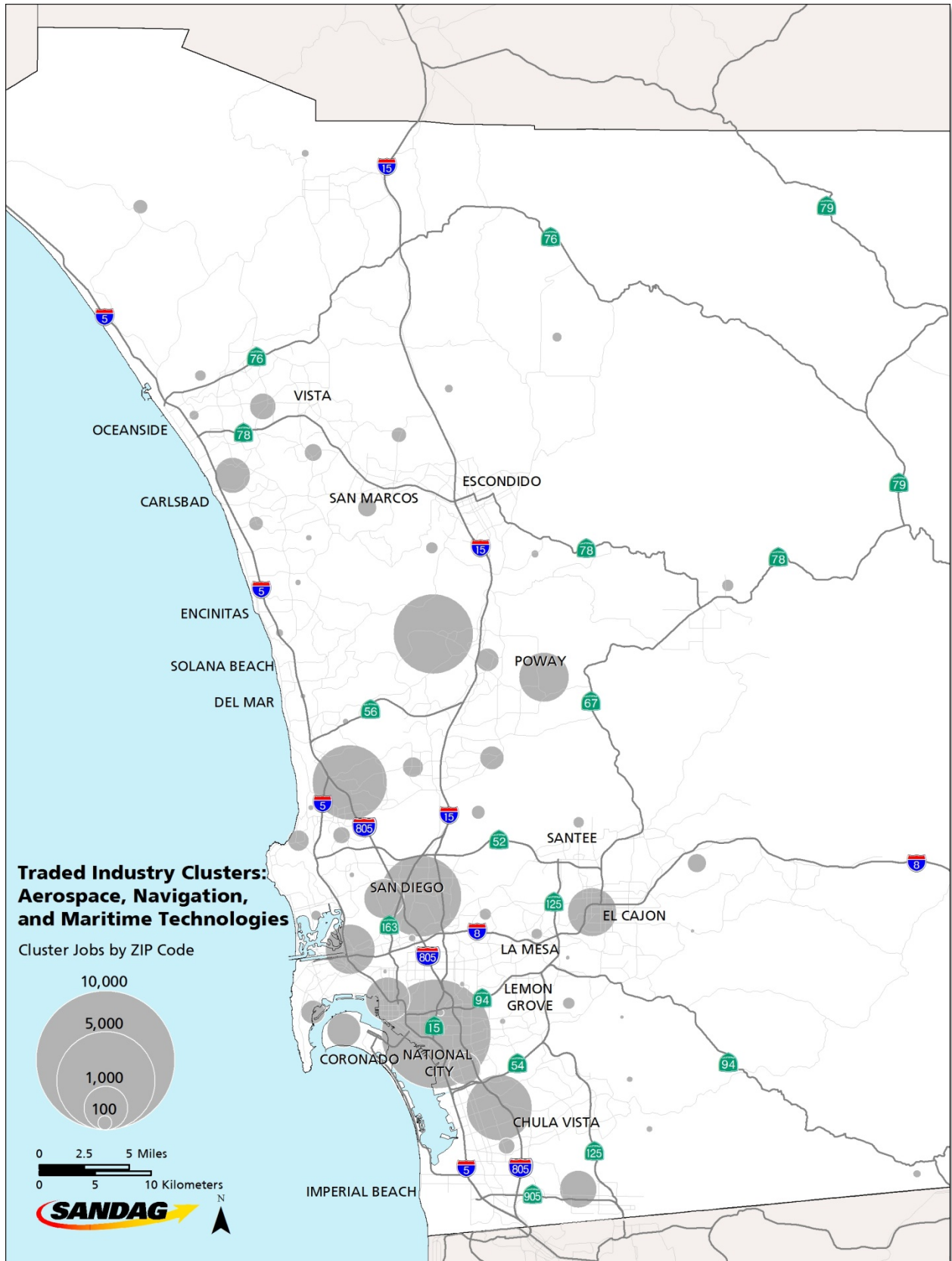


Figure 7
Apparel Manufacturing

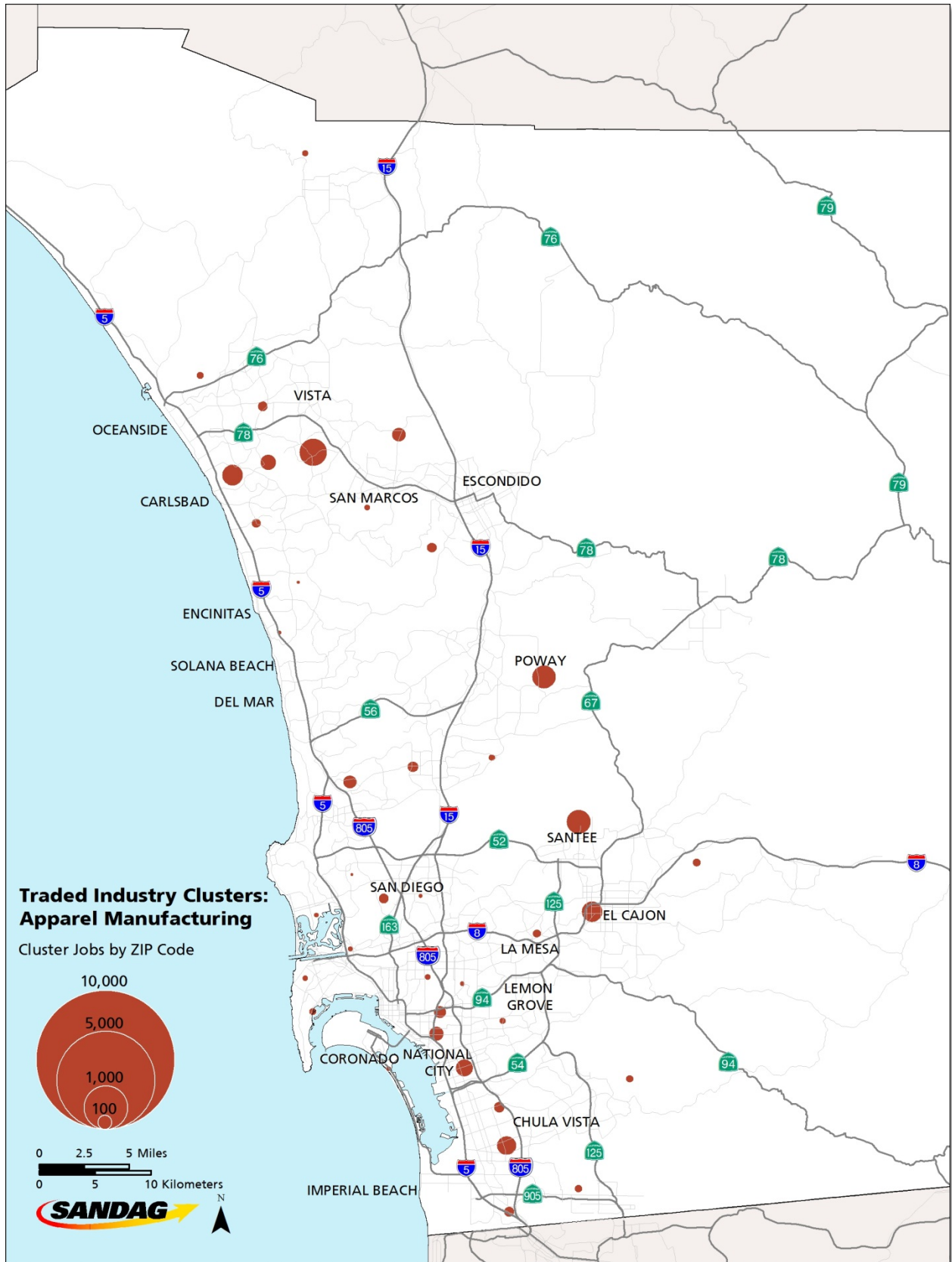


Figure 8
Biomedical Devices and Products

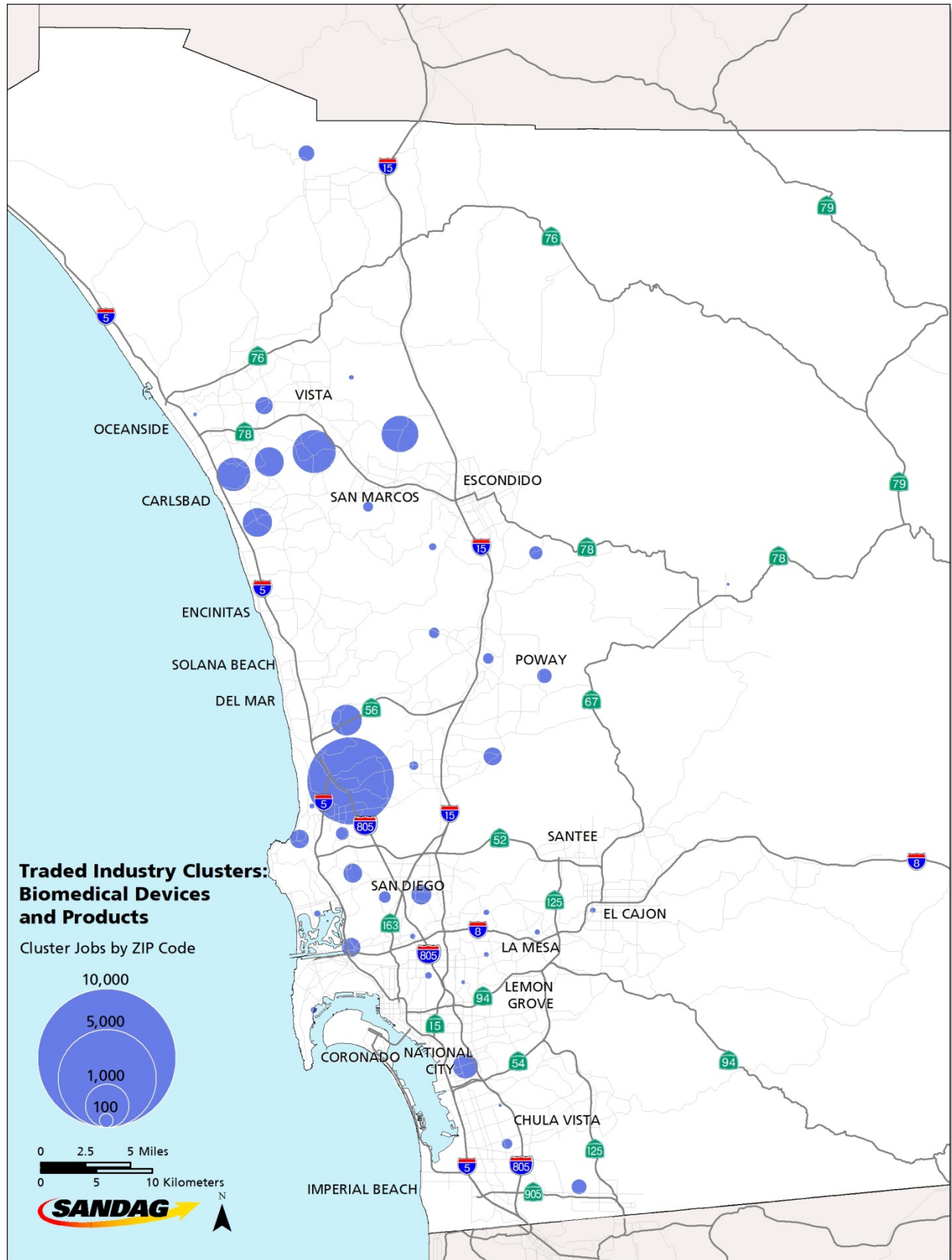


Figure 9
Biotechnology and Pharmaceuticals

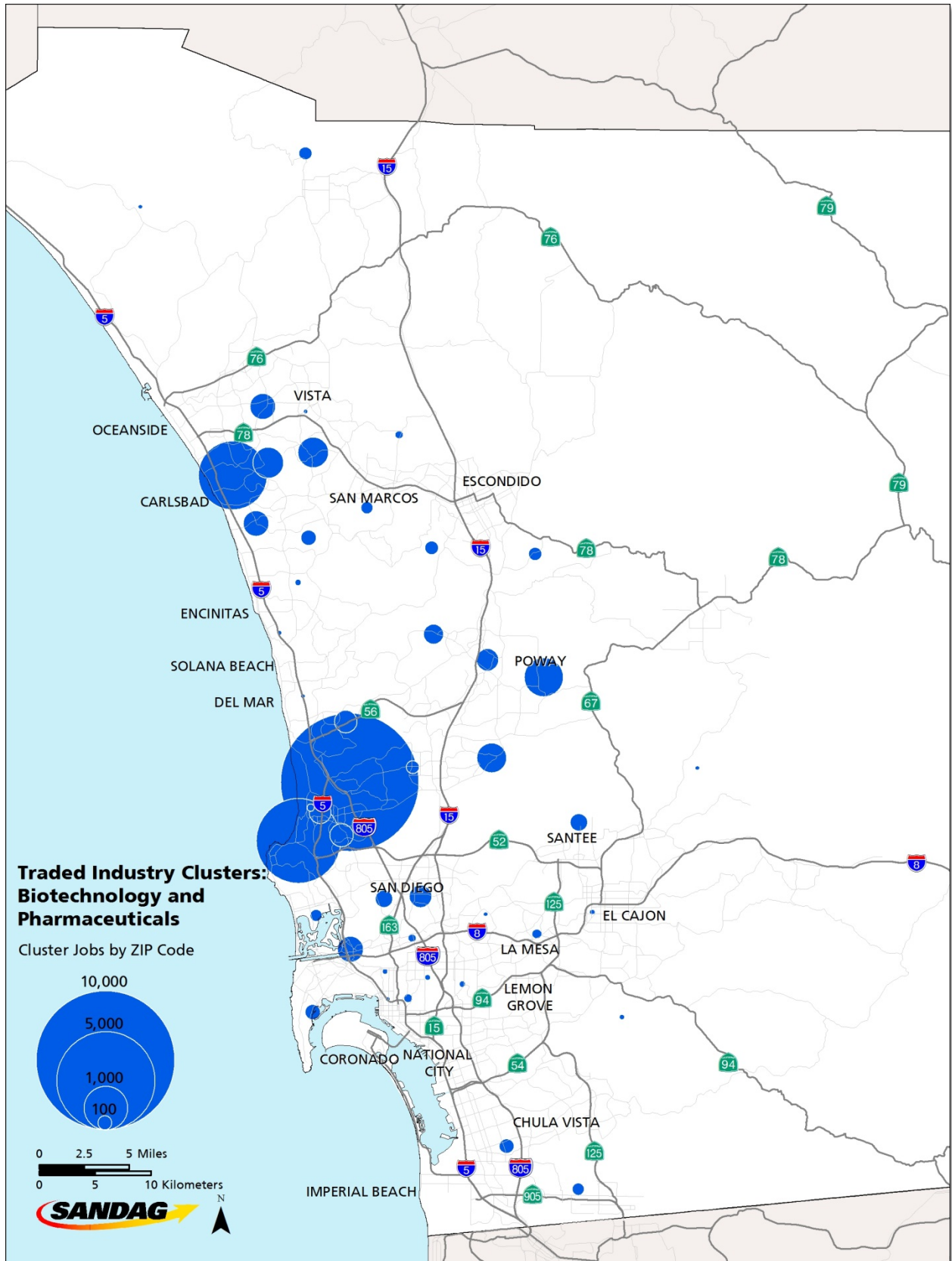


Figure 11
Entertainment and Hospitality

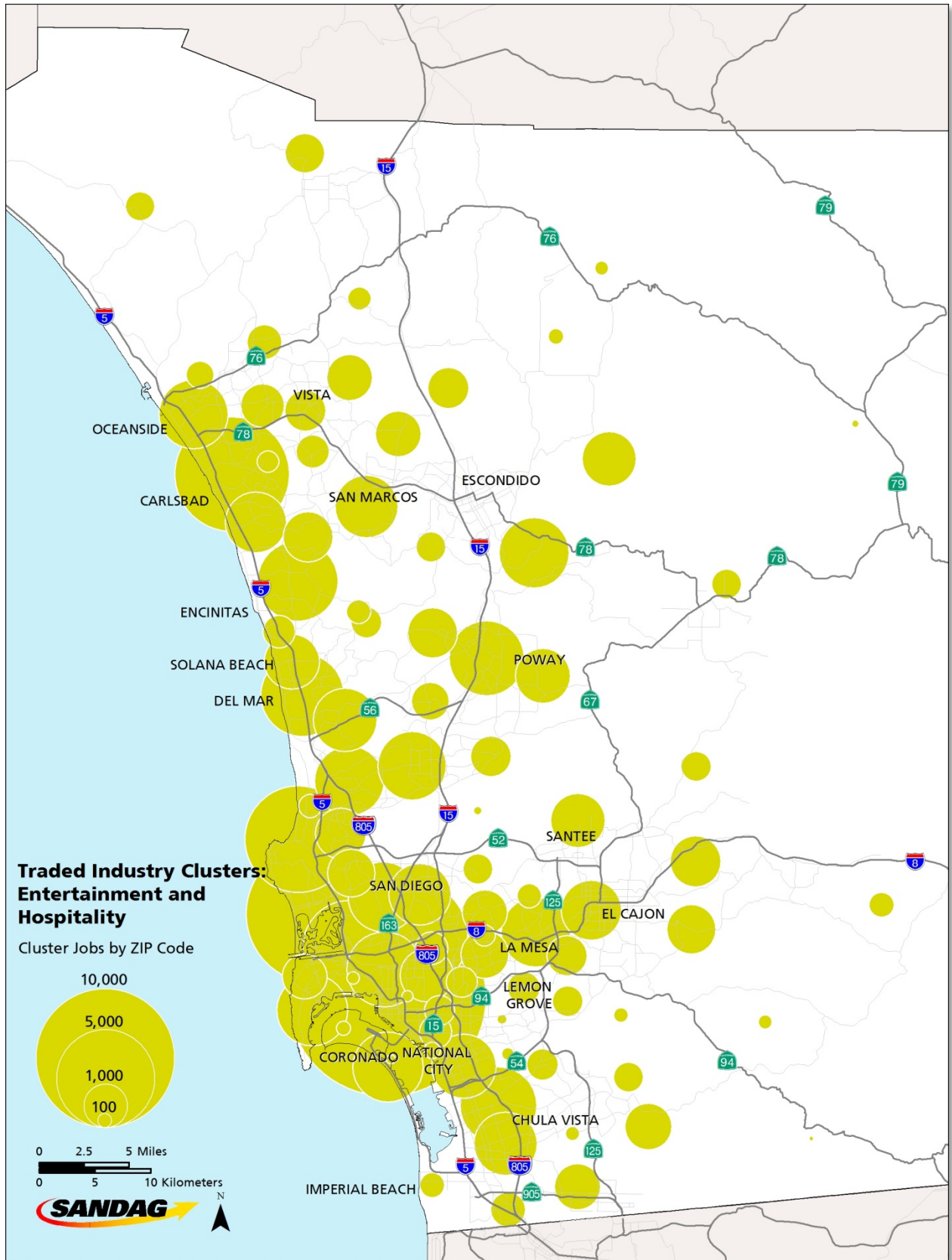


Figure 12
Fruits and Vegetables

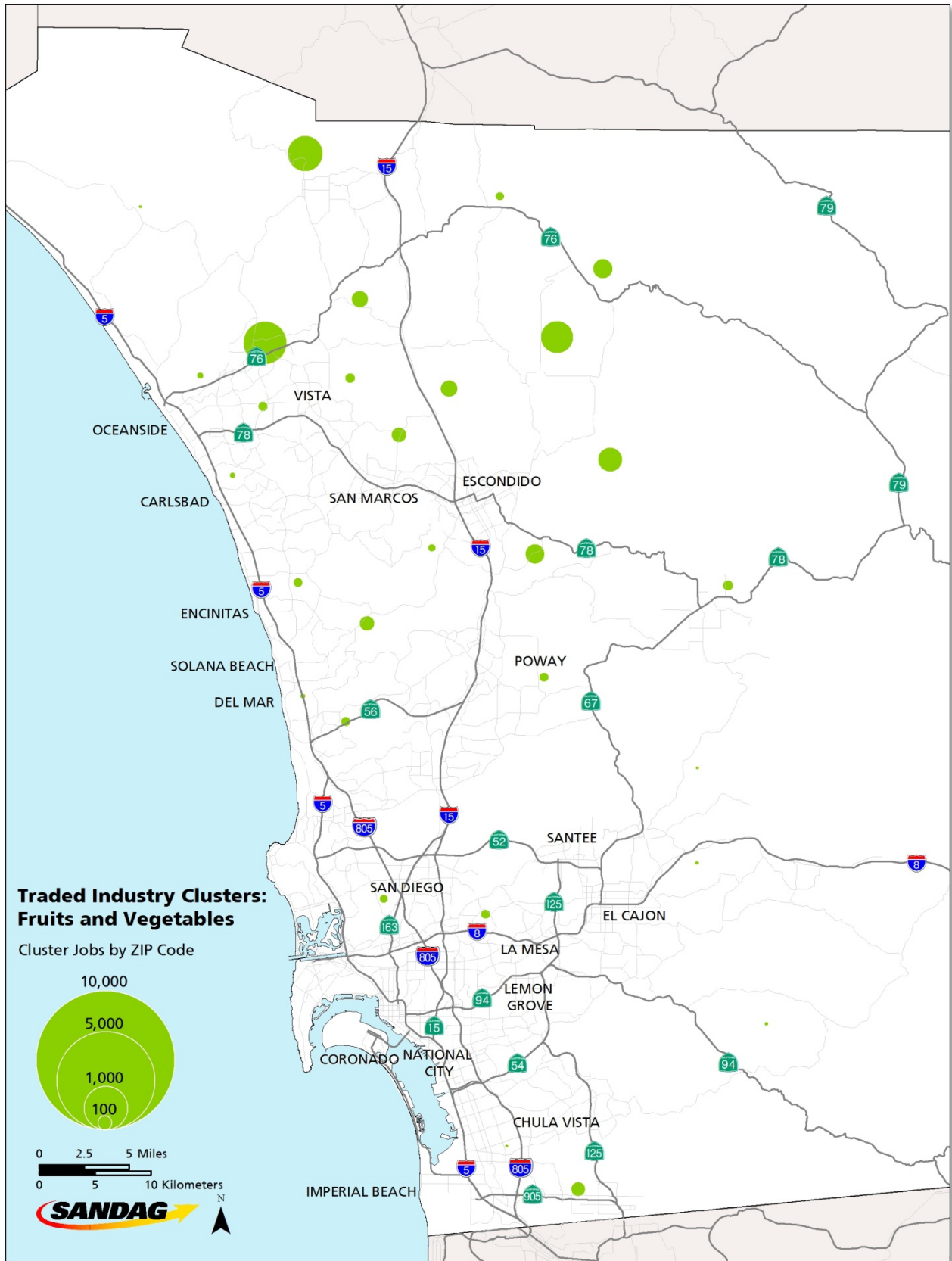


Figure 13
Horticulture

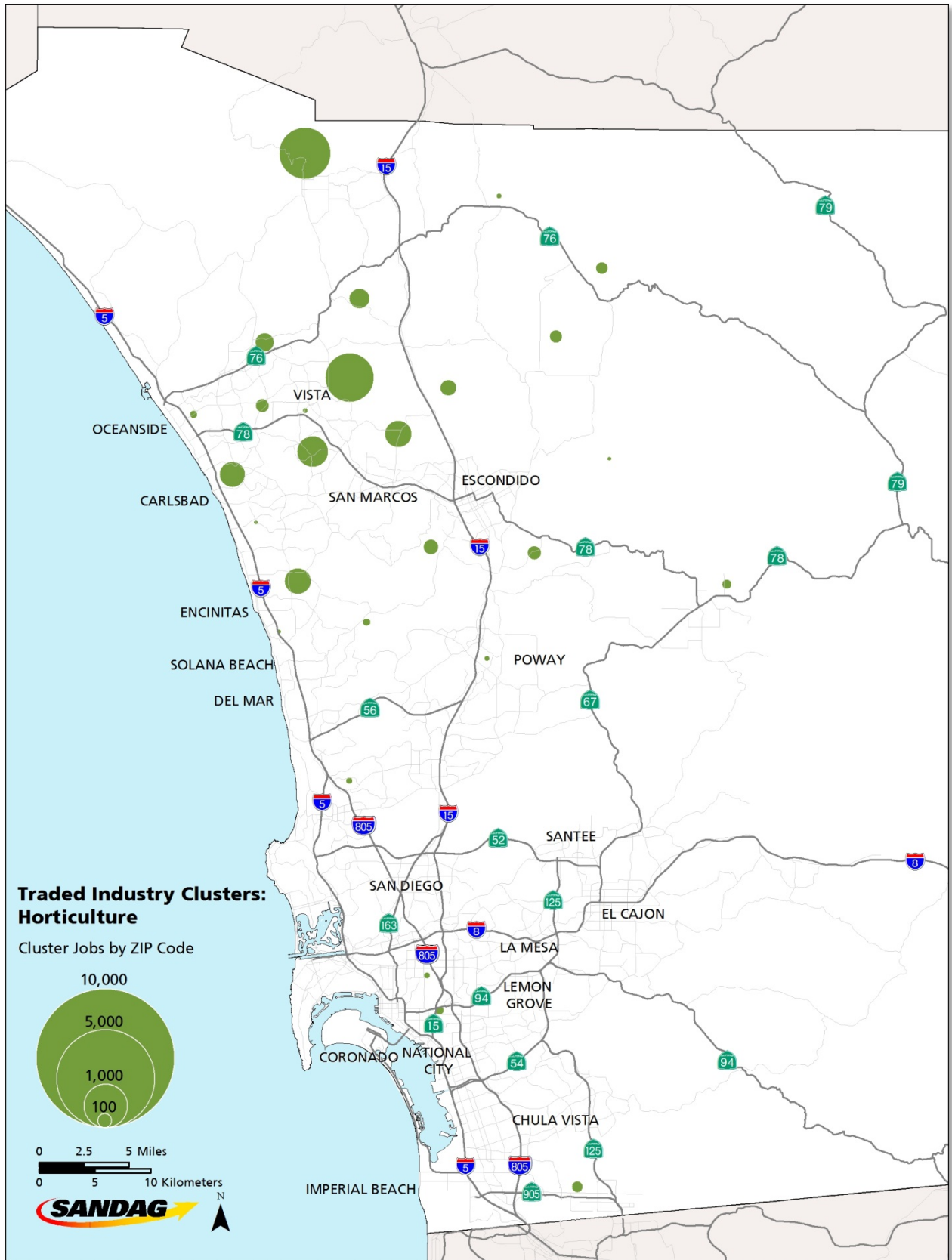


Figure 14
Information and Communications Technologies (ICT)

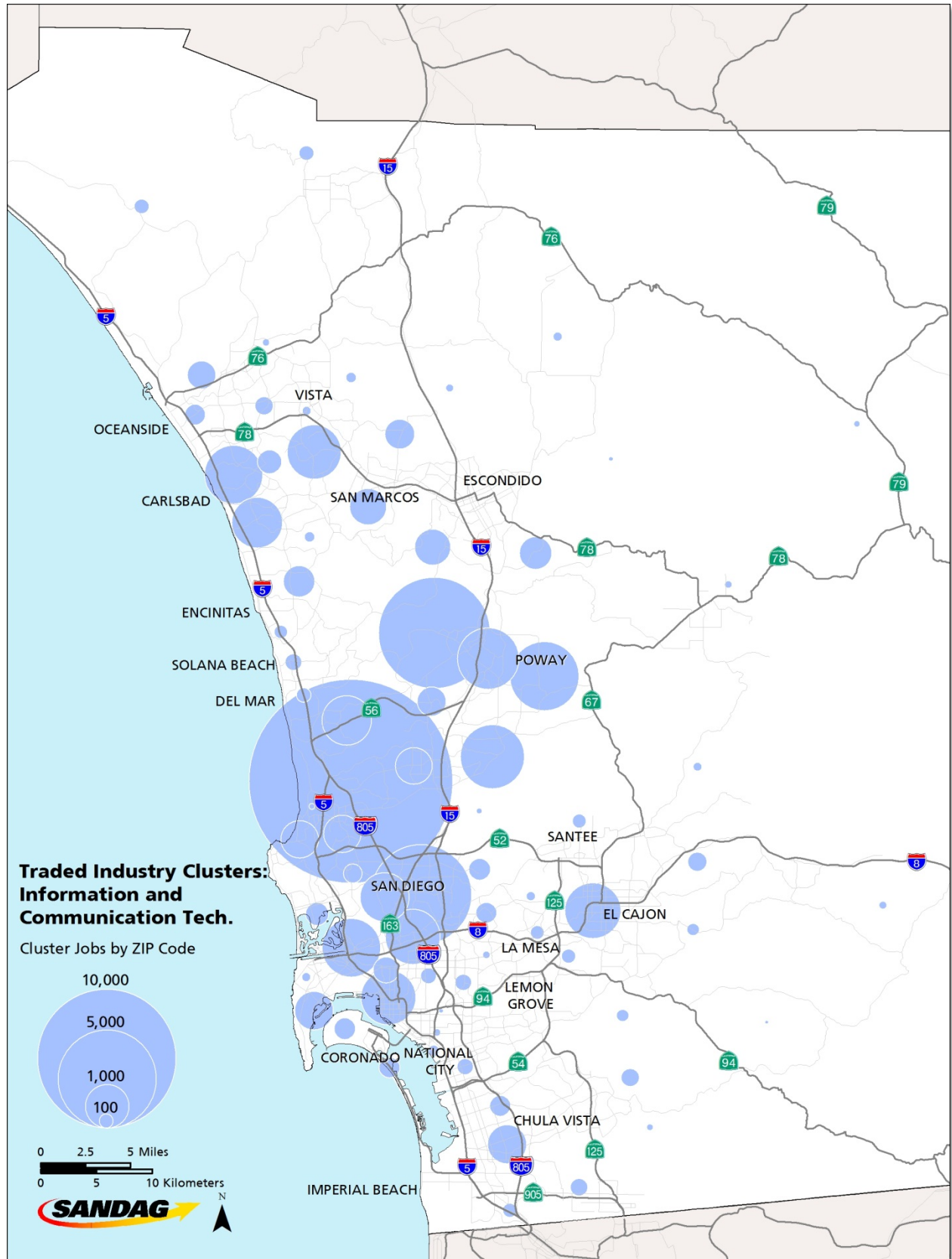


Figure 15
Publishing and Marketing

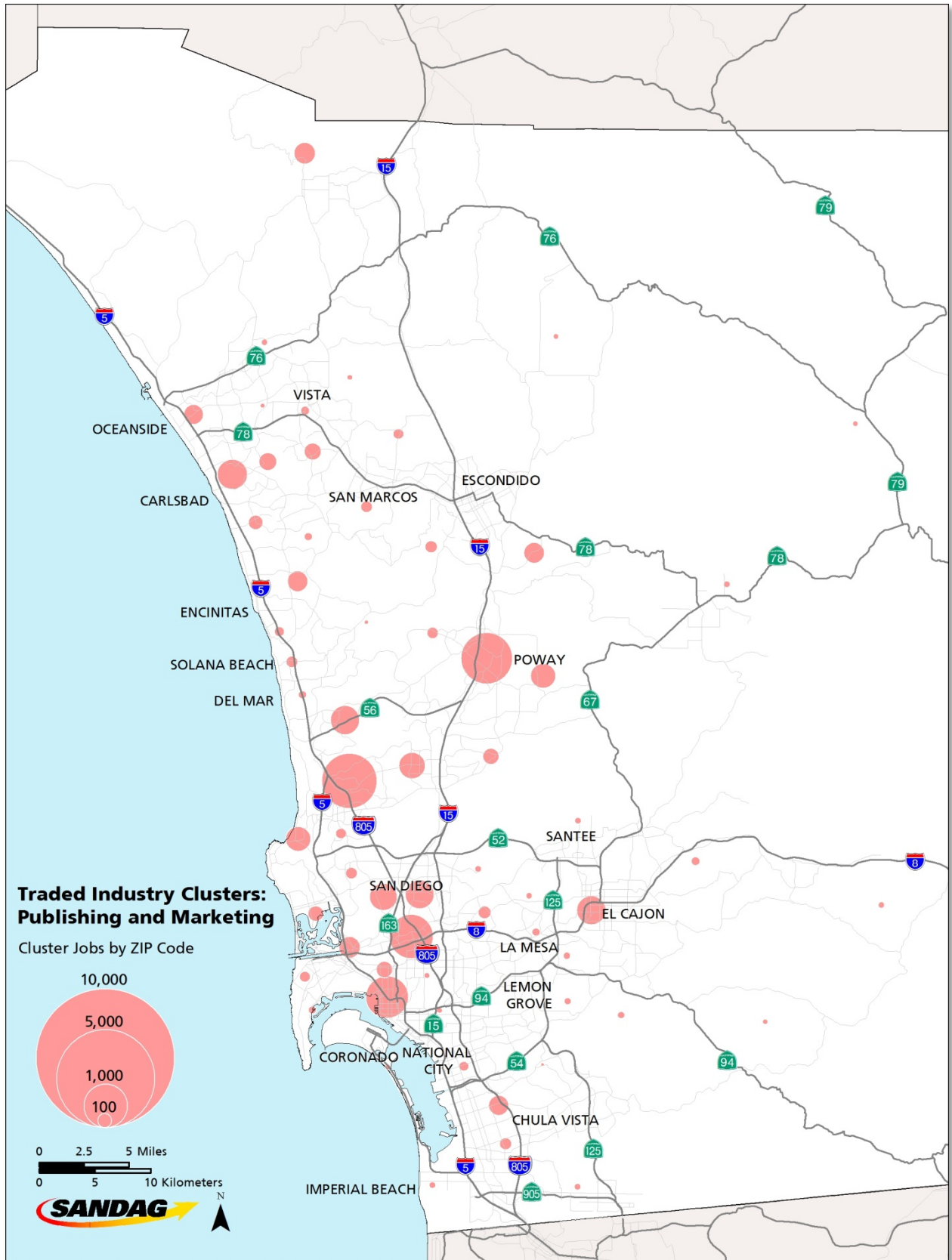
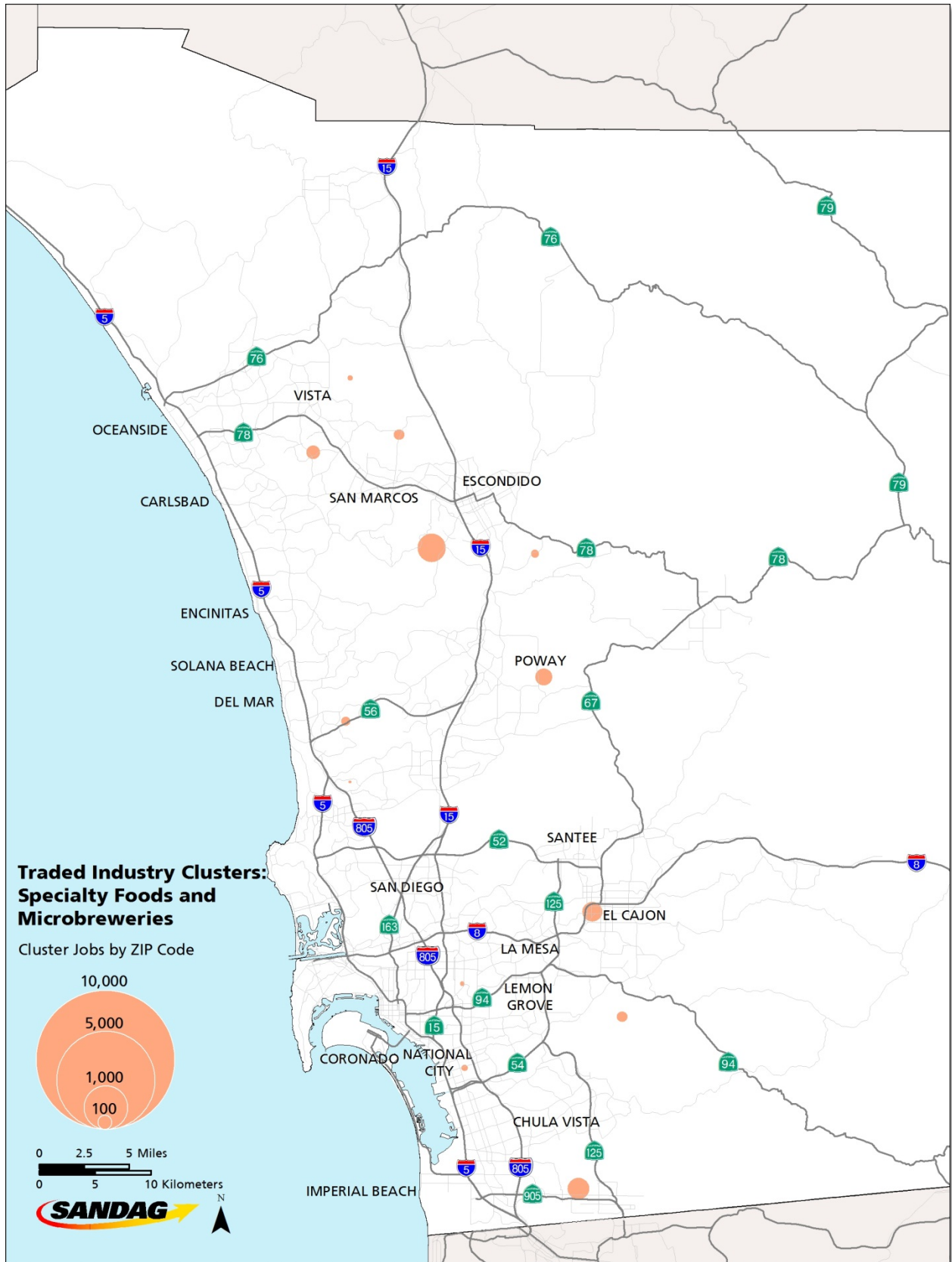


Figure 16
Specialty Foods and Microbreweries



Continued Importance of the Defense Sector

According to a 2011 San Diego Military Advisory Council (SDMAC) report, the San Diego region is home to a number of military installations that form the core of America's defense establishment in the southwestern region of the United States. Its presence supports intelligence, analysis, research and development, manufacturing, construction, and other activities in the region and forms a highly integrated relationship with these sectors. The SDMAC report estimated that the Department of Defense (DOD) spent \$18.2 billion in the San Diego region in Fiscal Year 2009, for a total economic impact of \$30.5 billion.⁹

Directly, the military employs approximately 100,000 active duty personnel and approximately 22,000 civilian staff, accounting for more than 8 percent of the region's total employment.¹⁰ In addition to being a significant source of direct jobs, the defense sector influences the structure of the local economy through grants and contracts. For instance, Table 3 provides the total DOD procurement funds allocated to industry cluster NAICS Codes. Total procurement dollars flowing into the region amount to nearly \$8.8 billion in 2010, with approximately 74 percent (\$6.5 billion) allocated to industry cluster NAICS codes.¹¹ Those industry clusters receiving the largest procurement funds are Aerospace, Navigation, and Maritime Technologies and ICT.

⁹ San Diego Military Advisory Council (SDMAC), Military Economic Impact Study, 2011.

¹⁰ SANDAG Current Employment Estimates (2010). Percent calculated as (uniformed military + civilian dept. of defense) / (civilian wage and salary + uniformed military + self-employed).

¹¹ U.S. General Services Administration, Federal Procurement Data Center, 2008-2010. https://www.fpds.gov/fpdsng_cms/, compiled by SANDAG and queried from the Federal Procurement Data Center's Database on August 15, 2011.

Table 3
Total Department of Defense Procurement Funds in the San Diego Region
Allocated to Industry Cluster NAICS Codes, 2010

	2010	
	Total Procurement	% Procurement
Action Sports Mfg.	\$599,787	0.0%
Advanced Precision Mfg.	\$25,310,569	0.3%
Aerospace, Navigation, and Maritime Tech.	\$3,385,215,671	38.6%
Apparel Mfg.	\$9,718,938	0.1%
Biomedical Devices and Products	\$80,373,583	0.9%
Biotechnology and Pharmaceuticals	\$158,895,043	1.8%
Cleantech	\$47,498,421	0.5%
Entertainment and Hospitality	\$24,075,865	0.3%
Fruits and Vegetables	\$1,386,215	0.0%
Horticulture	\$0	0.0%
ICT	\$2,652,618,288	30.3%
Publishing and Marketing	\$102,095,016	1.2%
Specialty Foods and Microbreweries	\$7,446	0.0%
TRADED INDUSTRY CLUSTER TOTAL	\$6,487,794,843	74.1%
REGIONAL TOTAL	\$8,758,659,249	100.0%

Source: 2010 Federal Procurement Data Center, U.S. General Services Administration; compiled by SANDAG.

Notes: Data collected from geographical areas covered by San Diego Congressional Districts: 49, 50, 51, 52, and 53. Note that Congressional Districts extend beyond the boundaries of the San Diego Region. Procurement funds are summed by NAICS and percentage splits shown in Appendix B. Figures may not add due to rounding.

Evolution and Future Trends of Traded Industry Clusters

Evolution of Clusters

The region's economic drivers have been changing over the past two decades. Figure 17 is an illustration of how universities and defense have transformed industry clusters. For instance, formerly, the local economy was focused on defense and aerospace manufacturing. When the number of defense contracts shrank in the early 1990s, new industry clusters emerged. Technologies used by defense and aerospace industries began to transform new ideas and new knowledge into advanced, high-quality products or services. In other words, innovation began to spread across different spectrums, forming new industry clusters, such as software, communications, computer and electronics, and recreational goods manufacturing. These clusters evolved since then and will continue to do so in the future. Additionally, universities have a strong influence on shaping the San Diego region. Many industries, such as biotechnology, pharmaceuticals, and biomedical products have been developed in the region as a result of collaboration between universities and research institutes. These industries have shaped the climate of San Diego's economy today and will continue to evolve in the future.

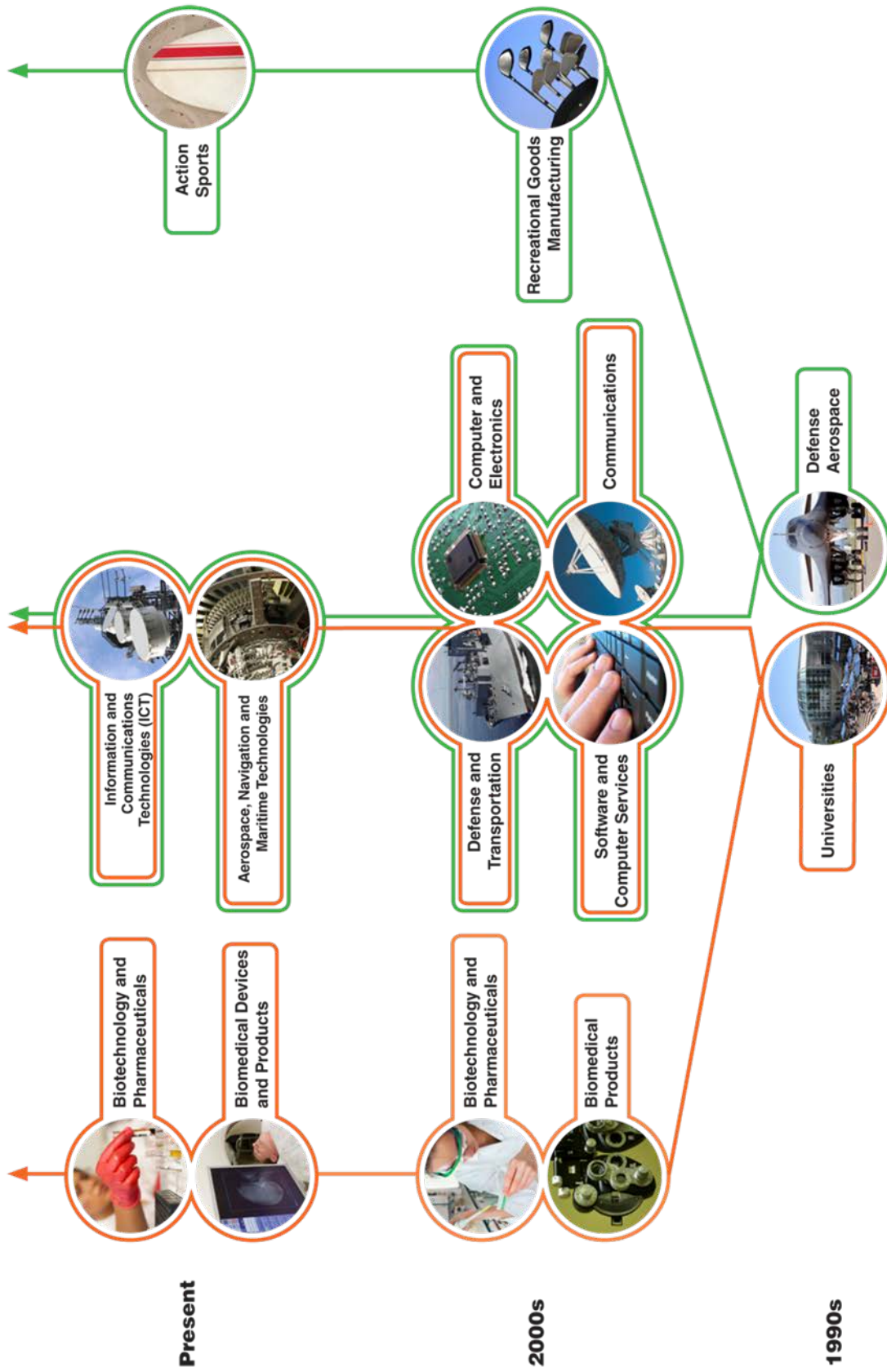
Many clusters continue to be strong drivers of the regional economy. The Biomedical Devices and Products and Biotechnology and Pharmaceuticals clusters have consistently been strong drivers since the first cluster study was completed in 1998. The Fruits and Vegetables and Horticulture clusters also continue to be two mature and strong anchors for the region's economy.

Other clusters no longer meet the criteria as a cluster. For example, Financial Services decreased in size over time and is no longer a cluster. Similarly, data for the Design cluster no longer meets the criteria to be considered an industry cluster.

Many clusters also have merged or evolved over time. Historically, San Diego had distinct Communications, Computer and Electronics, and Software clusters. Recent data show considerably more interconnection between these sectors, so they have been combined to form the ICT cluster. The Entertainment and Amusement and Travel and Hospitality clusters merged into one because the data show the local industry buyer and supplier linkages are stronger when grouped together than apart. The Publishing cluster now includes marketing, and has been renamed accordingly. Similarly, with growth in microbrewing in San Diego, the Specialty Foods cluster has grown into Specialty Foods and Microbreweries.

New clusters for this study include Advanced Precision Manufacturing and Apparel Manufacturing.

Figure 17
Illustration of How Universities and Defense Transform Traded Industry Clusters



Future Trends: The “Watch List”

As noted above, the definitions of several clusters changed and two new industry clusters were added to the list in the current report. The definitions presented here, based on 2009 employment and 2009 wage data, reflect the current structure of the San Diego economy. But the region's economy continues to evolve. As technologies and business needs change, new cluster grouping will come into existence. During the Technical Advisory Group meetings, a few sectors were identified to be on a “watch list.” These sectors can be monitored and, if they meet the criteria in future studies, they can be included in an updated list of industry clusters.

- E-Security/Cybersecurity
- Musical Instrument Manufacturing
- Maritime Industries

Another means of tracking industry sectors and potential new clusters is to watch VC funding trends. VC funding in the San Diego region dropped after the start of the recession in December 2007. However, the region still receives more than \$800,000 of VC funding each year. Some sectors continue to be leaders in VC (see Table 4), including biotechnology and software. This demonstrates that increased financial investment in these sectors may contribute to emerging industries as well as support growth in clusters in the San Diego region.

Table 4
Venture Capital Funds Received by San Diego Companies, by Sector, 2010 and 2011

Industry Sector	2010		2011	
	Total	% Total	Total	% Total
Biotechnology	\$442,561,900	50.3%	\$411,926,800	51.3%
Business Products and Services	\$83,000	0.0%	\$0	0.0%
Computers and Peripherals	\$39,999,900	4.5%	\$19,000,000	2.4%
Consumer Products and Services	\$0	0.0%	\$0	0.0%
Electronics/Instrumentation	\$10,630,000	1.2%	\$15,830,000	2.0%
Financial Services	\$1,675,000	0.2%	\$0	0.0%
Healthcare Services	\$0	0.0%	\$1,004,000	0.1%
Industrial/Energy	\$55,717,500	6.3%	\$78,400,000	9.8%
IT Services	\$17,944,800	2.0%	\$0	0.0%
Media and Entertainment	\$64,219,100	7.3%	\$59,040,000	7.4%
Medical Devices and Equipment	\$110,523,400	12.6%	\$72,228,000	9.0%
Networking and Equipment	\$0	0.0%	\$0	0.0%
Other	\$0	0.0%	\$19,000,000	2.4%
Retailing/Distribution	\$0	0.0%	\$1,000,000	0.1%
Semiconductors	\$19,268,100	2.2%	\$4,000,000	0.5%
Software	\$103,348,200	11.7%	\$111,600,000	13.9%
Telecommunications	\$14,304,000	1.6%	\$10,000,000	1.2%
REGIONAL TOTAL	\$880,274,900	100%	\$803,028,800	100%

Source: PricewaterhouseCoopers Money Tree Report; <https://www.pwcmoneytree.com/MTPublic/ns/nav.jsp?page=historical>; compiled by SANDAG.

Note: Percentages may not add due to rounding.

Importance of Traded Clusters

The clusters defined above drive the San Diego region economy. Local cluster industries are national leaders in innovation, government procurement, VC, and research funding. These industries also are export-oriented, and thus bring new money into the region by exporting goods and services.

Conclusion

Clusters will continue to evolve over time. As new technologies emerge, clusters will develop around those technologies, while other clusters may fade in importance. Existing cluster industries may grow and evolve in ways that lead to the formation of new or spinoff clusters. For this reason, SANDAG will continue to monitor and update the definitions of the region's clusters.

Acknowledgements

The cluster definitions in this update were reviewed in depth by a Technical Advisory Group composed of individuals from both the public and private sector. The following individuals graciously contributed their time and expertise to this project as members of the advisory group.

Technical Advisory Group:

Bill Anderson	City of San Diego
Casey Anderson	San Diego Farm Bureau
Jason Anderson	CleanTech San Diego
Sundari Baru	UCSD Extension
Tracy Bohlen	City of Oceanside
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Meredith Dowling	San Diego Regional Economic Development Corporation
Cindy Gompper Graves	South County Economic Development Council
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Jimmy Jackson	BIOCOM
Michael Jones	The Security Network, The Maritime Alliance
Gary Knight	San Diego North Economic Development Council
Eric Larson	San Diego Farm Bureau
Christina Luhn	San Diego Regional Economic Development Corporation
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Michael Meacham	City of Chula Vista
Gary Moss	San Diego Workforce Partnership
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Nathan Owens	Global Connect and San Diego Dialogue, UCSD
Bill Riedy	The Security Network, The Maritime Alliance
Louis Ronzitti	Securing our eCity, CyberSecurity Working Group
Duane Roth	CONNECT
Carmen Sandoval	San Diego Regional Chamber of Commerce
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TECHNICAL APPENDICES

APPENDIX A: METHODOLOGY

DATA SOURCES

Data for this report are drawn from three main sources. The 2009 IMPLAN input-output model is used to determine industry buyer-supplier transactions. The North American Industry Classification System (NAICS)-based industry employment and payroll data are from the California Employment Development Department (EDD) Quarterly Census of Employment and Wages (QCEW) (annual average 2008, 2009, and 2010) and from the SANDAG employment inventory (third quarter 2008, 2009, and 2010). The data are presented in 2010 annual averages, unless otherwise noted.

METHODOLOGY

STEP 1: Identify Base Industries

Determine base industries in the cluster using the following criteria:

- Employment concentration (i.e., location quotient) in San Diego County by NAICS code.
 - A location quotient equal to 1.0 means that the San Diego region has the same share of regional employment in an industry as the nation does. A location quotient greater than 1.0 means that the San Diego region has a higher local concentration of employment in an industry than the national average.
 - To be considered a “base” industry for preliminary analysis, industries should have a location quotient of 1.5 or greater.
 - A location quotient of 1.5 signifies that San Diego has 50 percent more highly concentrated employment in an industry than the national average.
- Industries also must meet minimum job thresholds:
 - 100 or more jobs in 2009 or
 - 50 or more jobs in 2009 and job growth (during recession) between 2008 and 2009.

STEP 2: Group “Base” Industries into “Core” Groups

Using the location quotient list, prior cluster definitions, and Technical Advisory Group input, group the high location quotient industries into “core” groups for each potential cluster.

STEP 2A: Exclude “Core” Industries with High Sales to Households

Exclude sectors that have high sales to households and therefore have a strong local-serving orientation. Industries with high sales to households are not considered to be export-oriented and are removed from the industry cluster definitions.

- “High” is defined as one standard deviation above the mean sales to households across all industries. For 2009, this threshold is 35 percent or more of an industry’s total sales to households.
- The household percent is calculated for each selling industry (Row Sector) using IMPLAN’s direct requirement table to determine the sales from the industry to households as:
 - Direct Requirements for Households / Direct Requirements for all sectors where households are assumed as IMPLAN sectors 10001-10009.
- Local and population serving industries generally were not included in the cluster definitions, including: retail, wholesale, local healthcare, construction, and government.
- An exception was made for specialty wholesalers that support local cluster industries (e.g., fresh flower wholesalers and sporting equipment wholesalers). In these cases, for the wholesale sector to be considered a core part of the cluster, its location quotient must be greater than 3.0.

A few exceptions to the above criteria were made for industries that have a portion of sales to both local residences and out of town visitors that help drive hospitality and tourism in the region. For example, local sports teams, zoos, botanical gardens, theme parks, restaurants, and food establishments remain in the Entertainment and Hospitality cluster due to a high percentage of sales to both local and out-of-town attendees. Many of these jobs wouldn’t be located in San Diego without money flowing into the region through the tourism and convention center industries.

STEP 2B: Identify Non-Grouped Industries

There may be some NAICS industries that show up as having high location quotients but do not neatly fall within one of the prior clusters definitions. Sectors that exhibited high location quotients but failed to fit into a “core cluster” were assigned to an “orphan” inventory list (those NAICS industries not yet associated with a cluster). SANDAG staff and the Technical Advisory Group considered whether these high location quotient industries were indicators of an emerging cluster. However, not all high location quotient industries ultimately made it onto the cluster list. Many industries did not make the list for the following reasons: low employment (despite high concentration), low number of companies, regional company characteristics, and high sales to households and/or high population-serving orientation.

STEP 3: Identify Strong Transactions between “Core” Industries and “Sales and Purchases” Industries

STEP 3A: Standard Deviation Analysis for Break Points

Find strong relationships between all core industries and their sales and purchases supplier industries by converting core NAICS industries into corresponding IMPLAN sectors. Then analyze the base sectors’ transactions with all other IMPLAN sectors in a matrix.

IMPLAN shows the flow of dollars between one industry and another. These transactions show the relative importance of the relationships between one sector to another sector. Using dollar values alone could skew results toward high-volume sectors, so the data need to be weighted. To weigh the transactions results, the following method is used:

- Calculate the average sales of a sector (across all IMPLAN sectors).
- Divide each of the seller's sales transactions (a cell where the seller row intersects with a buyer column) by the seller's average. For example, sector 1 might sell an average of \$5,000 worth of goods to each of the other sectors. Sector 1 might sell \$20,000 worth of goods to Sector 2 and \$1,000 worth of goods to Sector 3. In this case, Sector 1 sells four times as much to sector 2 as it does to all other IMPLAN sectors on average, but only sells 1/5th as much to Sector 3 as it does to all other IMPLAN sectors on average. This will be referred to as the sales magnitude.
- Repeat the above process for buyers. Calculate the average purchases of a sector (across all 440 IMPLAN sectors) by summing that sector's purchases and dividing by 440.
- Divide each of the buyer's purchase transactions (each cell where the buyer column intersects with a seller row) by the buyer's average. This will be referred to as the purchase magnitude.
- "Strong" magnitudes are when a base cluster sector shows at least one sales magnitude or purchase magnitude at least two standard deviations above the average across all sectors (sales magnitudes equal or greater than 21.3 and purchase magnitude equal or greater than 30.15), or shows two or more sales/purchase magnitudes at least one standard deviation above the average across all sectors (sales magnitude equal or greater than 11.49 and purchase magnitude equal or greater than 15.94). This step is intended to find the base industries' biggest partners (either buyers or suppliers).
 - For example, if sector 1 has a sales magnitude of 21.30 or higher with sector 2, the magnitude signifies that sector 1 sells 21.30 times as much to sector 2 as it does to all other sectors on average.
 - If sector 1 has a Purchase Magnitude of 30.15 or higher with sector 2, it signifies that sector 1 buys 30.15 times as much from this sector as it does from all 440 other sectors on average. This is considered significant enough to warrant consideration in the cluster.

STEP 3B: Find Strong Relationships between "Core" Industries and "Sales and Purchases" Industries to determine preliminary Industry Cluster Definitions.

The industry relationships identified in Step 3A were grouped into preliminary industry cluster definitions. These definitions were refined by dropping select industries (by NAICS code) based on the following criteria:

- Industries with less than ten jobs were dropped from the list due to insufficient employment (ex. Dry Bean and Pea Farming).
- Duplicate industries between the "core" industries and "sales and purchases" industries were deleted as to avoid redundancy and double-counting jobs (ex. Vegetable and Melon Farming).
- Generally, local serving industries were dropped because they are not export-oriented (e.g., doctor's offices).

- Some industries that exhibited a large number of jobs in different industry clusters were split between different industry clusters (ex. Research and Development) to adequately reflect the employment in these clusters.
- If only one industry makes up an entire industry cluster, it was dropped from the cluster list since it lacks interdependent (sales and purchases) relationships with other industries (ex. Musical Instruments).

STEP 4: Cluster Strengths Matrix

The cluster strengths matrix is used to determine whether a sector's sales magnitudes and purchase magnitudes are big enough to warrant inclusion (or too small to be considered for inclusion) in the cluster. This matrix is used to review the Step 2 and Step 3 results for:

- Strong relationships (carried forward in the cluster definition).
- Weak relationships (not likely to be included in the cluster definition).
- Industries that appear in multiple clusters to determine the "best fit" with a cluster.
- Determine if an industry needs to be split (because an industry serves several clusters) based on IMPLAN transactions as well as business lists, internet research sources, individual company Web sites, ticket and other tracking sales, and advisory group input.

STEP 5: Convert and Fine-Tune

Convert back from IMPLAN sectors to NAICS codes, and double-check the data for relevance to the cluster. In some cases, large IMPLAN sectors cover a wide variety of NAICS codes, some of which may be relevant to the cluster, and some of which may not be relevant. In these cases, the following criteria are used to determine whether a NAICS industry belongs in the cluster:

- NAICS definition ("reasonableness" test) and Technical Advisory Group review.
- Export orientation or population-serving orientation of the sector.

For example, IMPLAN sectors show strong relationships between some core industries in the Fruits and Vegetables cluster with sales to fruits and vegetable manufacturing activities. However, the Technical Advisory Group indicated that fruits and vegetables grown in the county are picked and sold fresh and are not frozen or manufactured to other products.

STEP 6: Review Results

Review results with the Technical Advisory Group. Potentially make adjustments to the industry clusters based on Technical Advisory Group's comments.

APPENDIX B: TRADED INDUSTRY CLUSTER DEFINITIONS

NAICS	DESCRIPTION	2010 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
ACTION SPORTS MANUFACTURING			
339920	Sporting and Athletic Goods Mfg.		
423910	Sporting and Recreational Goods and Supplies Merchant Wholesalers		
	TOTAL	4,177	\$65,300
ADVANCED PRECISION MANUFACTURING			
331210	Iron and Steel Pipe and Tube Mfg. from Purchased Steel		
331524	Aluminum Foundries (except Die-Casting)		
332114	Custom Roll Forming		
332312	Fabricated Structural Metal Mfg.		
332313	Plate Work Mfg.		
332420	Metal Tank (Heavy Gauge) Mfg.		
333311	Automatic Vending Machine Mfg.		
333319	Other Commercial and Service Industry Machinery Mfg. (50%) ¹		
333512	Machine Tool (Metal Cutting Types) Mfg.		
333513	Machine Tool (Metal Forming Types) Mfg.		
333514	Special Die and Tool, Die Set, Jig, and Fixture Mfg.		
333518	Other Metalworking Machinery Mfg.		
333992	Welding and Soldering Equipment Mfg.		
333999	All Other Miscellaneous General Purpose Machinery Mfg.		
811211	Consumer Electronics Repair and Maintenance		
811212	Computer and Office Machine Repair and Maintenance		
811213	Communication Equipment Repair and Maintenance		
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance		
	TOTAL	4,416	\$51,800
AEROSPACE, NAVIGATION, AND MARITIME TECHNOLOGIES			
334414	Electronic Capacitor Mfg.		
334416	Electronic Coil, Transformer, and Other Inductor Mfg.		
334511	Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Mfg.		
335313	Switchgear and Switchboard Apparatus Mfg.		
335314	Relay and Industrial Control Mfg.		
336411	Aircraft Mfg.		
336412	Aircraft Engine and Engine Parts Mfg.		
336413	Other Aircraft Parts and Auxiliary Equipment Mfg.		
336414	Guided Missile and Space Vehicle Mfg.		
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Mfg.		
336611	Ship Building and Repairing		
336612	Boat Building		
487110	Scenic and Sightseeing Transportation, Land		
487990	Scenic and Sightseeing Transportation, Other		
488111	Air Traffic Control		

NAICS	DESCRIPTION	2010 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
AEROSPACE, NAVIGATION, AND MARITIME TECHNOLOGIES (Continued)			
488119	Other Airport Operations		
488190	Other Support Activities for Air Transportation		
488310	Port and Harbor Operations		
488330	Navigational Services to Shipping		
488390	Other Support Activities for Water Transportation		
488410	Motor Vehicle Towing		
488490	Other Support Activities for Road Transportation		
488510	Freight Transportation Arrangement		
488991	Packing and Crating		
541380	Testing Laboratories (35%) ¹		
541614	Process, Physical Distribution, and Logistics Consulting Services		
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotech) (20%) ¹		
	TOTAL	32,099	\$79,300

APPAREL MANUFACTURING

313311	Broadwoven Fabric Finishing Mills		
313312	Textile and Fabric Finishing (except Broadwoven Fabric) Mills		
314911	Textile Bag Mills		
314911	Textile Bag Mills		
314912	Canvas and Related Product Mills		
314999	All Other Miscellaneous Textile Product Mills		
315119	Other Hosiery and Sock Mills		
315191	Outerwear Knitting Mills		
315211	Men's and Boys' Cut and Sew Apparel Contractors		
315212	Women's, Girls', and Infants' Cut and Sew Apparel Contractors		
315222	Men's and Boys' Cut and Sew Suit, Coat, and Overcoat Mfg.		
315223	Men's and Boys' Cut and Sew Shirt (except Work Shirt) Mfg.		
315228	Men's and Boys' Cut and Sew Other Outerwear Mfg.		
315232	Women's and Girls' Cut and Sew Blouse and Shirt Mfg.		
315291	Infants' Cut and Sew Apparel Mfg.		
315292	Fur and Leather Apparel Mfg.		
315299	All Other Cut and Sew Apparel Mfg.		
315991	Hat, Cap, and Millinery Mfg.		
316991	Luggage Mfg.		
316993	Personal Leather Good (except Women's Handbag and Purse) Mfg.		
316999	All Other Leather Good and Allied Product Mfg.		
323113	Commercial Screen Printing		
	TOTAL	2,870	\$30,400

BIOMEDICAL DEVICES AND PRODUCTS

325120	Industrial Gas Mfg.		
333314	Optical Instrument and Lens Mfg.		
339112	Surgical and Medical Instrument Mfg.		
339113	Surgical Appliance and Supplies Mfg.		
339114	Dental Equipment and Supplies Mfg.		
339115	Ophthalmic Goods Mfg.		
339116	Dental Laboratories		

NAICS	DESCRIPTION	2010 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
BIOMEDICAL DEVICES AND PRODUCTS (Continued)			
541380	Testing Laboratories (5%) ¹		
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotech) (20%) ¹		
811219	Other Electronic and Precision Equipment Repair and Maintenance		
	TOTAL	12,012	\$99,500
BIOTECHNOLOGY AND PHARMACEUTICALS			
112990	All Other Animal Production		
325411	Medicinal and Botanical Mfg.		
325412	Pharmaceutical Preparation Mfg.		
325413	In-Vitro Diagnostic Substance Mfg.		
325414	Biological Product (except Diagnostic) Mfg.		
541380	Testing Laboratories (15%) ¹		
541711	Research and Development in Biotechnology		
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotech) (35%) ¹		
	TOTAL	22,636	\$107,000
CLEANTECH			
333315	Photographic and Photocopying Equipment Mfg.		
333319	Other Commercial and Service Industry Machinery Mfg. (50%) ¹		
334413	Semiconductor and Related Device Mfg. (25%) ¹		
334513	Instruments and Related Products Mfg. for Measuring, Displaying, and Controlling Industrial Process Var.		
334514	Totalizing Fluid Meter and Counting Device Mfg.		
335314	Relay and Industrial Control Mfg.		
541380	Testing Laboratories (10%) ¹		
541420	Industrial Design Services		
541620	Environmental Consulting Services		
541690	Other Scientific and Technical Consulting Services (25%) ¹		
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotech) (5%) ¹		
	TOTAL	7,986	\$87,400
ENTERTAINMENT AND HOSPITALITY			
114111	Finfish Fishing		
481111	Scheduled Passenger Air Transportation		
481211	Nonscheduled Chartered Passenger Air Transportation		
481212	Nonscheduled Chartered Freight Air Transportation		
481219	Other Nonscheduled Air Transportation		
487210	Scenic and Sightseeing Transportation, Water		
532292	Recreational Goods Rental		
711110	Theater Companies and Dinner Theaters		
711120	Dance Companies		
711130	Musical Groups and Artists		
711190	Other Performing Arts Companies		
711211	Sports Teams and Clubs		
711212	Racetracks		
711219	Other Spectator Sports		

NAICS	DESCRIPTION	2010 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
ENTERTAINMENT AND HOSPITALITY (Continued)			
711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities		
711320	Promoters of Performing Arts, Sports, and Similar Events without Facilities		
711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures		
711510	Independent Artists, Writers, and Performers		
712130	Zoos and Botanical Gardens		
713110	Amusement and Theme Parks		
713120	Amusement Arcades		
713290	Other Gambling Industries		
713910	Golf Courses and Country Clubs		
713930	Marinas		
713990	All Other Amusement and Recreation Industries		
721110	Hotels (except Casino Hotels) and Motels		
722110	Full-Service Restaurants		
722211	Limited-Service Restaurants		
722212	Cafeterias, Grill Buffets, and Buffets		
722213	Snack and Nonalcoholic Beverage Bars		
722310	Food Service Contractors		
722320	Caterers		
722330	Mobile Food Services		
722410	Drinking Places (Alcoholic Beverages)		
	TOTAL	149,352	\$21,800
FRUITS AND VEGETABLES			
111150	Corn Farming		
111219	Other Vegetable (except Potato) and Melon Farming		
111310	Orange Groves		
111320	Citrus (except Orange) Groves		
111336	Fruit and Tree Nut Combination Farming		
111339	Other Noncitrus Fruit Farming		
111998	All Other Miscellaneous Crop Farming		
115112	Soil Preparation, Planting, and Cultivating		
115114	Postharvest Crop Activities (except Cotton Ginning)		
115115	Farm Labor Contractors and Crew Leaders		
115116	Farm Management Services		
115210	Support Activities for Animal Production		
115310	Support Activities for Forestry		
312130	Wineries		
	TOTAL	4,241	\$26,900
HORTICULTURE			
111411	Mushroom Production		
111419	Other Food Crops Grown Under Cover		
111421	Nursery and Tree Production		
111422	Floriculture Production		
424930	Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers		
	TOTAL	6,013	\$29,100

NAICS	DESCRIPTION	2010 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
INFORMATION AND COMMUNICATIONS TECHNOLOGIES (ICT)			
323121	Tradebinding and Related Work		
323122	Prepress Services		
334111	Electronic Computer Mfg.		
334112	Computer Storage Device Mfg.		
334113	Computer Terminal Mfg.		
334119	Other Computer Peripheral Equipment Mfg.		
334210	Telephone Apparatus Mfg.		
334220	Radio and Television Broadcasting and Wireless Communications Equipment Mfg.		
334290	Other Communications Equipment Mfg.		
334310	Audio and Video Equipment Mfg.		
334411	Electron Tube Mfg.		
334412	Bare Printed Circuit Board Mfg.		
334413	Semiconductor and Related Device Mfg. (75%) ¹		
334417	Electronic Connector Mfg.		
334418	Printed Circuit Assembly (Electronic Assembly) Mfg.		
334419	Other Electronic Component Mfg.		
334510	Electromedical and Electrotherapeutic Apparatus Mfg.		
334515	Instrument Mfg. for Measuring and Testing Electricity and Electrical Signals		
334516	Analytical Laboratory Instrument Mfg.		
334517	Irradiation Apparatus Mfg.		
334518	Watch, Clock, and Part Mfg.		
334519	Other Measuring and Controlling Device Mfg.		
334611	Software Reproducing		
334612	Prerecorded Compact Disc (except Software), Tape, and Record Reproducing		
335311	Power, Distribution, and Specialty Transformer Mfg.		
335999	All Other Miscellaneous Electrical Equipment and Component Mfg.		
511210	Software Publishers		
512110	Motion Picture and Video Production		
512191	Teleproduction and Other Postproduction Services		
517110	Wired Telecommunications Carriers		
517210	Wireless Telecommunications Carriers (except Satellite)		
517410	Satellite Telecommunications		
517911	Telecommunications Resellers		
517919	All Other Telecommunications		
541330	Engineering Services		
541380	Testing Laboratories (35%) ¹		
541511	Custom Computer Programming Services		
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotech) (20%) ¹		
	TOTAL	72,043	\$94,400

PUBLISHING AND MARKETING

511110	Newspaper Publishers
511120	Periodical Publishers
511130	Book Publishers
511199	All Other Publishers
512230	Music Publishers

NAICS	DESCRIPTION	2010 ANNUAL AVERAGE	
		EMPLOYMENT	WAGE
PUBLISHING AND MARKETING (Continued)			
519130	Internet Publishing and Broadcasting and Web Search Portals		
519190	All Other Information Services		
541810	Advertising Agencies		
541820	Public Relations Agencies		
541830	Media Buying Agencies		
541840	Media Representatives		
541850	Display Advertising		
541860	Direct Mail Advertising		
541870	Advertising Material Distribution Services		
541890	Other Services Related to Advertising		
541910	Marketing Research and Public Opinion Polling		
541930	Translation and Interpretation Services		
541990	All Other Professional, Scientific, and Technical Services		
	TOTAL	11,848	\$56,600
SPECIALTY FOODS AND MICROBREWERIES			
311830	Tortilla Mfg.		
312120	Breweries		
313241	Weft Knit Fabric Mills		
322211	Corrugated and Solid Fiber Box Mfg.		
322212	Folding Paperboard Box Mfg.		
322215	Nonfolding Sanitary Food Container Mfg.		
	TOTAL	1,717	\$43,500
TOTAL REGIONAL CLUSTER EMPLOYMENT		331,410	\$56,000
REGION TOTAL (ALL INDUSTRIES) EMPLOYMENT		1,233,300	\$50,700
SHARE OF REGION TOTAL EMPLOYMENT IN CLUSTERS		27%	

Sources: SANDAG, Current Employment Inventory (2010).

Note: ¹ This industry is split among two or more clusters. The percentage split indicated the proportion of employment in the NAICS code that is included in the cluster.

info

info presents information produced as part of the SANDAG overall planning program. The series contains population, housing, employment, land use, transportation, criminal justice, and other data, as well as occasional reports on other subjects of general interest. This report is financed with federal funds from the United States Department of Transportation, state funds from Caltrans, and local funds from SANDAG member jurisdictions.

SANDAG

The San Diego Association of Governments (SANDAG) is the region's primary research and planning agency, providing the public forum for regional policy decisions about growth, transportation, transit planning and construction, environmental management, housing, open space, energy, public safety, and binational topics. SANDAG is composed of mayors, council members, and county supervisors from each of the region's 18 cities and county government:

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THE REGIONAL INFORMATION SYSTEM

The SANDAG Regional Information System contains a comprehensive collection of historic, current, and forecasted information. We continuously update these datasets that contain demographic, economic, land use, transportation, criminal justice, and environmental information. Much of this information can be obtained at: www.sandag.org Formatted data reports and raw data can be extracted from the Profile Warehouse and the Data Warehouse. The site also provides access to several mapping applications.

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