The North Bay Life Science Alliance (NBLSA) monitors trends in employment, financing, commercial space, and government support for life science businesses in Marin, Napa, Solano, and Sonoma counties. Consequently, the North Bay is connected and important to the greater Bay Area, one of the global hubs of life science businesses and finance.

While this report identifies 90 businesses involved in global life science markets within the NBLSA counties, there may be as many as 470 headquartered and branch businesses stretching across different life science sectors in the North Bay. There has been both growth of life science jobs and geographic movement. As of the second quarter of 2015, the NBLSA counties accounted for 10,000 jobs in life science. For the entire year 2015, researchers were awarded $13 million in National Institute of Health (NIH) grants, primarily from The Buck Institute for Research on Aging in Marin County. Venture capital trends are moving toward a larger proportion of life science investment in portfolios; in Marin County, biotechnology is second only to software as venture capital investment since 2009.

Highly-educated workers dominate these fields; most are 25 years and older. In Marin County more than 54 percent of the resident population is over 25 years of age and has at least a bachelor’s degree; Marin County has a similar proportion of bachelor’s degrees or higher to San Francisco County (54.8 percent in Marin County to 52.9 in San Francisco). In the NBLSA counties, most life science workers have at least a bachelor’s degree or higher, matching the local demography well. Wages in life science businesses are generally higher than average wages in these counties, ranging from $18/hour for technicians to six-figure salaries for medical researchers, business management and sales. Marin and San Mateo counties have the highest life science wages in California. Annually, the impact of the life science industries grows in these communities as the number of employees increase along with the amount of businesses connecting along supply chains and value chains locally.

Since 2010, a relative abundance of commercial space has slowly disappeared as vacancy rates have fallen. Pricing remains competitive in terms of the greater Bay Area. Flex lab and research space remained in short supply as 2016 unfolded. Housing markets have tracked employment in life science jobs, a correlation that suggests the breadth of effects on the local economy as these businesses grow. In the NBLSA counties, due to the capture of leakages and use of regional workers, approximately $49 million of business revenue is generated for the regional economy, including businesses outside of life science, for every 100 new workers in a bioscience business.
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INTRODUCTION

Life Science Industry Characteristics, Economic Impacts, and Possibilities

The North Bay’s four counties (Marin, Napa, Solano, and Sonoma) have become a continually growing hub of life science firms and activities. The life science industry is an umbrella over a large number of industries as well as a mix of multinational corporations and their branch offices and facilities. Additionally, the field encourages the existence of lone biology researchers attempting to find the next significant cure. The California Life Science Association (CLSA at www.clsa.org), a trade association for life science businesses generally describes the life science industry sectors as a mix of the following businesses:

- Biomaterials and Bioprocesses
- Medical Therapeutics
- Agricultural Biotechnology
- Animal health and nutrition
- Nutraceuticals

The North Bay Life Science Alliance monitors trends in employment, financing, commercial space, and government support for life science businesses in Marin, Napa, Solano, and Sonoma counties. The North Bay is connected and important to the greater Bay Area, which is one of the global hubs of life science businesses and finance.
BROADER TRENDS

Like other technology and scientific industries, life science businesses connect labor, finance and global market opportunities. Economic recovery in the United States has coincided with an expansion of businesses and workers in these industries. Typically, an investment pattern starts with funded research on new or expanded science and patents (normally through governmental and non-profit foundation grant funding), leading to venture capital or equity-market financing for commercial science applications.

FUNDING

Since 2005, NBLSA counties have generated $10-$15 million annually in National Institute of Health (NIH) grant-funding, most of which goes to researchers at The Buck Institute for Research on Aging. The federal fiscal years 2013-14 and 2014-15 data is in Figure 1. UC Davis, a major research university at Solano County’s eastern border, generates approximately $190 million per year in NIH funding.

Grant funding can generate interest from venture capitalists. These grants help venture funds to share risk with governmental agencies as the research is becoming commercialized. Price Waterhouse Cooper (PWC) reported that over $2 billion was invested in US-based life science firms in the fourth quarter of 2015. Figure 2 shows that venture deals fell in Q4 2015 after relatively robust growth since mid-2014. Venture capital funding for life science grew to just over 18 percent of the US market total as of 2015 Q4 (the latest data available). Biotechnology represents over 71 percent of these deals, and medical devices represent the other 29 percent. Most of the funding in medical device technology is late-stage (beyond clinical trials or already in the market); biotechnology venture deals are more in early-stage (research is going through or toward the end of clinical trials). This is important NBLSA information for two reasons:

- Companies in the North Bay are predominantly biotech or medical device firms and
- The Bay Area is the largest region in the United States experiencing venture deals.

Figure 2 also shows recent trends in the life science industry and Figure 3 shows the changes in Marin County as an example of the mix of venture capital in the NBLSA. Figure 4 shows the types of venture capital deals made in Marin County specifically. (Note: biotechnology is second to software since 2009.)

**FIGURE 1: NIH FUNDING IN NBLSA COUNTIES, 2014 AND 2015 FISCAL YEARS**

![Graph showing NIH funding in NBLSA counties, 2014 and 2015 fiscal years](attachment:image.png)

Source: National Institute for Health (grants.nih.gov)
FIGURE 2: NATIONAL TRENDS IN VENTURE CAPITAL FUNDING, TOTAL AND LIFE SCIENCE, % CHANGE

Source: PWC Life Sciences Venture Funding Trends, 2015 Q4

FIGURE 3: LIFE SCIENCE TRENDS BY QUARTER, US VENTURE CAPITAL MARKET, BILLIONS $

Source: PWC Life Sciences Venture Funding Trends, 2015 Q4
THINKING GLOBALLY AND REGIONALLY

A recent report by Deloitte LLP provides global opportunities and concerns in 2016. Growth of spending in pharmaceuticals is suggested to be tied to global health care spending and is predicted to grow at 4.3 percent per year from 2016 to 2019 and reach a total of $1.4 trillion in 2019 for global pharmaceutical sales. By 2019, biotech is estimated to grow from 18 percent of pharmaceutical sales to 26 percent worldwide, mainly in vaccines and biologics (genetically-engineered proteins derived from human genes). This would be a total of $445 billion in sales revenue for biotech with China, Russia, Brazil and the United States being the major markets.

Medical technology and devices is predicted to grow 4.1 percent annually to $454 billion for worldwide sales revenues by 2019. In-vitro diagnostics is considered this industry segments largest product category, estimated by Deloitte to be 14 percent of the global med tech market. In 2015 Medtronic, a business with a major division located in Sonoma County, became larger than long-time industry leader Johnson and Johnson in terms of medical technology and device sales. Mergers and acquisitions, including the Covidien acquisition by Medtronic, is likely how companies will continue to grow versus venture funding through 2020. Bioinformatics and biosensors are drawing more venture capital likely due to its potential tie to mobile technologies and the future of such companies. The Deloitte report also identified major issues for life science businesses, including:

- Economic uncertainty: economic weakness in China, Russia and Brazil have investors nervous
- Changing demographics: an aging population and chronic disease suggest more health-care system challenges and spending implications in that segment
- Accessibility and affordability: trends toward universal health care, such as the Affordable Care Act in the U.S., may increase overall spending on health care by governments
- Taxation: need for more tax management and consideration of rules for global revenue generation and transparency is rising

As local life science firms grow their employment and revenues, the NBLSA counties must consider how to support new and expanding businesses in the face of competition from other regions and utilization of commercial real estate.
COMMERCIAL SPACE

THE BAY AREA
In 2015 demand for commercial space increased while vacancy rates fell quickly for flex-lab space, commercial real estate that can flex between office, industrial and laboratory uses. The vacancy rate for this mix of office and lab spaces in San Mateo County is estimated at 5.1 percent and may be as low as 0.2 percent in San Francisco. One solution has been to sublease space where possible (The Buck Institute for Research on Aging) in Novato does that now, almost like an incubator), including equipment use and leasing. The East Bay also saw some expansion in 2015 also and vacancies are down to around 5 percent. The East Bay is a good model for the North Bay, having taken advantage of rising prices in San Francisco and San Mateo counties to create a proximate alternative. Pricing on leasing space is closer to $36 per square foot in the East Bay compared to $38/sq ft in San Francisco as of January 2016 (Source: Newmark Cornish Carey). The North Bay had both acquisition activity and vacancy rates fall during 2015.

MARIN COUNTY
BioMarin (www.bmrn.com) is the largest commercial real estate story of 2015 for the NBSLA counties. BioMarin’s purchase of the San Rafael Corporate Center in 2015 reinforced Marin County’s importance as a location to operate (see Table 1). This property is approximately 315,000 square feet as a mix of offices and potential research and development space. Another 700,000 square feet of space now exists in Marin County comprised of the former Fireman’s Fund/Allianz Insurance building in northern Novato. This space became available in early 2016. Industrial space in Marin County has low vacancy, due both to a lack of overall supply and new building (3.3 percent vacancy as of Q4 2015)[Source materials for this section are from Keegan and Coppin, Newmark Cornish Carey, and Cushman Wakefield]. Office vacancy is approximately 17 percent. Property sales were the big story in Marin County for 2015. Table 1 provides some examples.

SONOMA COUNTY
Sonoma County has a medical device research, development and manufacturing cluster, anchored by Medtronic and Trivascular, primarily in the Airport Corridor of northern Santa Rosa. While Petaluma is a potential growth area for the life science industry, space is very limited in and most deals in 2015 were in spaces of less than 10,000 square feet. Vacancy rates are down to 4 percent as of 2016 and office space remains around 15 percent vacancy; prices are rising but remain under $2.25 per square foot for Class A office. Concurrently, new apartment construction is allowing Petaluma to grow its population and potential, local workforce with limited commuting.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SALES PRICE</th>
<th>SQ FT</th>
<th>$/SQ FT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton Landing, Novato</td>
<td>$82,000,000</td>
<td>410,000 sf</td>
<td>$200 psf</td>
</tr>
<tr>
<td>88 &amp; 75 Rowland, Novato</td>
<td>$25,000,000</td>
<td>143,444 sf</td>
<td>$174 psf</td>
</tr>
<tr>
<td>7250 Redwood Blvd, Novato</td>
<td>$16,250,000</td>
<td>87,000 sf</td>
<td>$186 psf</td>
</tr>
<tr>
<td>Larkspur Landing, Larkspur</td>
<td>$82,000,000</td>
<td>199,046 sf</td>
<td>$412 psf</td>
</tr>
<tr>
<td>5725 Paradise Dr., Corte Madera</td>
<td>$51,000,000</td>
<td>97,410 sf</td>
<td>$523 psf</td>
</tr>
<tr>
<td>4040 Civic Center, San Rafael</td>
<td>$34,900,000</td>
<td>130,237 sf</td>
<td>$267 psf</td>
</tr>
<tr>
<td>4000 Civic Center, San Rafael</td>
<td>Not Available</td>
<td>142,364 sf</td>
<td></td>
</tr>
<tr>
<td>Drakes Bay Office Park</td>
<td>Not Available</td>
<td>130,177 sf</td>
<td></td>
</tr>
<tr>
<td>899 North Gate, San Rafael</td>
<td>$13,500,000</td>
<td>55,000 sf</td>
<td>$245 psf</td>
</tr>
<tr>
<td>16450 Los Gamos, San Rafael</td>
<td>$22,000,000</td>
<td>148,000 sf</td>
<td>$149 psf</td>
</tr>
<tr>
<td>San Rafael Corporate Ctr. (Bio Marin)</td>
<td>$116,000,000</td>
<td>314,788 sf</td>
<td>$368 psf</td>
</tr>
</tbody>
</table>

Source: Keegan and Coppin Commercial (www.keegancoppin.com)
Rohnert Park has two spaces that may work for life science, especially with Sonoma State University two miles from the city center. A former State Farm Insurance complex is now vacant, with over 42,000 square feet of space. Another property on the same street (State Farm Drive) has over 23,000 square feet. While Rohnert Park’s commercial real estate supply is mainly office space, and not industrial (vacancy for office space is closer to 30 percent, while industrial space is limited and closer to 7.5 percent), life science research and development could expand in Rohnert Park.

Santa Rosa now has gigabit Internet in the Airport Corridor, making it a desirable research and development expansion area. Craft brewing, as with other industrial space in Sonoma County, is becoming a direct competitor to potential R&D and lab space. The office space vacancy rate near the airport is just over 10 percent while the industrial vacancy rate is down to 2.5 percent. Most of the major acquisitions in 2015 were either retail or health-care related.

Solano County
Solano County has the largest number of life science employees in the NBLSA’s four counties. The Genentech campus in northeast Solano County, just outside Vacaville on the 505 corridor, is a comprehensive bioscience campus and relatively close to UC Davis. Solano County has an office vacancy rate of 18 percent as of Q4 2015, according to Colliers International. Rents are relatively low, at $2.10 per square foot for class A space. Fairfield saw life science activity in Q4 2015 with Zimmer Biomet Fagain leasing 6,000 sq ft of Class B office space.

The industrial space inventory in Solano County is approximately 340,000 square feet vacant as of Q4 2015. Tiny Benicia has approximately 160,000 square feet of industrial space available in the R&D flex category as 2016 begins. Presently, Solano County hasses construction but also has multiple economic efforts underway for currently underdeveloped commercial sites, some of which may be suitable for life science work. More than 200,000 feet of industrial space was leased in Q4 2015 to logistics and solar businesses in Benicia. About 100,000 square feet were leased in Fairfield in Q4 2015, most of which was warehousing for food manufacturing and general logistics. Vacaville’s small amount of industrial space was continued to be eaten up by ICON aircraft and warehousing and logistics businesses in 2015, over 600,000 square feet in Q4 2015.

Napa County
Napa County remains a place for the wine industry’s supply chain, and the 2015 commercial real estate market continues to be a warehousing and retail marketplace. The former Dey Pharmaceutical facility near the Napa County Airport (2751 Napa Valley Corporate Drive) has 78,000 square feet of flex-lab space, specifically designed for pharmaceutical research and manufacturing. Napa County may be a place for logistics, but competes directly with the wine industry for those spaces. Industrial vacancy was approximately 10 percent at the beginning of 2016. Napa County has an office space vacancy rate is 8.3 percent as of January 2016. The 2014 earthquake, while still visible in the downtown city of Napa, had little lasting effect on the community’s economics. Industrial and warehouse space was very tight heading as of January 2016, with both rates at approximately four percent vacancy. American Canyon has virtually no industrial, warehousing or R&D flex vacancy.

Summary
Commercial real estate for life science businesses ranges from office to industrial to flex lab. Depending on the type of business and what part of the industry value and supply chain a business is, the North Bay had moderate availability of space available as 2016 unfolded. These are competitive on pricing with the core Bay Area counties. These counties house employees also; there has been a correlation between housing prices and hiring by life science employers since 2010. These issues and more are discussed further in the next section.
DATA AND COMPARISONS

EMPLOYMENT

In the second quarter of 2015 (the latest data available), there were approximately 110,000 Bay Area workers in life science as defined in this report (see Table 2 for industries that define life science businesses). Figure 5 shows the change in the number of life science workers in the NBLSA’s four counties. Since 2010, the 30 percent expansion is among the fastest growing industries in these four counties overall. It represents a combination of rapid growth and also a focus on economic development in these industries. A recent economic impact report by the CSLA, based NAICS codes in Table 2 proportions life science businesses with a certain number of jobs in each code.

### TABLE 2: NAICS CODES USED TO DEFINE LIFE SCIENCE INDUSTRIES, CLSA, 2015

<table>
<thead>
<tr>
<th>NAICS CODE</th>
<th>DESCRIPTION</th>
<th>SECTOR</th>
<th>% APPLIED</th>
</tr>
</thead>
<tbody>
<tr>
<td>61131</td>
<td>Colleges and Universities</td>
<td>Academic Research</td>
<td>0.14</td>
</tr>
<tr>
<td>325411</td>
<td>Medicinal and Botanical Mfg.</td>
<td>Biopharmaceuticals</td>
<td>1</td>
</tr>
<tr>
<td>325412</td>
<td>Pharmaceutical Preparation Mfg.</td>
<td>Biopharmaceuticals</td>
<td>1</td>
</tr>
<tr>
<td>325413</td>
<td>In-Vitro Diagnostic Substance Mfg.</td>
<td>Biopharmaceuticals</td>
<td>1</td>
</tr>
<tr>
<td>325414</td>
<td>Biological Product (except Diagnostic) Mfg.</td>
<td>Biopharmaceuticals</td>
<td>1</td>
</tr>
<tr>
<td>325193</td>
<td>Ethyl Alcohol Mfg.</td>
<td>Biorenewables</td>
<td>1</td>
</tr>
<tr>
<td>325199</td>
<td>All Other Basic Organic Chemical Mfg.</td>
<td>Biorenewables</td>
<td>1</td>
</tr>
<tr>
<td>325311</td>
<td>Nitrogenous Fertilizer Mfg.</td>
<td>Biorenewables</td>
<td>1</td>
</tr>
<tr>
<td>325312</td>
<td>Phosphate Fertilizer Mfg.</td>
<td>Biorenewables</td>
<td>1</td>
</tr>
<tr>
<td>325314</td>
<td>Fertilizer (Mixing Only) Mfg.</td>
<td>Biorenewables</td>
<td>1</td>
</tr>
<tr>
<td>32532</td>
<td>Pesticide and Other Agricultural Chemical Mfg.</td>
<td>Biorenewables</td>
<td>1</td>
</tr>
<tr>
<td>334510</td>
<td>Electro medical and Electrotherapeutic Apparatus Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>334516</td>
<td>Analytical Laboratory Instrument Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>334517</td>
<td>Irradiation Apparatus Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>339112</td>
<td>Surgical and Medical Instrument Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>339113</td>
<td>Surgical Appliance and Supplies Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>339114</td>
<td>Dental Equipment and Supplies Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>339115</td>
<td>Ophthalmic Goods Mfg.</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>339116</td>
<td>Dental Laboratories</td>
<td>Med Devices and Diagnostics</td>
<td>1</td>
</tr>
<tr>
<td>54138</td>
<td>Testing Laboratories</td>
<td>Research, Testing, &amp; Medical Labs</td>
<td>0.19</td>
</tr>
<tr>
<td>541711</td>
<td>Research and Development in Biotechnology</td>
<td>Research, Testing, &amp; Medical Labs</td>
<td>1</td>
</tr>
<tr>
<td>541712</td>
<td>R&amp;D in the Physical, Engineering, &amp; Life Sciences (except Biotechnology)</td>
<td>Research, Testing, &amp; Medical Labs</td>
<td>0.12</td>
</tr>
<tr>
<td>62151</td>
<td>Medical Laboratories</td>
<td>Research, Testing, &amp; Medical Labs</td>
<td>1</td>
</tr>
<tr>
<td>42345</td>
<td>Medical, Dental, &amp; Hospital Equipment &amp; Supplies Merchant Wholesalers</td>
<td>Wholesale Trade</td>
<td>1</td>
</tr>
<tr>
<td>42346</td>
<td>Ophthalmic Goods Merchant Wholesalers</td>
<td>Wholesale Trade</td>
<td>1</td>
</tr>
<tr>
<td>42421</td>
<td>Drugs and Druggists’ Sundries Merchant Wholesalers</td>
<td>Wholesale Trade</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Source: California Life Sciences Association (www.CLSA.org)
FIGURE 5: EMPLOYMENT IN LIFE SCIENCE BUSINESSES, 2006 – 2015 (Q2), NBLSA COUNTIES

Sources: EDD (www.edd.ca.gov) and BLS (www.bls.gov) and CLSA NAICS Definitions

FIGURE 6: MARIN COUNTY HOUSING PRICES, LIFE SCIENCE EMPLOYMENT AND OTHER EMPLOYMENT INDEX 2010 = 100, 2006–2015

Sources: www.car.org, California EDD and NBLSA
HOUSING

Housing markets experienced regional growth again in 2015, as interest rates remained low and regional jobs and income growth continued to support high housing prices. Figures 7 and 8 provide data indicate the percentage growth in home prices during 2015, according to the California Association of Realtors® (www.car.org), and the median, single-family home prices as of January 2016.

**FIGURE 7: PERCENTAGE GROWTH IN MEDIAN SINGLE-FAMILY HOME PRICES, 2014 - 2015 NBLSA COUNTIES AND SELECTED AREAS**

Source: www.car.org

Connecting the Dots: Employment and Housing Price Growth

The growth of life science employment supports more housing demand, purchases of goods and services, and more support for jobs and local tax receipts. Figures 9 and 10, indexed to 2010, show the annual housing prices compared to annual employment in life science and all other businesses in these counties. Jobs growth has been more correlated with housing prices growth since 2010 than growth of jobs outside of life science businesses. Marin and Solano have been strong life science markets for employment and businesses outside San Francisco and San Mateo counties.

In Marin County (Figure 9), housing prices fell toward their bottom in 2010, but not with the magnitude of change as experienced in Solano County (Figure 10). Solano County while still not having recovered fully has recovered the most.
FIGURE 8: MEDIAN SINGLE-FAMILY HOME PRICES, JANUARY 2016, NBLSA COUNTIES ($1M HEAVY LINE)

Source: www.car.org

FIGURE 9: MARIN COUNTY HOUSING PRICES, LIFE SCIENCE EMPLOYMENT AND OTHER EMPLOYMENT INDEX 2010 = 100

Sources: www.car.org, California EDD and NBLSA
In both counties, life science jobs increased through the recent recession and perhaps helped to stabilize the local economy. However, in both cases, the movement of housing prices in Marin and Solano counties seems highly connected to life science jobs versus general employment in other industries. While this is not a causal relationship, it may speak to the idea that life science jobs are more likely to enhance local employment where workers also reside locally, supporting housing demand.

For example, in Marin County, the growth of life science jobs is about 27 percent since 2010, and housing prices have increased about 37 percent over the same time; overall employment in Marin County grew by only 12 percent otherwise since 2010. In Solano County, there has been a 60 percent increase in life science jobs, fueled by growth at major global firms. Housing prices have increased 66 percent since 2010, but employment outside life science has only increased by 9.6 percent. The labor market recovery overall in Solano County started after the rest of the NBLSA counties, but the housing market and life science employment recovered sooner.

**FIGURE 10: SOLANO COUNTY HOUSING PRICES, LIFE SCIENCE EMPLOYMENT AND OTHER EMPLOYMENT INDEX 2010 = 100**

Transportation

In 2016, the North Bay counties of Sonoma and Marin will be connected by a new light rail system. (See [http://main.sonomamarintrain.org/](http://main.sonomamarintrain.org/) for more on this rail service, stops, schedule, and dates of beginning service). This service, called the Sonoma-Marin Area Rapid Transit or SMART, connects residential areas in these two counties with major commercial real estate stops to the Larkspur Ferry Terminal, which then connects the North Bay to San Francisco through mass transportation. This additional asset saves time and costs for all businesses in the North Bay and provides a rapid transit option not previously available above the Golden Gate Bridge.
NBSLA COUNTIES’ RESIDENTS IN LIFE SCIENCE JOBS: EDUCATION, AGE AND WAGES

Tables 3 – 8 shows the demographics of residents, and reflects potential hiring pools of local life science businesses. Some of these workers are employed in the Bay Area but outside the NBSLA counties. Each set of tables shows the latest data (2014) as compared to Census 2010, which is also consider the bottom of the most recent recession.

Napa Valley College, Solano Community College, College of Marin, and the Santa Rosa Junior College are all candidates to provide training and coursework to lab technicians, lab assistants, and other clinical staff as needed for life science businesses. Dominican University has coursework in biology and historic agreements with The Buck Institute for Research on Aging for placing interns and new graduates in technical positions. Sonoma State University has biology programs at both the undergraduate and graduate levels.

### TABLE 3: EDUCATIONAL ATTAINMENT IN LIFE SCIENCE WORKERS BY GEOGRAPHY, 2014, NUMBER OF WORKERS

<table>
<thead>
<tr>
<th>EDUCATIONAL LEVEL</th>
<th>MARIN</th>
<th>NAPA</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>SAN FRANCISCO</th>
<th>SAN MATEO</th>
<th>SAN DIEGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a High School Graduate</td>
<td>83</td>
<td>65</td>
<td>213</td>
<td>374</td>
<td>370</td>
<td>1,783</td>
<td></td>
</tr>
<tr>
<td>High School Graduate</td>
<td>243</td>
<td>98</td>
<td>475</td>
<td>670</td>
<td>1,041</td>
<td>1,152</td>
<td>5,584</td>
</tr>
<tr>
<td>Some College or Associate's Degree</td>
<td>656</td>
<td>623</td>
<td>2,107</td>
<td>2,159</td>
<td>2,539</td>
<td>3,718</td>
<td>17,749</td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>1,148</td>
<td>225</td>
<td>1,762</td>
<td>1,558</td>
<td>4,007</td>
<td>11,013</td>
<td>21,306</td>
</tr>
<tr>
<td>Post-Baccalaureate</td>
<td>1,122</td>
<td>80</td>
<td>917</td>
<td>1,488</td>
<td>4,668</td>
<td>12,337</td>
<td>18,009</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>3,252</strong></td>
<td><strong>1,026</strong></td>
<td><strong>5,326</strong></td>
<td><strong>6,088</strong></td>
<td><strong>12,629</strong></td>
<td><strong>28,590</strong></td>
<td><strong>64,431</strong></td>
</tr>
</tbody>
</table>

Source: American Community Survey, 5-year average, Calculations by Marin Economic Consulting

### TABLE 4: EDUCATION OF LIFE SCIENCE WORKERS BY GEOGRAPHY, 2010 CENSUS, NUMBER OF WORKERS

<table>
<thead>
<tr>
<th>EDUCATIONAL LEVEL</th>
<th>MARIN</th>
<th>NAPA</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>SAN FRANCISCO</th>
<th>SAN MATEO</th>
<th>SAN DIEGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a High School Graduate</td>
<td>19</td>
<td>3</td>
<td>90</td>
<td>290</td>
<td>319</td>
<td>1,632</td>
<td></td>
</tr>
<tr>
<td>High School Graduate</td>
<td>348</td>
<td>202</td>
<td>521</td>
<td>1,255</td>
<td>798</td>
<td>1,473</td>
<td>6,478</td>
</tr>
<tr>
<td>Some College or Associate's Degree</td>
<td>653</td>
<td>248</td>
<td>1,524</td>
<td>2,091</td>
<td>2,438</td>
<td>4,976</td>
<td>15,933</td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>1,269</td>
<td>303</td>
<td>1,589</td>
<td>2,092</td>
<td>3,998</td>
<td>10,151</td>
<td>20,602</td>
</tr>
<tr>
<td>Post-Baccalaureate</td>
<td>923</td>
<td>141</td>
<td>428</td>
<td>1,282</td>
<td>3,492</td>
<td>10,312</td>
<td>18,060</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>3,212</strong></td>
<td><strong>894</strong></td>
<td><strong>4,065</strong></td>
<td><strong>6,810</strong></td>
<td><strong>11,016</strong></td>
<td><strong>27,231</strong></td>
<td><strong>62,705</strong></td>
</tr>
</tbody>
</table>

Source: 2010 Census, Calculations by Marin Economic Consulting
UC Davis is on Solano County’s eastern border, and UC Berkeley and UCSF are within 20 miles of Marin County. Earnings of workers in life science tend to be higher than in the rest of the local economy. Life science businesses tend to attract older, more educated workers on average. In terms of educational pipeline, there are higher-education institutions in these counties, but their scope is somewhat limited for primary life science research. This is a challenge to be met by these institutions as life science employment grows.

### TABLE 5: AGE OF LIFE SCIENCE WORKERS BY GEOGRAPHY, 2014, NUMBER OF WORKERS

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>MARIN</th>
<th>NAPA</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>SAN FRANCISCO</th>
<th>SAN MATEO</th>
<th>SAN DIEGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-18</td>
<td>38</td>
<td>70</td>
<td>122</td>
<td>684</td>
<td>38</td>
<td>70</td>
<td>122</td>
</tr>
<tr>
<td>18-24</td>
<td>210</td>
<td>78</td>
<td>438</td>
<td>2,316</td>
<td>1,562</td>
<td>1,968</td>
<td>10,642</td>
</tr>
<tr>
<td>25-34</td>
<td>1,912</td>
<td>216</td>
<td>2,316</td>
<td>2,480</td>
<td>7,820</td>
<td>13,074</td>
<td>31,484</td>
</tr>
<tr>
<td>35-49</td>
<td>2,454</td>
<td>586</td>
<td>4,020</td>
<td>4,160</td>
<td>9,424</td>
<td>28,230</td>
<td>48,024</td>
</tr>
<tr>
<td>50-64</td>
<td>1,536</td>
<td>1,090</td>
<td>3,652</td>
<td>4,342</td>
<td>5,868</td>
<td>12,722</td>
<td>34,778</td>
</tr>
<tr>
<td>65-74</td>
<td>328</td>
<td>82</td>
<td>168</td>
<td>510</td>
<td>520</td>
<td>1,032</td>
<td>3,480</td>
</tr>
<tr>
<td>75+</td>
<td>64</td>
<td>58</td>
<td>26</td>
<td>84</td>
<td>26</td>
<td>332</td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>6,504</td>
<td>2,052</td>
<td>10,652</td>
<td>12,176</td>
<td>25,258</td>
<td>57,180</td>
<td>128,862</td>
</tr>
</tbody>
</table>

Source: American Community Survey, 5-year average, Calculations by Marin Economic Consulting

### TABLE 6: AGE OF LIFE SCIENCE WORKERS BY GEOGRAPHY, 2010, NUMBER OF WORKERS

<table>
<thead>
<tr>
<th>AGE RANGE</th>
<th>MARIN</th>
<th>NAPA</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>SAN FRANCISCO</th>
<th>SAN MATEO</th>
<th>SAN DIEGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-18</td>
<td>38</td>
<td>78</td>
<td>498</td>
<td>146</td>
<td>60</td>
<td>26</td>
<td>144</td>
</tr>
<tr>
<td>18-24</td>
<td>630</td>
<td>78</td>
<td>498</td>
<td>910</td>
<td>1,458</td>
<td>2,252</td>
<td>8,084</td>
</tr>
<tr>
<td>25-34</td>
<td>1,938</td>
<td>232</td>
<td>1,542</td>
<td>3,148</td>
<td>6,996</td>
<td>14,296</td>
<td>32,580</td>
</tr>
<tr>
<td>35-49</td>
<td>2,412</td>
<td>908</td>
<td>3,400</td>
<td>5,202</td>
<td>8,710</td>
<td>26,132</td>
<td>51,916</td>
</tr>
<tr>
<td>50-64</td>
<td>1,372</td>
<td>548</td>
<td>2,550</td>
<td>3,754</td>
<td>4,214</td>
<td>10,782</td>
<td>29,994</td>
</tr>
<tr>
<td>65-74</td>
<td>34</td>
<td>22</td>
<td>42</td>
<td>374</td>
<td>398</td>
<td>794</td>
<td>2,228</td>
</tr>
<tr>
<td>75+</td>
<td>98</td>
<td>86</td>
<td>98</td>
<td>196</td>
<td>160</td>
<td>180</td>
<td>464</td>
</tr>
<tr>
<td>All</td>
<td>6,504</td>
<td>2,052</td>
<td>10,652</td>
<td>12,176</td>
<td>25,258</td>
<td>57,180</td>
<td>128,862</td>
</tr>
</tbody>
</table>

Source: Census 2010, 5-year average, Calculations by Marin Economic Consulting

The education profile of Marin County moves in sync with the Bay Area until the more advanced degrees, and outpaces the overall Bay Area in more educated categories.
The earnings profiles rise as workers become more educated. The growth of wages is more rapid in life science than overall jobs, but is likely to follow other industries where scientific education is paid a premium.

### TABLE 7: WAGES OF LIFE SCIENCE WORKERS BY EDUCATION AND WHERE THEY LIVE, 2014, CURRENT DOLLARS

<table>
<thead>
<tr>
<th>EDUCATIONAL LEVEL</th>
<th>MARIN</th>
<th>NAPA</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>SAN FRANCISCO</th>
<th>SAN MATEO</th>
<th>SAN DIEGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a High School Graduate</td>
<td>$40,186</td>
<td>$55,489</td>
<td>$15,727</td>
<td>$12,549</td>
<td>$37,654</td>
<td>$28,639</td>
<td></td>
</tr>
<tr>
<td>High School Graduate</td>
<td>39,857</td>
<td>39,012</td>
<td>52,466</td>
<td>40,566</td>
<td>48,268</td>
<td>51,821</td>
<td>36,220</td>
</tr>
<tr>
<td>Some College or Associate's Degree</td>
<td>97,973</td>
<td>60,132</td>
<td>59,133</td>
<td>50,224</td>
<td>46,977</td>
<td>71,415</td>
<td>46,682</td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>75,675</td>
<td>93,249</td>
<td>78,912</td>
<td>90,922</td>
<td>79,486</td>
<td>94,392</td>
<td>78,954</td>
</tr>
<tr>
<td>Post-Baccalaureate</td>
<td>123,764</td>
<td>97,202</td>
<td>132,596</td>
<td>123,858</td>
<td>106,084</td>
<td>160,453</td>
<td>126,076</td>
</tr>
<tr>
<td>Totals</td>
<td>$93,182</td>
<td>$68,268</td>
<td>$77,686</td>
<td>$76,367</td>
<td>$78,226</td>
<td>$117,460</td>
<td>$78,139</td>
</tr>
</tbody>
</table>

Source: American Community Survey, 5-year average, Calculations by Marin Economic Consulting

### TABLE 8: WAGES OF LIFE SCIENCE WORKERS BY EDUCATION AND WHERE THEY LIVE, 2010, CURRENT DOLLARS

<table>
<thead>
<tr>
<th>EDUCATIONAL LEVEL</th>
<th>MARIN</th>
<th>NAPA</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>SAN FRANCISCO</th>
<th>SAN MATEO</th>
<th>SAN DIEGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not a High School Graduate</td>
<td>$25,412</td>
<td>$35,379</td>
<td>$19,422</td>
<td>$19,422</td>
<td>$19,695</td>
<td>$51,137</td>
<td>$26,540</td>
</tr>
<tr>
<td>High School Graduate</td>
<td>39,857</td>
<td>39,012</td>
<td>52,466</td>
<td>40,566</td>
<td>48,268</td>
<td>51,821</td>
<td>36,220</td>
</tr>
<tr>
<td>Some College or Associate's Degree</td>
<td>97,973</td>
<td>60,132</td>
<td>59,133</td>
<td>50,224</td>
<td>46,977</td>
<td>71,415</td>
<td>46,682</td>
</tr>
<tr>
<td>Bachelor's Degree</td>
<td>75,675</td>
<td>93,249</td>
<td>78,912</td>
<td>90,922</td>
<td>79,486</td>
<td>94,392</td>
<td>78,954</td>
</tr>
<tr>
<td>Post-Baccalaureate</td>
<td>123,764</td>
<td>97,202</td>
<td>132,596</td>
<td>123,858</td>
<td>106,084</td>
<td>160,453</td>
<td>126,076</td>
</tr>
<tr>
<td>Totals</td>
<td>$76,899</td>
<td>$92,393</td>
<td>$72,191</td>
<td>$68,528</td>
<td>$68,635</td>
<td>$109,024</td>
<td>$76,296</td>
</tr>
</tbody>
</table>

Source: Census 2010, 5-year average, Calculations by Marin Economic Consulting
MAJOR BUSINESSES IN THE NBLSA

There are major, multinational pharmaceutical and medical device companies with headquarters and branch offices in the NBLSA counties. Non-profit research also takes place here at The Buck Institute for Research on Aging in Novato. It was the first research facility in the county to respond to the Institute of Medicine’s (see http://www.nationalacademies.org/hmd/) call for the establishments of at least 10 Centers of Excellence to undertake the study of aging. There is also a wide variety of businesses that fall under the umbrella of the life science industry; data shown earlier suggest there are over 470 business operations in the NBLSA’s four counties, including stand-alone, local businesses and branches of global companies. Table 9 provides some of the major players by county.

### TABLE 9: MAJOR LIFE SCIENCE EMPLOYERS, NBLSA COUNTIES

<table>
<thead>
<tr>
<th>MARIN</th>
<th>SOLANO/NAPA</th>
<th>SONOMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpine Pharmaceuticals</td>
<td>Allied Biotech, Inc.</td>
<td>Biosearch Technologies Inc.</td>
</tr>
<tr>
<td>AngioCure</td>
<td>Battelle Memorial Institute</td>
<td>Boracchia + Associates</td>
</tr>
<tr>
<td>Bio Plas, Inc.</td>
<td>Chemsw Inc.</td>
<td>Claret Medical Inc.</td>
</tr>
<tr>
<td>BioCision, LLC</td>
<td>DesigneRx Pharmaceuticals</td>
<td>Direct Flow Medical Inc.</td>
</tr>
<tr>
<td>BioMarin</td>
<td>Gene And Cell Technologies</td>
<td>Dow Pharmaceutical Sciences</td>
</tr>
<tr>
<td>The Buck Institute</td>
<td>Genentech</td>
<td>Endomatrix Inc.</td>
</tr>
<tr>
<td>for Research on Aging</td>
<td>Intertek Group</td>
<td>Glaxis Therapeutics, LLC</td>
</tr>
<tr>
<td>CP Lab Safety</td>
<td>Johnson &amp; Johnson</td>
<td>IDEX Health &amp; Science</td>
</tr>
<tr>
<td>Cytograft Tissue</td>
<td>MuriGenics, Inc.</td>
<td>Labcon, North America</td>
</tr>
<tr>
<td>Engineering Inc.</td>
<td>MyeloRx</td>
<td>Laboratory Corporation of America</td>
</tr>
<tr>
<td>G2B Pharma</td>
<td>RetinalGenix</td>
<td>Medtronic</td>
</tr>
<tr>
<td>Glialogix</td>
<td></td>
<td>MicroMed Laboratories</td>
</tr>
<tr>
<td>Lippomix</td>
<td></td>
<td>NeilMed Pharmaceuticals Inc.</td>
</tr>
<tr>
<td>Marin Biologic Laboratory, Inc.</td>
<td></td>
<td>Oculus Innovative Sciences</td>
</tr>
<tr>
<td>Medidata Solutions</td>
<td></td>
<td>Osseon Therapeutics Inc.</td>
</tr>
<tr>
<td>MicroCam</td>
<td></td>
<td>Radiant Research</td>
</tr>
<tr>
<td>Mount Tam Biotechnologies</td>
<td></td>
<td>Raydiance, Inc.</td>
</tr>
<tr>
<td>Naia Pharmaceuticals</td>
<td></td>
<td>Reluent Solutions LLC</td>
</tr>
<tr>
<td>NewGen Surgical</td>
<td></td>
<td>SMC Ltd. - Stoesser</td>
</tr>
<tr>
<td>Otogenix</td>
<td></td>
<td>Sonoma Orthopedic Products</td>
</tr>
<tr>
<td>Parnell Pharmaceuticals Inc.</td>
<td></td>
<td>Targeted Cancer Therapeutics LLC</td>
</tr>
<tr>
<td>PPD, Inc.</td>
<td></td>
<td>Thermo Fisher Scientific</td>
</tr>
<tr>
<td>PulmoGeniX</td>
<td></td>
<td>TriVascular, Inc.</td>
</tr>
<tr>
<td>QURE Healthcare</td>
<td></td>
<td>Wright Engineered Plastics</td>
</tr>
<tr>
<td>Raptor Pharmaceutical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RetinalGenix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanovas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simpatica Medicine, Inc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sutter Instrument Company</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxon Biosciences, Inc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TetraQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultragenyx Pharmaceutical Inc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XCell Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teijin Pharma</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Dun and Bradstreet (2015) and California EDD (2015)
WAGE BY OCCUPATION BY COUNTY

The number of life science occupations that may be at various types of businesses are shown below. These are specific to science jobs of these industries, not sales and administration jobs. In Table 10 notice that all these occupations pay more than the median for all occupations in the NBLSA counties as of quarter 1 2015 (the latest available data). Growth in median wages is shown here also as a way to see how these jobs are paid more across the spectrum of possible jobs.

TABLE 10: WAGES AND WAGE EQUIVALENTS, HOURLY PAY, LIFE SCIENCE OCCUPATIONS GROWTH RATES AND COMPARISONS TO CALIFORNIA OVERALL

<table>
<thead>
<tr>
<th>2015 WAGES</th>
<th>CALIFORNIA</th>
<th>MARIN</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>NAPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Scientists and Technologists</td>
<td>$29.06</td>
<td></td>
<td>$38.04</td>
<td>$30.63</td>
<td>$29.04</td>
</tr>
<tr>
<td>Biochemists and Biophysicists</td>
<td>46.99</td>
<td></td>
<td>51.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbiologists</td>
<td>43.65</td>
<td></td>
<td>51.73</td>
<td>40.31</td>
<td></td>
</tr>
<tr>
<td>Zoologists and Wildlife Biologists</td>
<td>28.99</td>
<td></td>
<td>38.72</td>
<td>39.02</td>
<td></td>
</tr>
<tr>
<td>Biological Scientists, All Other</td>
<td>38.87</td>
<td></td>
<td>42.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epidemiologists</td>
<td>35.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Scientists, Except Epidemiologists</td>
<td>47.89</td>
<td>56.38</td>
<td>51.85</td>
<td>49.95</td>
<td></td>
</tr>
<tr>
<td>Life Scientists, All Other</td>
<td>41.36</td>
<td></td>
<td>37.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Technicians</td>
<td>23.06</td>
<td></td>
<td>34.39</td>
<td>28.33</td>
<td>18.00</td>
</tr>
<tr>
<td>Chemical Technicians</td>
<td>21.52</td>
<td></td>
<td>25.91</td>
<td>18.44</td>
<td>20.76</td>
</tr>
<tr>
<td>Life, Physical, and Social Science Technicians, All Other</td>
<td>22.72</td>
<td>21.51</td>
<td>19.64</td>
<td>25.81</td>
<td></td>
</tr>
<tr>
<td>Soil and Plant Scientists</td>
<td>30.93</td>
<td></td>
<td>34.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservation Scientists</td>
<td>34.86</td>
<td>44.13</td>
<td>30.28</td>
<td>36.82</td>
<td>43.95</td>
</tr>
<tr>
<td>All Occupations</td>
<td>$19.20</td>
<td>$25.75</td>
<td>$18.94</td>
<td>$19.01</td>
<td>$18.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2014-15 GROWTH RATES</th>
<th>CALIFORNIA</th>
<th>MARIN</th>
<th>SOLANO</th>
<th>SONOMA</th>
<th>NAPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Scientists and Technologists</td>
<td>1.89%</td>
<td>60.98%</td>
<td>17.13%</td>
<td>7.00%</td>
<td></td>
</tr>
<tr>
<td>Biochemists and Biophysicists</td>
<td>4.52%</td>
<td>2.44%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbiologists</td>
<td>2.88%</td>
<td>1.93%</td>
<td>-0.57%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zoologists and Wildlife Biologists</td>
<td>-5.14%</td>
<td>-2.54%</td>
<td>18.06%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Scientists, All Other</td>
<td>3.87%</td>
<td>2.47%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epidemiologists</td>
<td>-2.07%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Scientists, Except Epidemiologists</td>
<td>5.28%</td>
<td>6.72%</td>
<td>-1.24%</td>
<td>8.56%</td>
<td></td>
</tr>
<tr>
<td>Life Scientists, All Other</td>
<td>3.50%</td>
<td>25.25%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biological Technicians</td>
<td>6.22%</td>
<td>6.73%</td>
<td>-7.30%</td>
<td>-2.81%</td>
<td></td>
</tr>
<tr>
<td>Chemical Technicians</td>
<td>1.94%</td>
<td>10.40%</td>
<td>-3.46%</td>
<td>2.27%</td>
<td></td>
</tr>
<tr>
<td>Environmental Science &amp; Protection Technicians, Including Health</td>
<td>1.16%</td>
<td>-0.89%</td>
<td>-5.19%</td>
<td>8.86%</td>
<td>31.02%</td>
</tr>
<tr>
<td>Life, Physical, and Social Science Technicians, All Other</td>
<td>4.56%</td>
<td>19.24%</td>
<td>-8.05%</td>
<td>3.86%</td>
<td></td>
</tr>
<tr>
<td>Soil and Plant Scientists</td>
<td>-7.09%</td>
<td>-2.99%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conservation Scientists</td>
<td>1.01%</td>
<td>-1.71%</td>
<td>9.00%</td>
<td>1.24%</td>
<td>5.78%</td>
</tr>
<tr>
<td>All Occupations</td>
<td>1.59%</td>
<td>3.33%</td>
<td>-1.10%</td>
<td>2.04%</td>
<td>1.41%</td>
</tr>
</tbody>
</table>

Source: http://www.labormarketinfo.edd.ca.gov/data/oes-employment-and-wages.html

The wage payments, the revenues made by these businesses, the grant and venture capital fund, all contribute to spending in the local economies. The economic impacts of these businesses touch almost every industry in this region. These wages are converted by employees, along with regional business spending, into broad economic impacts on almost every employer, resident and local government in these four counties and beyond.
ECONOMIC IMPACTS AND THE EFFECTS OF LIFE SCIENCE JOBS

Like any other industry, life science businesses are economically connected to other businesses through a variety of commercial arrangements. The economic impact analyses provide ways to see the breadth of effects on the City of Novato. The economic impacts come in three categories and each has three stages of effects. The three categories are new business revenues, supported jobs (as full-time equivalent positions) and new state and local tax revenues. The community impacts are connected to both new state and local tax revenues used for community purposes, but there are also social benefits in terms of larger, local education connections to life science job opportunities and expanded scientific space.

The supported jobs represent new, overall employees that are new workers in life science (direct) or elsewhere in the county economy based on the new business income growth (indirect and induced). State and local taxes are new, annual tax receipts that originate in Marin County from the new business incomes and employees mentioned above and summarized in Table 11 for 2014 (the latest data available).

<table>
<thead>
<tr>
<th>IMPACT TYPE</th>
<th>EMPLOYMENT</th>
<th>LABOR INCOME</th>
<th>VALUE ADDED</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effect</td>
<td>100</td>
<td>12,284,607</td>
<td>16,428,250</td>
<td>29,921,693</td>
</tr>
<tr>
<td>Indirect Effect</td>
<td>79</td>
<td>3,942,402</td>
<td>6,272,076</td>
<td>10,343,735</td>
</tr>
<tr>
<td>Induced Effect</td>
<td>61</td>
<td>2,795,152</td>
<td>5,103,290</td>
<td>8,202,099</td>
</tr>
<tr>
<td>Total Effect</td>
<td>239</td>
<td>19,022,161</td>
<td>27,803,617</td>
<td>48,467,527</td>
</tr>
</tbody>
</table>

**TABLE 11: SUMMARY ECONOMIC IMPACTS, INCREMENTAL BENEFITS, 2014**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>EMPLOYMENT</th>
<th>LABOR INCOME</th>
<th>VALUE ADDED</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific research and development services</td>
<td>103</td>
<td>$12,647,254</td>
<td>$16,913,168</td>
<td>$30,811,930</td>
</tr>
<tr>
<td>Real estate</td>
<td>20</td>
<td>628,467</td>
<td>2,367,817</td>
<td>3,491,251</td>
</tr>
<tr>
<td>Marketing research/Other Professional Services</td>
<td>12</td>
<td>521,652</td>
<td>572,748</td>
<td>941,612</td>
</tr>
<tr>
<td>Employment services</td>
<td>9</td>
<td>370,889</td>
<td>396,804</td>
<td>663,308</td>
</tr>
<tr>
<td>Limited-service restaurants</td>
<td>7</td>
<td>329,727</td>
<td>357,638</td>
<td>785,973</td>
</tr>
<tr>
<td>Full-service restaurants</td>
<td>6</td>
<td>325,817</td>
<td>381,655</td>
<td>700,759</td>
</tr>
<tr>
<td>Architectural, engineering, and related services</td>
<td>5</td>
<td>280,206</td>
<td>276,512</td>
<td>548,044</td>
</tr>
<tr>
<td>Individual and family services</td>
<td>4</td>
<td>107,837</td>
<td>137,849</td>
<td>225,359</td>
</tr>
<tr>
<td>Hospitals</td>
<td>3</td>
<td>158,360</td>
<td>231,944</td>
<td>362,462</td>
</tr>
<tr>
<td>Retail - Food and beverage stores</td>
<td>3</td>
<td>150,079</td>
<td>183,431</td>
<td>274,265</td>
</tr>
<tr>
<td>All Others</td>
<td>67</td>
<td>$3,501,873</td>
<td>$5,804,051</td>
<td>$9,662,564</td>
</tr>
<tr>
<td>Totals</td>
<td>239</td>
<td>$19,022,161</td>
<td>$27,803,617</td>
<td>$48,467,527</td>
</tr>
</tbody>
</table>

Source: IMPLAN® and Marin Economic Forum

In Table 11, each year’s increase in workers increases commercial space use, business revenues for life science businesses and many others, and supports the growth of quality jobs. By the end of 2016, 300 workers may have come to Marin County as additional workers in this cluster. The economic benefits do not end at the county borders. Sonoma, Napa and Solano counties may also benefit from growth in Marin County by housing workers, providing financing options, and also experiencing growth in life science businesses and workers as the cluster becomes more regional.

If bioscience research firms need equipment, laboratory supplies, specific waste disposal services, and other direct support needs, these industries should be developed parallel to bioscience firms. Combining the economic impact data with commercial real estate data also provides a way of estimating the commercial space needs for both the bioscience employer and those businesses that expand because of the new employer. Further, building residential units instead of scientifically-focused commercial space would have fewer economic impacts when comparing new residents to new workers and businesses on the same parcels.
Regional Strengths and Areas for Improvement

There are five areas NBLSA should monitor as the life science industry clusters expand:

1. Knowledge and Talent: Good Progress
   - BioMarin is a dominant firm with approximately 1,200 employees and continues to grow in Marin County, where life science is approximately 1.4 percent of employment;
   - Solano County is home to global leaders in biopharma (Genentech), life science businesses employ approximately 3 percent of Solano County’s workforce (health care is another 11 percent);
   - Sonoma County has also seen growth in life science, now approximately 2.5 percent of total employment, with firms such as Medtronic and TriVascular;
   - North Bay colleges and universities, along with The Buck Institute for Research on Aging, are potential partners in the life science industry’s expansion over time.

2. Established Businesses
   - There are approximately 470 life science-related branches and businesses in the NBLSA area, identified across over 20 subindustries;
   - Genentech, BioMarin, Medtronic and TriVascular are the dominant players in the North Bay Life Science Alliance counties.
     - 94 businesses with global reach are identified in this report
     - Payroll data suggests there are an additional 360 life science businesses throughout the NBLSA counties
     - Marin County has more life science businesses than its regional counterparts

3. Financing and Commercial Real Estate
   - BioMarin expanded in San Rafael both for lab space and parking for employees;
   - NIH funding in the NBLSA area grew slightly in 2015;
   - Venture capital deals may be trending to a slower growth rate across all technology industries, including life science, but...
   - Commercial real estate is available, as pricing in the Bay Area’s life science clusters suggest migration. Concurrently, industrial space becomes scarcer every month.

4. Regional support for growth
   - The SMART rail system accesses major transportation and commercial real estate hubs, and adds value to businesses growing within or coming to Marin and Sonoma counties by reducing commute times and increasing productivity;
   - Solano County declared one of its industry clusters for medical and life science exclusively;
   - Sonoma County increased its focus on life science, where a new gigabit fiber network now exists in the center of its medical device cluster of commercial buildings;
   - Marin County saw BioMarin grow its footprint in San Rafael without major political resistance; and
   - Marin County secured, through the City of Novato, a tax credit for Ultragenyx (based on their hiring 100 new employees over three years) of $2.4 million.

5. Economic Impacts
   - Each county in the North Bay area is a potential supply or value chain partner for the others;
   - The conversion of venture capital and grant funding creates economic vitality across a wide array of businesses, not just in life science;
   - 100 new workers in the NBLSA area implies over $48 million of new business income and another 120 jobs supported in other industries on average; and
   - The multiplier effect of the 10,000 workers is estimated at $4.8 billion of a $65 billion regional economy (approximately 7.3 percent).
## APPENDIX

<table>
<thead>
<tr>
<th>CORPORATE NAME</th>
<th>DESCRIPTION</th>
<th>CITY</th>
<th>COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allied Biotech, Inc.</td>
<td>Biomedical research and animal diagnostics labs</td>
<td>Vallejo</td>
<td>Solano</td>
</tr>
<tr>
<td>Alpine Pharmaceuticals Company</td>
<td>Sinecch™ (homeopathic remedy for reducing bruising &amp; swelling) manufacturer</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>AngioCure</td>
<td>Medical device</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>Battelle Memorial Institute</td>
<td>Research &amp; development</td>
<td>Vallejo</td>
<td>Solano</td>
</tr>
<tr>
<td>Bio Plas, Inc.</td>
<td>Laboratory disposables</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>BioCision, LLC</td>
<td>Develops solutions for process standardization through the application</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>BioMarin</td>
<td>of advanced thermal regulation technologies</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Biosearch Technologies Inc.</td>
<td>Develops biopharmaceuticals</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Boracchia + Associates</td>
<td>Provides medical products and solutions</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>The Buck Institute for Research on Aging</td>
<td>Contract research/ biotech/biomed companies, drug companies, research</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td></td>
<td>scientists/labs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Peptide Research</td>
<td>Biotechnology, peptides</td>
<td>Napa</td>
<td>Napa</td>
</tr>
<tr>
<td>(Echelon Biosciences)</td>
<td>Scientific &amp; laboratory software</td>
<td>Fairfield</td>
<td>Solano</td>
</tr>
<tr>
<td>Chemsw Inc.</td>
<td>Develops endovascular technology</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Claret Medical Inc.</td>
<td>Laboratory supplies</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>CP Lab Safety</td>
<td>Small molecule</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Cytograft Tissue Engineering Inc.</td>
<td>Cardiovascular medicine</td>
<td>Vacaville</td>
<td>Solano</td>
</tr>
<tr>
<td>DesignRx Pharmaceuticals</td>
<td>Transcatheter heart valve technologies developer</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Direct Flow Medical Inc.</td>
<td>Pharmaceutical clinical trial services</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Dow Pharmaceutical Sciences</td>
<td>Develops endothelial maintenance platform</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Endomatrix Inc.</td>
<td>Nasally-delivered epinephrine</td>
<td>Corte Madera</td>
<td>Marin</td>
</tr>
<tr>
<td>G2B Pharma</td>
<td>Pharmacological company developing a therapeutic treatment for MS</td>
<td>Vallejo</td>
<td>Solano</td>
</tr>
<tr>
<td>Gene And Cell Technologies</td>
<td>RAegenerative medicine company</td>
<td>Vacaville</td>
<td>Solano</td>
</tr>
<tr>
<td>Genentech</td>
<td>Biotechnology corporation</td>
<td>Larkspur</td>
<td>Marin</td>
</tr>
<tr>
<td>Gilaloxig</td>
<td>Bioscience company focused on R&amp;D of therapeutics for autoimmune disease</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Glixis Therapeutics, LLC</td>
<td>Molecular diagnostics company</td>
<td>Benicia</td>
<td>Solano</td>
</tr>
<tr>
<td>Heragen</td>
<td>Market leader in fluidic pathway products and applications</td>
<td>Rohnert Park</td>
<td>Sonoma</td>
</tr>
<tr>
<td>IDEX Health &amp; Science</td>
<td>Testing laboratories</td>
<td>Benicia</td>
<td>Solano</td>
</tr>
<tr>
<td>Intertek Group</td>
<td>Medical devices, pharmaceutical and consumer packaged goods</td>
<td>Vacaville</td>
<td>Solano</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>Produce labware</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Labcon, North America</td>
<td>Esoteric testing, genomics, and clinical and anatomic pathology</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Laboratory Corporation of America</td>
<td>Research institute, contract R&amp;D</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Lippomix</td>
<td>Pharmaceutical, biotechnology, diagnostic, agricultural and legal markets</td>
<td>Ross</td>
<td>Marin</td>
</tr>
<tr>
<td>Marin Biologic Laboratories, Inc.</td>
<td>Clinical trial, leader in clinical technology</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Medidata Solutions</td>
<td>Medical device company</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>Medtronic</td>
<td>Surgical cameras</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MicroCam</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
#TABLE A-1: SAMPLE OF BUSINESSES LOCATED IN NORTH BAY, CA, 2015

<table>
<thead>
<tr>
<th>CORPORATE NAME</th>
<th>DESCRIPTION</th>
<th>CITY</th>
<th>COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>MicroMed Laboratories</td>
<td>Fully equipped laboratory and a wide spectrum of microbiology tests</td>
<td>Petaluma</td>
<td>Marin</td>
</tr>
<tr>
<td>Sonoma Mount Tam Biotechnologies</td>
<td>Biotechnology, specialty drugs for lupus</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>MuriGenics, Inc.</td>
<td>Pharmaceuticals (in-vivo and in-vitro contract drug discovery and development services)</td>
<td>Vallejo</td>
<td>Solano</td>
</tr>
<tr>
<td>MyeloRx</td>
<td>Develops drugs for oncology and immune-related diseases</td>
<td>Vallejo</td>
<td>Solano</td>
</tr>
<tr>
<td>Naia Pharmaceuticals</td>
<td>Drug discovery and development</td>
<td>Greenbrae</td>
<td>Marin</td>
</tr>
<tr>
<td>NeilMed Pharmaceuticals Inc.</td>
<td>Pharmaceutical company</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>NewGen Surgical</td>
<td>Medical devices &amp; surgical products</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>Novi Biotech LLC</td>
<td>Biotechnology company</td>
<td>Vacaville</td>
<td>Solano</td>
</tr>
<tr>
<td>Oculus Innovative Sciences</td>
<td>Healthcare products</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Osseon Therapeutics Inc.</td>
<td>Medical devices for the treatment of vertebral compression fractures</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Otogenix</td>
<td>Catheters and sinus imaging systems</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>Parnell Pharmaceuticals Inc.</td>
<td>Develops products to aid those with dryness of the skin and tissues of the body</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>PPD, Inc.</td>
<td>Full service product development</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>PulmoGeniX</td>
<td>Asthma diagnosis and treatment device</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>QURE Healthcare</td>
<td>Uses case-based simulation to do external performance evaluation</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Radiant Research</td>
<td>Clinical research</td>
<td>Vacaville</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Radnet</td>
<td>Medical diagnostic imaging centers</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Raptor Pharmaceutical</td>
<td>Develops therapeutics that treat rare, debilitating and often fatal diseases</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Raydiance, Inc.</td>
<td>Manufacturer of world’s first software-controlled ultrashort pulse (USP) laser.</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Relucient Solutions LLC</td>
<td>Stents and orthopedics manufacturer</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>RetinalGenix</td>
<td>Imaging</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>Sanovas</td>
<td>Minimally-invasive surgical tools</td>
<td>San Anselmo</td>
<td>Marin</td>
</tr>
<tr>
<td>Simpatica Medicine, Inc.</td>
<td>Digital health and precision medicine company</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>SMC Ltd. - StoesserContract</td>
<td>Manufacturer of devices for the health care industry.</td>
<td>San Rafael</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Sonoma Orthopedic Products</td>
<td>Medical devices/ doctors, hospitals, patients</td>
<td>San Rafael</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Sutter Instrument Company</td>
<td>Manufacturer of biomedical research instrumentation.</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Targeted Cancer Therapeutics LLC</td>
<td>Discovery and development of therapies for treating cancer</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Taxon Biosciences, Inc.</td>
<td>Uses proprietary advances in genomics, microbi, and bioinformatics to solve mission critical challenges in the energy health and agriculture industries</td>
<td>Tiburon</td>
<td>Marin</td>
</tr>
<tr>
<td>Teijin Pharma</td>
<td>Bioscience organization</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>TetraQ</td>
<td>Commercial and regulatory compliant preclinical and clinical contract research organization</td>
<td>San Rafael</td>
<td>Marin</td>
</tr>
<tr>
<td>Thermo Fisher Scientific</td>
<td>Analytical instruments, laboratory supply chain programs and ecommerce, laboratory equipment, lab services, specialty diagnostics</td>
<td>Petaluma</td>
<td>Sonoma</td>
</tr>
<tr>
<td>TriVascular, Inc.</td>
<td>Technologies for aortic disease</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>Ultragenyx Pharmaceutical Inc.</td>
<td>Biotechnology company developing products for the treatment of rare disease</td>
<td>Novato</td>
<td>Marin</td>
</tr>
<tr>
<td>Wright Engineered Plastics</td>
<td>Plastic injection molding service</td>
<td>Santa Rosa</td>
<td>Sonoma</td>
</tr>
<tr>
<td>XCell Science</td>
<td>Therapeutic, cell biology stem cell research</td>
<td>Novato</td>
<td>Marin</td>
</tr>
</tbody>
</table>

Sources: Dun and Bradstreet (2015), EDD (2015), and Author’s Calculations
# REGIONAL EDUCATIONAL INSTITUTIONS AND LIFE SCIENCES PROGRAMS

<table>
<thead>
<tr>
<th>Institution</th>
<th>Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Rosa JC (Sonoma)</td>
<td>Anatomy, Biology, Botany, Microbiology, Physiology</td>
</tr>
<tr>
<td>College of Marin (Marin)</td>
<td>Biotechnology, Biology</td>
</tr>
<tr>
<td>Napa Valley College (Napa)</td>
<td>Biology, Plant Science, Ecology</td>
</tr>
<tr>
<td>Solano Community College (Solano)</td>
<td>Biology, Industrial Biotechnology</td>
</tr>
<tr>
<td>Touro University (Solano)</td>
<td>Health Sciences, Medical Doctor (MD), Pharmacy</td>
</tr>
<tr>
<td>UC Davis (Solano/Yolo)</td>
<td>Biotechnology, Medical Doctor (MD), Pharmacy, Biology, Ecology, Engineering</td>
</tr>
<tr>
<td>Sonoma State University (Sonoma)</td>
<td>Biology</td>
</tr>
<tr>
<td>Dominican University (Marin)</td>
<td>Biological Sciences BA/MS, Lab Sciences MS</td>
</tr>
</tbody>
</table>

Source: Marin Economic Forum
REFERENCES


Employment Development Department of California (EDD): www.edd.ca.gov


National Employment Time Series (NETS), Dun and Bradstreet, 2015, provided by Marin Consulting and Kiosk Marketing.


CONTACT US

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