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March 26, 2025

House Committee on Economic Development, Small Business, and Trade
Oregon State Legislature
900 Court St NE
Salem, OR 97301

Dear Chair Nguyen and Members of the Committee,

I am submitting the *Oregon Bioscience 2025 Economic Impact Report* as written testimony for HB 2417 and HB 2418. This report highlights the significant contributions of the bioscience industry to Oregon's economy, workforce, and innovation landscape. I appreciate your consideration of this information as you review these bills.

Thank you for your time and attention.

Sincerely,

Liisa Bozinovic
Liisa Bozinovic

oregonbio.org

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Oregon Bioscience
Association



2025 Economic Impact Report

Measuring the Economic, Fiscal, and
Demographic Impacts of Oregon's Life and
Bioscience Industry, including Clark County,
Washington



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Dear Colleagues,

Bioscience in Oregon and Southwest Washington is driving innovation and economic growth like never before. In 2023, this powerhouse industry generated over \$11.5 billion in economic activity, creating nearly 28,000 high-paying jobs with an average annual salary of \$100,000. That's 50% higher than the state average. And, it's not just about the numbers—bioscience is about making life better for the employees and the surrounding communities. From developing cutting-edge medical devices and life-saving pharmaceuticals to pioneering research at universities and hospitals, this sector is shaping the future of healthcare, agriculture, and sustainability. The sector's growth is lifting communities, creating opportunities for women and racially and ethnically diverse workers, and positioning Oregon and Southwest Washington as a leader in the global market.

Importantly, bioscience in Oregon and Southwest Washington extends beyond big cities: Companies are spread across nearly every county in Oregon, meaning this economic boost benefits communities large and small. In fact, over half of the industry's products are exported, bringing new money into the region and strengthening our local economy.

The ripple effects show that the total economic impact reaches \$21 billion when you account for the supply chains and local spending driven by this thriving sector. With bioscience touching nearly every part of the economy—from healthcare and manufacturing to high-tech research—the potential for growth is limitless.

An up-and-coming bioscience hub, Oregon and Southwest Washington attract attention from across the globe. For business leaders, investors, policymakers, and anyone curious about the future, read on to learn more how bioscience is transforming our region. Dive in and discover how this innovative industry is shaping a more prosperous, healthier future for all.

Sincerely,



Liisa Bozinovic, Executive Director



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INTRODUCTION

Pinnacle Economics, Inc., (“Pinnacle”) was engaged by the Oregon Bioscience Association (“Oregon Bio”) to measure the economic, fiscal, and demographic impacts of the bioscience industry in Oregon in 2023. This represents the seventh such study, and updates previous efforts that measured the bioscience industry in 2002, 2007, 2009, 2014, 2017, and 2020. This study continues with the expanded geographic scope to include Clark County, Washington. Similar to previous studies, the bioscience industry consists of the following two general categories:

1. Private bioscience represents bioscience-related activities carried out by private companies within five industry sectors: 1) agricultural feedstocks and chemicals manufacturing, 2) drugs and pharmaceutical manufacturing, 3) medical devices and equipment manufacturing, 4) research, testing, and medical laboratories, and 5) bioscience-related distribution. These industry sectors align with TEconomy Partners, LLC., and Biotechnology Innovation Organization’s 2022 industry definition.
2. Life science research at universities and hospitals.

To quantify the direct economic impacts (or dimensions) of the bioscience industry, Pinnacle relied on detailed, firm-level wage and employment data from the Oregon Employment Department (“OED”) and aggregated wage and employment data from the Washington Employment Security Department (“ESD”), as well as funding, expenditure, payroll, and employment data gathered by Pinnacle and Oregon Bio from research universities and hospitals in Oregon and Clark County. These direct measures were then augmented with additional data from economic impact models of Oregon and Clark County developed using the IMPLAN software.

The bioscience industry’s total economic impacts or contributions are larger than the industry itself because bioscience spending and incomes are linked to additional economic activity in other sectors of the economy. That is, the total economic impacts of the bioscience industry in Oregon and Clark County include the direct economic activity plus secondary or multiplier effects generated due to supply-chain (indirect impacts) and consumption-driven (induced impacts) spending in other industries. These multiplier effects were measured using IMPLAN economic impact models of the Oregon and Clark County economies in 2022. All dollars in this report are nominal dollars.

Alec Josephson, economist and president of Pinnacle Economics, is the sole author of this report. With over 30 years of economic consulting experience, Mr. Josephson is a nationally recognized expert in economic impact analysis and has directed, conducted, and/or authored well over 1,000 economic impact studies. See www.pinnacleecon.com.

Caution must be exercised with time series analyses, especially with significant events such as the coronavirus pandemic that began in 2020, as well as structural or definitional changes in industries (QCEW data) or the input-output modeling framework (IMPLAN). According to OED, “Occasionally employment levels in a QCEW dataset will suddenly shift for reasons unrelated to true economic change.” These reasons include boundary changes, changes in geocoding methodology, non-economic code changes, and multiple worksite reporters. (See OED’s “Annual Geocoded QCEW Data File User’s Guide & Data Dictionary,” September, 2021.) In the previous study, Pinnacle and Oregon Bio worked with OED economists at the beginning of this project to better understand potential changes to the underlying QCEW data, especially for some firms not having complete Oregon location data. OED confirmed that these businesses reported working in Oregon but may not have address data because they do not have a “brick and mortar” location, e.g., an employee working remotely from their Oregon residence for a company located outside of Oregon. In addition, the newer IMPLAN modeling framework has more industry sectors than the model used in the previous report, and this is especially relevant for bioscience-related distribution where the expanded IMPLAN sectoring framework went from one wholesale trade sector to nine wholesale trade sectors. While this change will affect the underlying economic impact numbers, it will also likely improve the reliability of the multiplier effects estimated by the IMPLAN model for this private bioscience sector.

The private bioscience industry is defined using North American Industry Classification System (“NAICS”) codes originally developed in Battelle and Biotechnology Innovation Organization (“BIO”) national studies conducted for 2006, 2007, 2010, and 2012. This definition was updated by TEconomy Partners, LLC., and BIO in their 2014 study and continues in their most recent 2022 study, TEconomy/BIO, The U.S. Bioscience Industry: Fostering Innovation and Driving America’s Economy Forward, 2022.

Clark County is included in this report to more fully quantify the bioscience industry in the larger, greater Portland area where business linkages and commuter flows between states are significant.

Independently Prepared for the Oregon Bioscience Association by Pinnacle Economics, Inc.

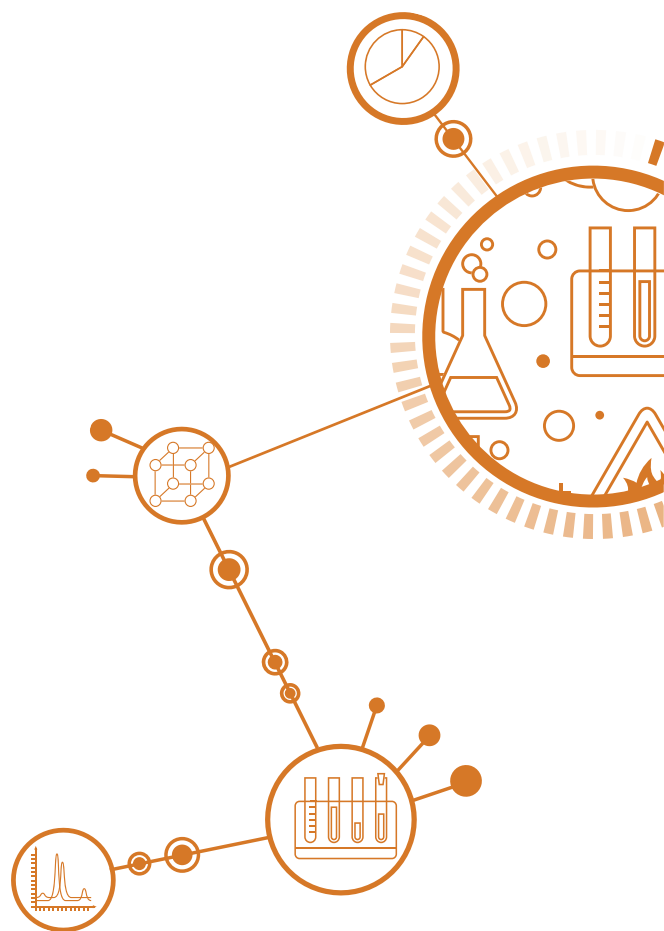
KEY FINDINGS

Private bioscience consisted of 1,995 establishments that directly generated \$10.3 billion in output and employed 20,783 workers who received \$2.6 billion in income including \$2.1 billion in wages and \$437.0 million in benefit. Private bioscience generated \$1.6 billion in other income such as profits, royalties, rents and dividends. With \$5.6 billion in exports (54.2 percent of industry output), private bioscience brings “new” money to the state. In 2023, private bioscience firms and employees directly generated \$401.5 million in tax and fee revenues for state and local governments.

- According to OED data, the average annual wage in private bioscience was \$102,426 or 52.4 percent greater than the statewide average wage (\$67,207) for private sector employment in 2023.
- Private bioscience exists in nearly every Oregon county and is well represented outside of the three-county Portland area. In 2023, 740 private bioscience firms are known to be located outside of Portland, and they employed 8,137 persons and paid \$688.0 million in wages.
- Since the first study for 2002, after removing bioscience-related distribution (which was added by Battelle/BIO in their 2014 study), private bioscience employment increased 127.1 percent (+7,921 jobs), total wages increased 376.3 percent (+\$1.0 billion), and average annual wages increased 109.7 percent (+\$48,501).

Table ES1
Bioscience Direct Impacts by Sector (\$ millions*)

Measure	Private Bioscience	Life Science Research	Total Bioscience
Jobs	20,783	7,246	28,029
Output	\$10,306.7	\$1,230.4	\$11,537.1
Income	\$2,565.7	\$822.0	\$3,387.7
• Wages	\$2,128.7	\$667.5	\$2,796.2
Other Income	\$1,591.7	\$72.5	\$1,664.2
Exports	\$5,583.6	\$38.9	\$5,622.5
Average Annual Wage (\$)	\$102,426	\$92,114	\$99,760
State and Local Tax and Fee Revenues	\$401.5	\$53.5	\$455.0
Federal Tax and Fee Revenues	\$638.8	\$184.4	\$823.2



Benefits include health and welfare, pension, and other benefits.

For private bioscience in 2023, the average annual wage is based on QCEW wage and employment data for all five sectors of bioscience. For historical comparisons, the average annual wage is based on the same QCEW wage and employment data but subtracts out the bioscience distribution sector which was added in the 2014 report.

OED location data is not available for some establishments known to be operating in Oregon in 2020.

These changes were estimated after controlling for Battelle/BIO's revised definition of private bioscience in 2014, i.e., bioscience-related distribution and some bioscience subsectors are not included.

Life science research at Oregon universities and hospitals directly generated \$1.2 billion in economic activity, including \$667.5 million in wages and 7,246 jobs. Including payroll taxes and benefits, total income for employees in life science research amounted to \$822.0 million. In addition, life science research institutions and employees directly generated \$53.5 million in state and local tax and fee revenues.

- The average annual wage for life science research institutions was \$92,114 in 2023, or 37.1 percent greater than the statewide average wage for private sector employment.
- Similar to private bioscience, life science research continues to experience growth. Since the first study for 2002, employment in life science research increased 175.5 percent (+4,616 jobs), total wages increased 358.6 percent (+\$521.9 million), and average annual wages increased 66.5 percent (+\$36,779).

Oregon's combined bioscience industry (private bioscience plus life science research) directly generated \$11.5 billion in economic activity, including \$3.4 billion in income (\$2.8 billion in wages and \$591.5 million in benefits), 28,029 jobs, and \$5.6 billion in exports in 2023. ¹⁰ Bioscience firms and their employees directly generated \$455.0 million in state and local tax and fee revenues.

- Even after excluding bioscience distribution, total bioscience employment increased by 12,537 jobs (+141.5 percent) between 2002 and 2023.

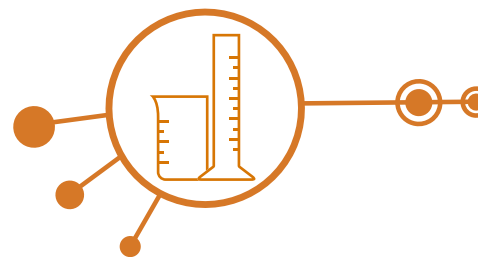
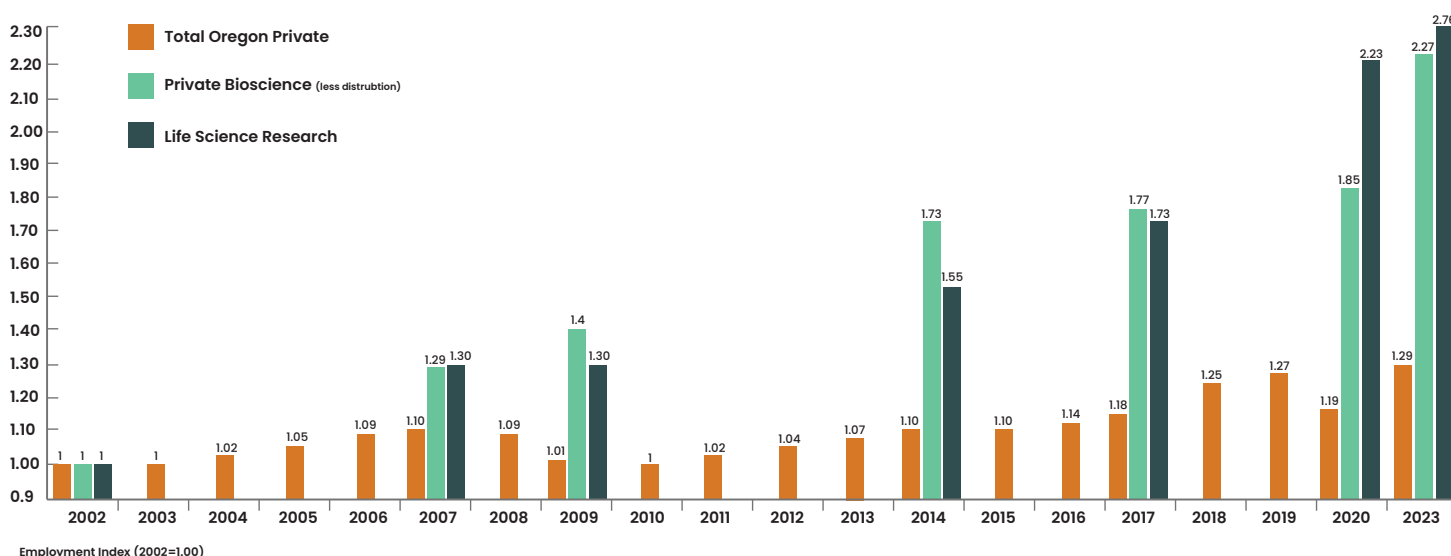


Figure ES1
Bioscience Employment Changes, 2002–2023, (Indexed to 2002)



⁹ Average annual wages are down slightly since the previous study due to increased life science research activities at universities, which pay slightly less on average, and decreased life science research activities at hospitals, which pay slightly more on average.

¹⁰ Bioscience export activity is largely attributed to private bioscience. However, much of life science research is funded by local and non-local private sources, and the federal government. In 2020, the National Institutes of Health funded \$424.0 million in medical research in Oregon. Similar to exports, non-local funding represents new dollars for the Oregon economy.

The direct economic activity associated with Oregon's bioscience industry will have secondary or "multiplier" spending effects for other sectors of Oregon's economy. Pinnacle estimates that the **total economic activity attributed to Oregon's bioscience industry amounts to \$21.2 billion in output (or sales), including \$6.8 billion in income and 74,925 jobs in 2023.** In addition, Oregon's bioscience industry is linked to economic activity that supports \$923.4 million in tax and fee revenues for state and local governments, as well as \$1.6 billion in federal government tax revenues.

Table ES2
Bioscience Total Impacts (\$ millions*)

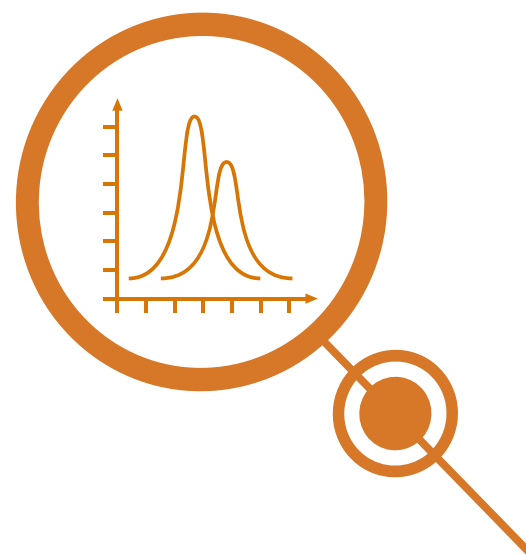
Impact Measure	Direct	Indirect	Induced	Total
Jobs	28,029	23,694	23,202	74,925
Output	\$11,537.1	\$5,365.0	\$4,298.9	\$21,200.9
Income	\$3,387.7	\$1,937.6	\$1,438.4	\$6,763.7
Other Income	\$1,664.2	\$841.1	\$966.2	\$3,471.5
State and Local Taxes/Fees	\$455.0	\$229.2	\$239.3	\$923.4
Federal Taxes/Fees	\$823.2	\$453.5	\$353.1	\$1,629.9

As shown in Table ES3, the bioscience industry generates economic activity in every sector of the Oregon economy. Secondary impacts attributed to bioscience include:

- Indirect or supply-chain impacts of \$5.4 billion in economic activity, including \$1.9 billion in income and 23,694 jobs. Approximately 22 percent of indirect job impacts accrue to the professional and technical services sector, benefiting employees and firms in marketing, management, computer programming and design, accounting, legal, advertising, and architectural and engineering.
- Induced or consumption-driven impacts of \$4.3 billion in economic activity, including \$1.4 billion in income and 23,202 jobs. These relatively large, induced impacts are attributed to the high-paying jobs in bioscience, as well as indirect impacts in Oregon that occur in high-wage sectors.

Table ES3
Bioscience Total Impacts by Major Industry Sector (\$ millions)

Major Industry Sector	Output	Income	Jobs	Jobs % of Total
Natural Resources	\$43.1	\$9.9	355	0.5%
Utilities	\$216.6	\$28.7	114	0.2%
Construction	\$80.8	\$24.9	307	0.4%
Manufacturing	\$4,545.0	\$810.3	7,525	10.0%
Trade	\$5,509.0	\$1,419.4	12,459	16.6%
Transportation	\$558.6	\$228.2	5,658	7.6%
Services	\$9,985.9	\$4,120.4	47,494	63.4%
Government	\$261.9	\$121.8	1,013	1.4%
Total All Industries	\$21,200.9	\$6,763.7	74,925	100.0%



From an economic impact perspective, the bioscience industry generates multiplier spending effects that benefit workers and business owners in other sectors of the Oregon economy. All else considered, the larger the multiplier, the greater the interdependence between an industry and the rest of the economy. According to the economic impact model of Oregon, the bioscience industry, in aggregate, has the following multipliers:

- An **employment multiplier of 2.7**, which suggests that every 10 jobs in the bioscience industry is linked to an additional 17 jobs in other sectors of the Oregon economy.¹¹
- An **income multiplier of 2.0**, which shows that every \$1 million in income directly generated in the bioscience industry is linked to another \$1.0 million in income for workers and business owners in other industries in Oregon.

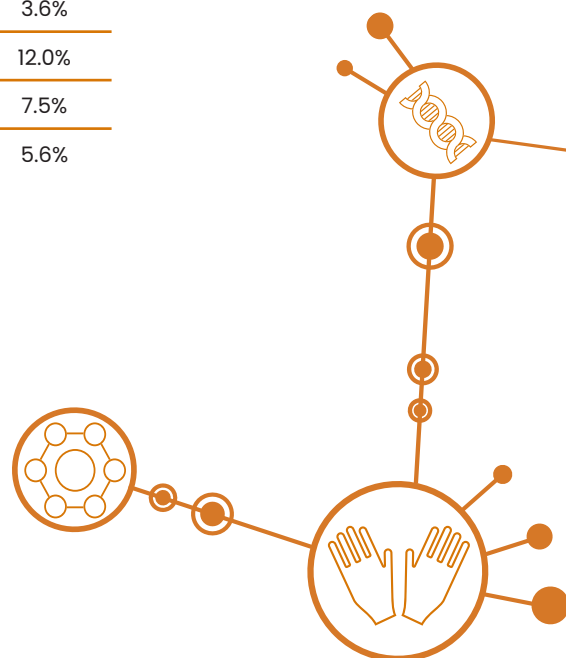
In 2023, of the 74,925 total jobs that are linked to Oregon's bioscience industry, an estimated 35,290 jobs (47.1 percent of total jobs) were held by women and 21,500 jobs were held by Racially and Ethnically Diverse Groups (28.7 percent), including 2,680 jobs for Black employees, 8,990 jobs for Hispanic employees, 5,610 jobs for Asian employees, and 4,220 jobs for employees of all other races.

- In 2023, the bioscience industry directly employed and estimated 13,010 women (46.9 percent of bioscience employment) and 7,950 racially and ethnically diverse workers (28.7 percent of bioscience employment).

Table ES4

Bioscience Job Impacts for Women and Racially and Ethnically Diverse Groups

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Women	13,010	9,930	12,350	35,290	47.1%
All Racially and Ethnically Diverse Groups	7,950	6,670	6,880	21,500	28.7%
• Black	910	850	920	2,680	3.6%
• Hispanic	2,890	2,960	3,140	8,990	12.0%
• Asian	2,660	1,510	1,440	5,610	7.5%
• All Other Races	1,490	1,350	1,380	4,220	5.6%



¹¹This is 65 percent greater than the weighted average IMPLAN job multiplier (1.87) across all industry sectors in Oregon. Weighted average job multipliers use industry employment to reflect the size or importance of each industry sector.

CLARK COUNTY

This study continues with the expanded geographic coverage to include the bioscience industry in Clark County, Washington. The key findings of the bioscience industry in Clark County in 2023 include:

Private bioscience in Clark County consisted of 312 establishments that produced \$1.9 billion in output and employed 3,725 workers with wages of \$343.4 million. Adding in benefits, the total income for employees in private bioscience was \$411.1 million. With \$1.5 billion in exports (81.9 percent of output), private bioscience brings new money to Clark County.

Life science research at Washington State University’s Vancouver campus received \$8.5 million in NIH and other grant funding in 2023. WSU Vancouver is completing construction of a \$63.8 million, 60,000 square foot Life Sciences Building at their Vancouver campus. This project was financed, in part, by an initial \$57.1 million grant from the Washington State Legislature.

Table ES5
Private Bioscience Direct Impacts in Clark County, 2023 (\$ millions*)

Economic Measure	Total Private Bioscience
Jobs	3,725
Output	\$1,869.1
Income	\$411.1
• Wages	\$343.4
Other Income	\$288.6
Exports	\$1,530.9
State and Local Taxes/Fees	\$37.3
Federal Taxes/Fees	\$101.3
Federal Taxes/Fees*	\$63.8

The total economic impacts attributed to the combined bioscience industry (including both private bioscience and life science research) in Clark County in 2023 consist of \$2.6 billion in output, including \$625.1 million in income and 7,439 jobs. In addition, the economic activity linked to Clark County’s bioscience industry generated \$72.6 million in tax and fee revenues for state and local taxing jurisdictions.

Table ES6
The Combined Bioscience Industry Impacts, by Type of Impact, in Clark County, 2023 (\$ millions*)

Economic Measure	Direct	Indirect	Induced	Total
Jobs	3,777	2,293	1,368	7,439
Output	\$1,877.6	\$424.1	\$253.1	\$2,554.7
Income	\$417.0	\$130.5	\$77.6	\$625.1
Other Income	\$288.9	\$68.9	\$64.0	\$421.8
State and Local Taxes/Fees	\$37.6	\$16.6	\$18.4	\$72.6
Federal Taxes/Fees	\$140.3	\$43.3	\$37.5	\$221.1

Note: The direct impacts reported in Table ES6 will be slightly larger than those reported in Table ES5 due to life science research activities at WSU Vancouver.

Clark County’s private bioscience industry has a multiplier spending effect as bioscience firms create additional local economic activity through supply-chain spending and the direct and indirect income creates additional consumption-driven spending.¹¹ For example, every \$1 million in bioscience output is linked to \$1.4 million in total economic activity, including \$330,700 in income, 3.9 jobs, and \$38,600 in state and local tax and fee revenues.

¹¹Given the different sizes of the Oregon and Clark County economies, multipliers should not be compared across study areas. All else the same, economic and fiscal impact multipliers will be smaller for economic study areas that are defined more narrowly. This is due to the fact that multipliers are inversely related to leakages or imports, i.e., the greater the propensity to import, the lower the multiplier.

MODELING APPROACH

As the name suggests—bio is a prefix meaning “life”—the bioscience industry consists of companies and institutions that apply science and technology to provide products and services related to human, plant, and animal life. The bioscience industry consists of two main components: 1) private sector companies (“private bioscience”) engaged in manufacturing, research, testing, and distribution, and 2) life science research activities at universities and hospitals (“life science research”).

In order to describe the data sources, analyses, and the full range of impacts, this report measures the direct and total impacts of private bioscience and life science research separately. These measures are then added together to measure the direct and total impacts of the combined bioscience industry. In addition, this study continues with the expanded geographic scope to include the bioscience industry in Clark County, Washington.

The bioscience industry directly contributes to an economy by producing goods and services, hiring workers, and paying wages and taxes. The direct economic activity associated with bioscience operations will begin a multiplier spending effect that benefits workers and business owners in other sectors of the economy.

In order to produce goods and services, bioscience firms and life science research institutions will purchase a variety of goods and services such as intermediate goods and services used in production, as well as physical property or workspace, insurance, research supplies, legal services, transportation services, and utilities. This spending generates the first round of indirect impacts. Suppliers and vendors to firms in the bioscience industry will also have to purchase goods and services necessary to operate, and this spending leads to additional rounds of indirect impacts. Because they represent interactions among businesses, these indirect effects are often referred to as “supply-chain” impacts.

The direct and indirect economic activity generates income for workers and business owners. As incomes increase, so, too, does purchasing power. Households will use this income to pay their mortgage or rent, purchase groceries, take their children in for medical care, etc. These types of impacts are called induced impacts. These induced effects are often referred to as “consumption-driven” impacts.

Input-Output Modeling

The economic modeling framework that best captures these direct, indirect, and induced effects is called input-output modeling. Input-output models provide an empirical representation of the economy and its inter-sectoral relationships, enabling the user to trace the effects (economic impacts) of a change in the demand for commodities (goods and services). Pinnacle used an input-output model of the Oregon economy constructed using the IMPLAN (for “IMPact Analysis for PLANing”) ¹³ to trace the direct economic activity associated with the bioscience industry as it ripples through the Oregon economy.

IMPLAN is widely used and well respected and is generally regarded as the most reliable input-

output modeling platform available. The United States Department of Agriculture (USDA) recognized the IMPLAN modeling framework as “one of the most credible regional impact models used for regional economic impact analysis” and, following a review by experts from seven USDA agencies, selected IMPLAN as its analysis framework for monitoring job creation associated with the American Recovery and Reinvestment Act (ARRA) of 2009. ¹⁴ The IMPLAN model has been used in all six economic impact reports. This, combined with the same QCEW data sources, data processing techniques, and controls for changes to the industry definition, allows for the most consistent measure of impacts over time.

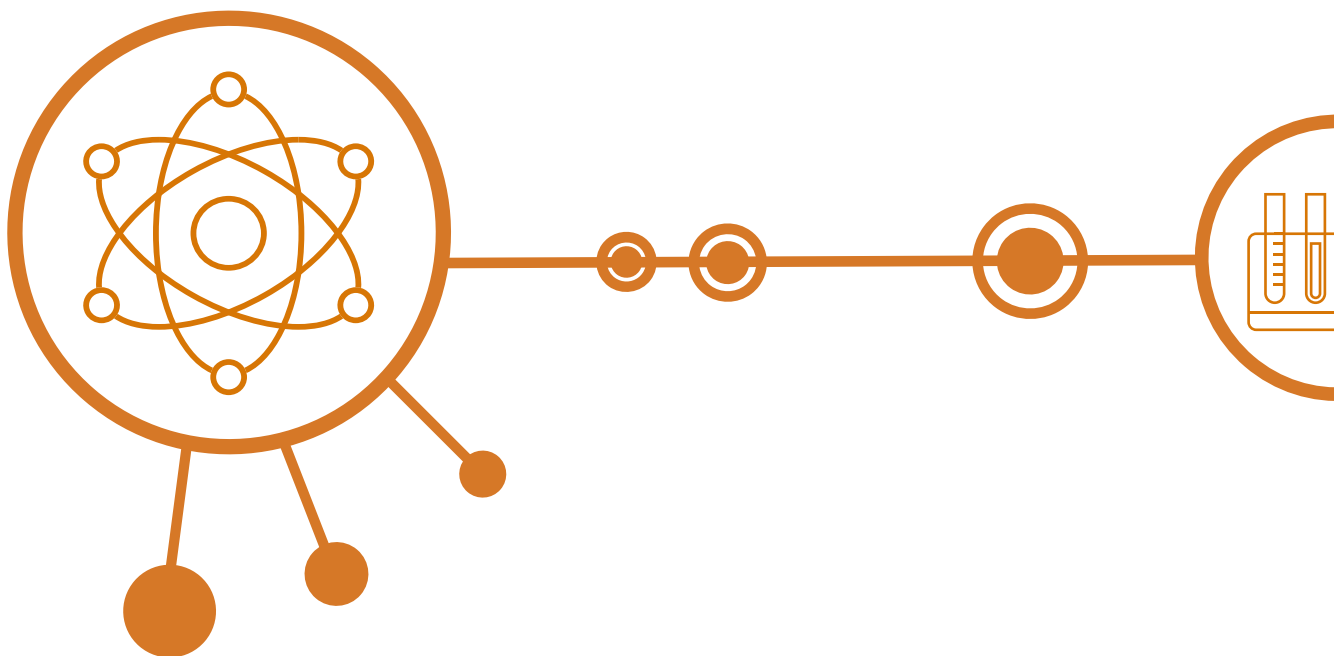
¹³IMPLAN was developed by the Forest Service of the US Department of Agriculture in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management of the US Department of the Interior to assist federal agencies in their land and resource management planning. Pinnacle has applied the model to a variety of public and private sector projects. In fact, Pinnacle Economics was recognized by the American Council for an Energy-Efficient Economy (“ACEEE”) for our pioneering work using IMPLAN to measure the economic impacts of energy efficiency and renewable energy programs. See Bell, Barrett, and McNeerney, Verifying Energy Efficiency Job Creation: Current Practices and Recommendations, ACEEE, Report F1501, September 2015.

¹⁴Excerpts from an April 9, 2009 letter to IMPLAN from John Kort, Acting Administrator of the USDA Economic Research Service, on behalf of Secretary Vilsack.

Economic Impact Measures

The following measures of economic activity are reported for both private bioscience and life science research:

- **Output** represents the total value of industry production. It is the broadest measure of economic activity and includes purchases of intermediate goods and services, as well as the total value added during production.
- **Total value added**¹⁵ is the sum of personal income (wages and business income), other income, and indirect business taxes. Total value added is a component of output, and the two should not be added together.
 - **Personal income** consists of wages, benefits and payroll taxes. Wage data from the Oregon Employment Department and Washington's Employment Security Department's Labor Market and Economic Analysis ("LMEA") division includes tips, commissions, bonuses, vacation, and holiday pay, but does not include benefits and employers' contributions to payroll taxes.
¹⁶These were estimated using IMPLAN. In this report, wages refer to OED or LMEA wages and income refers to wages plus IMPLAN payroll taxes and benefits.
 - **Other income** includes payments to individuals in the form of rents received on properties, royalties from contracts, dividends paid by corporations, and profits earned by corporations.
 - **Indirect business taxes** are taxes paid by businesses to local, state, and federal taxing jurisdiction.
- **Jobs** include both full- and part-time employment.
- **Exports** consist of the sales of goods and services outside of Oregon and Clark County. They include both domestic and international exports.
- **State and local taxes** include indirect business taxes (discussed above) as well as personal income taxes; social insurance taxes (employer and employee contributions); and various other taxes, fines, and fees paid by businesses and households.
- **Federal taxes** include personal income taxes, social insurance taxes (employer and employee contributions), corporate income taxes, and business production taxes and imports.



¹⁵At the state level, total value added is also referred to as Gross State Product ("GSP").

¹⁶According to the U.S. Bureau of Labor Statistics, "Total wages, for purposes of the quarterly UI reports submitted by employers in private industry in most States, include gross wages and salaries, bonuses, stock options, tips and other gratuities, and the value of meals and lodging, where supplied. In some of the States, employer contributions to certain deferred compensation plans, such as 401(k) plans, are included in total wages. Total wages, however, do not include employer contributions to Old-age, Survivors', and Disability Insurance (OASDI); health insurance; unemployment insurance; workers' compensation; and private pension and welfare funds." See <http://www.bls.gov/opub/hom/pdf/homch5.pdf>

THE BIOSCIENCE INDUSTRY IN OREGON

This section measures the direct and total impacts for private bioscience and life science research separately, and then combines them to measure the direct and total impacts of the bioscience industry in Oregon in 2023.

Private Bioscience in Oregon

The direct impacts of private bioscience are measured using detailed, firm-level payroll and employment data (the Quarterly Census of Employment and Wages or “QCEW”) ¹⁷ from the Oregon Employment Department for 2023 that is then augmented with output, value added, tax, and trade data from an economic impact model of Oregon developed using the IMPLAN economic impact modeling software. This information is then used to develop custom production functions for each of the five private bioscience sectors in the IMPLAN model to measure the total economic impacts of the private bioscience in Oregon.

Defining Private Bioscience

In the United States, most industries are classified using the North American Industry Classification System (“NAICS”) coding framework. Industries have an official NAICS code, and data on the number of establishments, employees, payrolls, and other measures. Unfortunately, private bioscience does not conform neatly to the NAICS-based industry classification system. Indeed, private bioscience performs a variety of activities across a variety of industry sectors, each with their own NAICS code.

To measure the direct dimensions of the private bioscience industry, Pinnacle uses the industry-accepted definition reported in TEconomy/BIO’s 2022 report (Table 1). ¹⁸ Private bioscience consists of five major sectors and 24 industries, as reported at the six-digit NAICS code level. The private bioscience industry consists of:

- **Agricultural feedstocks and chemicals manufacturing.** This sector uses biotechnology and other life science technologies to process agricultural goods and feedstocks and produce chemicals. All subsectors within this sector are in manufacturing (NAICS 3112 and 3251–3).
- **Drugs and pharmaceutical manufacturing.** Falling entirely within the manufacturing sector (NAICS 3254), this bioscience sector manufactures medicinal and pharmaceutical products.
- **Medical devices and equipment manufacturing.** This bioscience sector includes six separate NAICS codes, with major groupings in electro-medical and control instruments manufacturing (NAICS 3345), and medical equipment and supplies manufacturing (NAICS 3391).
- **Research, testing, and medical laboratories.** This sector encompasses bioscience activities where human capital is a major input. Activities include biotechnology research and medical/health testing. This bioscience sector is a service sector (NAICS 5413, 5417, and 6215).
- **Bioscience-related distribution.** This sector consists of industries within the wholesale trade sector of the economy (NAICS 4234, 4242, and 4249). Firms in this sector use specialized techniques such as cold storage, advanced monitoring, and automated drug distribution systems to deliver bioscience-related goods such as pharmaceuticals, medical devices, and agricultural and chemical products. (This sector was added to the private bioscience definition in 2014. To provide the most reliable measure of industry changes between 2002 and 2023, the current study reports industry changes without bioscience-related distribution.)

¹⁷The QCEW Program is a cooperative program between states and the U.S. Department of Labor, Bureau of Labor Statistics (“BLS”). Payroll and employment data are acquired from quarterly tax reports submitted to the Oregon Employment Department by Oregon employers who are subject to the state’s Unemployment Insurance (“UI”) laws. Although the data is highly regarded by government agencies, researchers, and others, the Oregon Employment Department advises, “Probably the most valuable use of the data printed in this publication is the ability they give the user to observe year-to-year trends of Oregon employment. However, there are certain restrictions that make strict year-to-year comparisons misleading or impossible. Technical changes in the unemployment insurance program, changes in the industrial classification system, or OED’s ongoing review of assigned industry and location codes can sometimes cause the appearance of gains and losses in employment and wage tables. Such changes do not accurately reflect changes in the structure of Oregon’s economy and as such may limit the legitimacy of year-to-year comparisons of data. This should be kept in mind when analyzing employment and payroll trends over many years.” However, these changes do not significantly affect the industries included in this analysis.

¹⁸TEconomy/BIO, The U.S. Bioscience Industry: Fostering Innovation and Driving America’s Economy Forward, 2022. The definition of private bioscience started with Battelle/BIO in their 2006, 2007, and 2010 studies. (See Battelle/BIO, Growing the Nation’s Bioscience Sector: State Bioscience Initiatives, April 2006, Growing the Nation’s Bioscience Sector: A Regional Perspective, January 2007, and State Bioscience Initiatives, May 2010.) This definition was then refined in Battelle/BIO’s 2014 study. (See Battelle/BIO, State Bioscience Jobs, Investments, and Innovation, 2014.) These bioscience industry studies by Battelle/BIO were then updated by TEconomy/BIO in 2018, 2020, and 2022. Importantly, the principals at TEconomy include the authors from Battelle in the prior studies.

Table 1
Definition of Private Bioscience, 2023

Bioscience Sector / NAICS	NAICS Description
Agricultural Feedstocks and Chemicals Manufacturing	
3112211	Wet corn milling
3112241	Soybean and other oilseed processing
325193	Ethyl alcohol manufacturing
325311	Nitrogenous organic fiber manufacturing
3253121	Phosphatic fertilizer manufacturing
325314	Fertilizer (mixing only) manufacturing
325320	Pesticide and other agricultural chemical manufacturing
Drugs and Pharmaceutical Manufacturing	
325411	Medicinal and botanical manufacturing
325412	Pharmaceutical preparation manufacturing
325413	In-vitro diagnostic substance manufacturing
325414	Other biological manufacturing
Medical Devices and Equipment Manufacturing	
334510	Electromedical apparatus manufacturing
334516	Analytical laboratory instrument manufacturing
334517	Irradiation apparatus manufacturing
339112	Surgical and medical instrument manufacturing
339113	Surgical appliance and supplies manufacturing
339114	Dental equipment and supplies manufacturing
Research, Testing and Medical Laboratories	
541380*	Testing laboratories
541714	Research and development in biotechnology
541715*	Research and development in the physical, engineering, and life sciences
621511	Medical laboratories
Bioscience-related Distribution	
423450	Medical, dental, and hospital equipment and supplies wholesalers
424210*	Drugs and druggists' sundries merchant wholesalers
424910*	Farm supplies merchant wholesalers

Source: TEconomy/BIO, The U.S. Bioscience Industry: Fostering Innovation and Driving America's Economy Forward, 2022.

Notes: 1) These industries did not exist in Oregon in 2023. 2) Asterisks (*) indicate industries that include firms that do not conduct bioscience-related activities. For these industries, Pinnacle researched each firm in the QCEW data using Dun & Bradstreet, Google, the Oregon Secretary of State's Corporate Division business search engine, and individual firm websites and annual reports to identify and include only those firms that conduct bioscience-related activities. It's important to note that once the project is completed for any given year, Pinnacle deletes all QCEW data, thus, we do not have access to historical firm-level data. However, Pinnacle's process for firm-level research is stringent and remains consistent across all studies.

Direct Impacts of Private Bioscience in Oregon in 2023

As shown in Table 2, in 2023, private bioscience in Oregon consisted of 1,995 firms that directly generated \$10.3 billion in output, including \$2.6 billion in income and 20,783 jobs. Direct income includes \$2.1 billion in wages (as reported in Oregon QCEW data) and \$437.0 million in benefits and payroll taxes (as estimated using IMPLAN). In addition, private bioscience is healthy and, as shown in the following section, with health comes growth. According to the IMPLAN model, in 2023, private bioscience generated \$1.6 billion in other income such as profits, royalties, dividends, and rents. In 2023, other income represents 15.4 percent of output.

Table 2

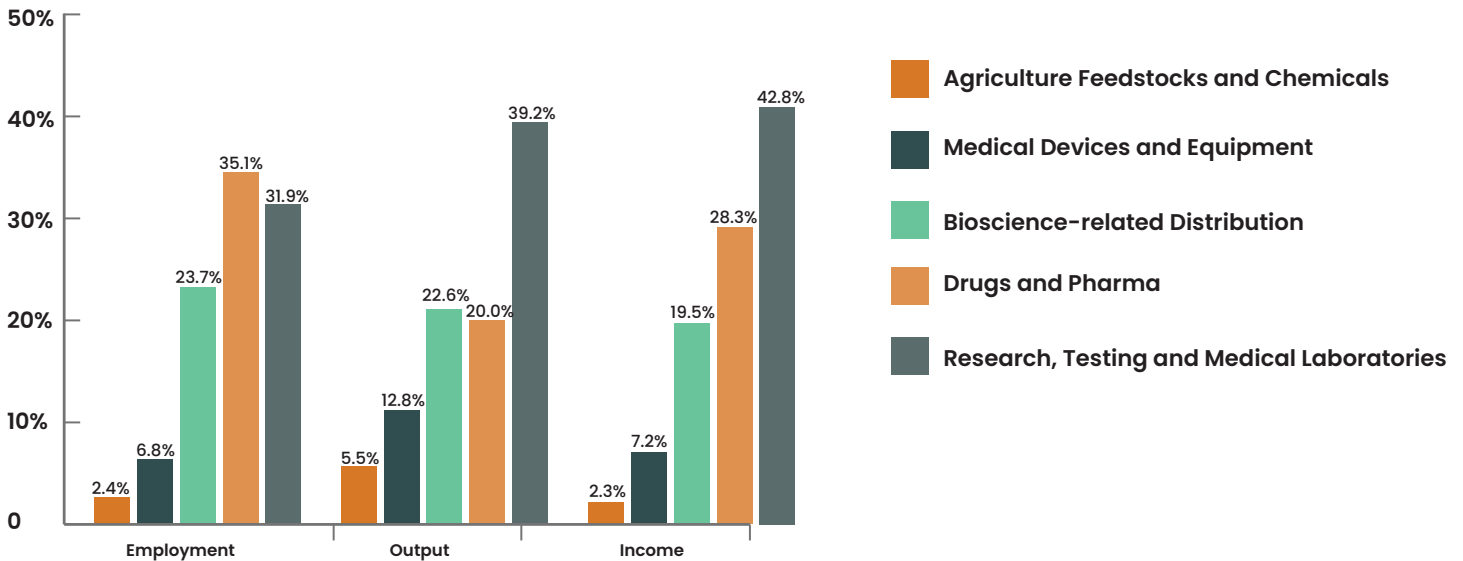
Private Bioscience Direct Impacts in Oregon, by Sector, 2023 (\$ millions*)

Impact Measure	Agricultural Feedstocks and Chemicals	Drugs and Pharma	Medical Devices and Equipment	Research, Testing and Medical Labs	Bioscience-related Distribution	Total Private Bioscience
# Establishments	38	88	150	926	793	1,995
Employment	508	1,416	4,924	7,305	6,630	20,783
Output	\$569.3	\$1,303.0	\$2,329.1	\$2,061.2	\$4,044.1	\$10,306.7
Gross State Product (a+b+c)	\$101.3	\$317.7	\$862.7	\$1,252.2	\$1,896.9	\$4,430.8
a) Income	\$55.5	\$141.3	\$550.7	\$862.4	\$955.7	\$2,565.7
• Wages	\$42.6	\$108.5	\$421.1	\$739.8	\$816.7	\$2,128.7
b) Other Income	\$35.4	\$125.6	\$271.1	\$359.1	\$800.4	\$1,591.7
c) Business Taxes	\$10.5	\$50.8	\$40.9	\$30.6	\$140.7	\$273.4
Exports (d+e)	\$348.2	\$1,287.0	\$2,275.8	\$765.7	\$907.0	\$5,583.6
d) Domestic Exports	\$257.3	\$1,073.9	\$1,880.7	\$275.4	\$476.4	\$3,963.7
e) Foreign Exports	\$90.9	\$213.1	\$395.1	\$490.2	\$430.6	\$1,619.9
Exports % of Output	61.2%	98.8%	97.7%	37.1%	22.4%	54.2%

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.

Private bioscience exported \$5.6 billion (54.2 percent of its total production) in 2023. Traded sectors are important to the state economy because they bring new money into the state rather than recycling existing dollars, where substitution effects tend to limit net, new economic activity. In addition, with about 71 percent of exports going to domestic markets and 29 percent of exports going to foreign markets, Oregon's private bioscience exports are diversified and minimize risk by insulating the Oregon economy from slow or contracting growth in one market. Figure 1 provides additional context by showing the relative contribution of each major sector in 2023, across selected economic measures. (The findings for each major sector are summarized in the appendix of this report.)

Figure 1

Composition of Private Bioscience in Oregon, by Sector, 2023

Sources: Pinnacle Economics using Oregon Employment Department QCEW data and an IMPLAN model of Oregon.

All five sectors of private bioscience generate average annual wages that exceed the statewide average annual wage. **According to QCEW data, in 2023, the average annual wage in private bioscience was \$102,426 or 52.4 percent greater than the statewide average wage across all private employers (\$67,207).** Leading wage sectors in private bioscience include bioscience-related distribution (\$123,186 average annual wage); research, testing and medical laboratories (\$101,273); and medical devices and equipment manufacturing (\$85,517).

Table 3

Private Bioscience in Oregon Average Annual Wages, by Sector, 2023

Bioscience Sector	Average Annual Wage	% of Oregon Average Annual Wage	Private Bioscience % Change Since 2020
Agricultural Feedstocks and Chemicals	\$83,888	124.8%	8.8%
Drugs and Pharmaceuticals	\$76,617	114.0%	21.8%
Medical Devices and Equipment Manufacturing	\$85,517	127.2%	15.6%
Research, Testing and Medical Labs	\$101,273	150.7%	26.0%
Bioscience-related Distribution	\$123,186	183.3%	5.9%
Private Bioscience All	\$102,426	152.4%	15.8%

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data.

Note: Oregon average annual wage based on all private sector employment.

Table 4 reports selected scientific, computer, engineering, and manufacturing occupations in private bioscience in Oregon in 2023.

Table 4
Selected Occupations in Private Bioscience in Oregon, 2023

Occupation	Jobs	Income	Average Annual Income
SCIENTIFIC			
Clinical Laboratory Technologists and Technicians	610	\$48,623,120	\$79,710
Medical Scientists, Except Epidemiologists	270	\$40,746,700	\$150,910
Natural Sciences Managers	200	\$48,695,550	\$243,480
Chemists	190	\$23,147,200	\$121,830
Biological Technicians	150	\$10,382,060	\$69,210
Biochemists and Biophysicists	120	\$17,695,770	\$147,460
Biological Scientists, All Other	100	\$14,342,210	\$143,420
Pharmacy Technicians	90	\$6,977,790	\$77,530
Bioengineers and Biomedical Engineers	70	\$10,878,370	\$155,410
Life, Physical, and Social Science Technicians, All Other	80	\$6,431,560	\$80,390
COMPUTER AND ENGINEERING			
Software Developers	490	\$91,543,380	\$186,820
Industrial Engineers	320	\$46,355,540	\$144,860
Mechanical Engineers	230	\$31,617,430	\$137,470
Computer and Information Systems Managers	160	\$42,056,900	\$262,860
Electrical Engineers	130	\$19,947,140	\$153,440
Computer Systems Analysts	110	\$17,373,530	\$157,940
MANUFACTURING			
General and Operations Managers	680	\$163,482,150	\$240,410
Miscellaneous Assemblers and Fabricators	590	\$35,911,360	\$60,870
Laborers and Freight, Stock, and Material Movers, Hand	430	\$27,990,300	\$65,090
Inspectors, Testers, Sorters, Samplers, and Weighers	340	\$24,992,040	\$73,510
First-Line Supervisors of Production and Operating Workers	270	\$30,370,190	\$112,480
Packaging and Filling Machine Operators and Tenders	250	\$14,007,310	\$56,030
Chemical Equipment Operators and Tenders	210	\$15,207,690	\$72,420
Electrical, Electronic, and Electromechanical Assemblers	200	\$12,492,210	\$62,460
Mixing and Blending Machine Setters, Operators, and Tenders	100	\$6,658,600	\$66,590

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.

Private bioscience in Oregon includes firms of all sizes. ¹⁹ Small businesses with less than four employees accounted 69.3 percent of all private bioscience firms in Oregon in 2023. Firms with less than 100 employees account for 98.2 percent of all private bioscience firms in Oregon, and these firms employed 12,275 persons (59.1 percent of total private bioscience employment) and paid \$1.4 billion in wages (64.2 percent) in 2023. Of course, private bioscience includes large employers. In 2023, private bioscience in Oregon include 35 firms with 100 or more employees (an increase of seven since 2020), and these firms employed 8,508 persons (40.9 percent of total private bioscience employment) and generated \$762.9 million in wages (35.8 percent).

Table 5
Direct Dimensions of Private Bioscience in Oregon, by Firm Size, 2023

Firm Size (# of employees)	# Firms	% of All Firms	Jobs	% of All Jobs	Wages (\$millions)	% of Total Wages
1-4	1,382	69.3%	2,082	10.0%	\$289.2	13.6%
5-9	234	11.7%	1,549	7.5%	\$170.0	8.0%
10-19	173	8.7%	2,339	11.3%	\$244.0	11.5%
20-99	171	8.6%	6,305	30.3%	\$662.6	31.1%
>100	35	1.8%	8,508	40.9%	\$762.9	35.8%
Total Private Bioscience	1,995	100.0%	20,783	100.0%	\$2,128.7	100.0%

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data..

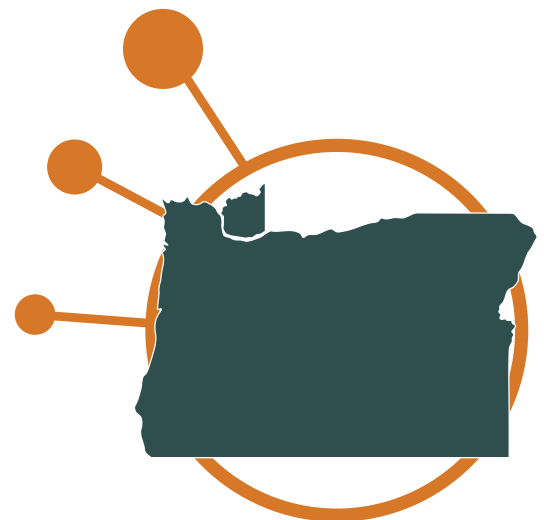
Private bioscience exists in nearly every Oregon county and is well represented outside of the three-county Portland area. According to QCEW data, 740 private bioscience firms (37 percent) are known to be located outside of Portland, and they employed 8,137 persons (39 percent of total private bioscience employment) and paid \$688.0 million in wages (32 percent) in 2023.

Table 6
Direct Economic Impacts of Private Bioscience in Oregon, by Region and Congressional District, 2023

Region/ Congressional District	# Firms	Jobs	Wages (\$ Millions)
Portland (3-county)	889	10,578	\$1,108.8
Rest of Oregon	740	8,137	\$688.0
Statewide (county unknown)	366	2,068	\$331.9
Total	1,995	20,783	\$2,128.7
CD-1	331	4,787	\$543.7
CD-2	289	2,746	\$248.1
CD-3	417	4,169	\$384.0
CD-4	234	1,646	\$154.3
CD-5	306	3,396	\$315.5
CD-6	52	1,971	\$151.2
Statewide (county unknown)	366	2,068	\$331.9
Total	1,995	20,783	\$2,128.7

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data.

¹⁹ On average, private bioscience establishments in Oregon employed 10.4 persons in 2023, a slight decrease since 2020.



To measure the job impacts by race and gender, Pinnacle augmented the IMPLAN economic impact model of Oregon with detailed demographic data for Oregon in 2021 from the U.S. Equal Employment Opportunity Commission (“EEOC”).²⁰ Table 7 breaks out the direct employment in Oregon’s private bioscience industry sectors by gender and race. Private bioscience directly employed 7,818 women and 6,095 racially and ethnically diverse persons in 2023. (These estimates are based on EEOC data for Oregon mapped to the 546 industry sectors in the IMPLAN model of Oregon.)

Table 7

Direct Employment of Private Bioscience in Oregon, by Sector and Demographic Group, 2023

Demographic Group	Agricultural Feedstocks and Chemicals	Drugs and Pharma	Medical Devices and Equipment	Research, Testing and Medical Labs	Bioscience-related Distribution	Total Private Bioscience	% of Total Private Bioscience
Gender							
Men	409	1,140	3,753	3,264	4,400	12,965	62.4%
Women	99	276	1,171	4,041	2,230	7,818	37.6%
Total	508	1,416	4,924	7,305	6,630	20,783	100.0%
Race							
White	353	983	3,193	5,467	4,692	14,688	70.7%
Total All Racially and Ethnically Diverse Groups	155	433	1,731	1,838	1,938	6,095	29.3%
• Black	10	28	142	219	237	635	3.1%
• Hispanic	92	257	484	623	726	2,183	10.5%
• Asian	25	69	894	610	574	2,172	10.4%
• All Other Races	28	79	211	386	401	1,105	5.3%
Total	508	1,416	4,924	7,305	6,630	20,783	100.0%

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and an EEOC-augmented IMPLAN model of Oregon.

²⁰The EEOC requires employers to file reports on the composition of their workforce by sex and by race/ethnic category. Key among these reports is the EEO-1, which is collected annually from private employers with 100 or more employees or federal contractors with 50 or more employees, and EEO-4, which is collected biannually from state and local governments with more than 100 employees. Through these reports, EEOC provides employment patterns and participation rates, by industry sector at a three-digit NAICS code level, for every state. These participation rates were mapped to the 546 industry sectors in IMPLAN. Participation rates refer to the percent of total employment in each industry that is occupied by a gender and/or racial group. For example, if an industry has 1,000 employees and a participation rate of 13.0 percent for Hispanic women, then Hispanic women account for 130 jobs in that industry in 2023. [Note: The employment impacts by gender and race are estimates. They have not been rounded to allow readers to fully trace all job impacts throughout this report.]

Private bioscience firms and their employees pay taxes and fees that support local, state, and federal taxing jurisdictions. Table 8 reports the direct fiscal impacts attributed to private bioscience in Oregon in 2023. In total, private bioscience directly generated \$401.5 million in tax and fee revenues for state and local taxing jurisdictions in Oregon, and \$638.8 million in tax and fee revenues for the federal government in 2023.

Table 8

Direct Fiscal Impacts of Private Bioscience in Oregon, by Sector, 2023 (\$ millions)

Taxing Jurisdiction / Tax or Fee Category	Agricultural Feedstocks and Chemicals	Drugs and Pharma	Medical Devices and Equipment	Research, Testing and Medical Labs	Bioscience-related Distribution	Total Private Bioscience
State and Local						
Corporate Profits, Dividends	\$0.6	\$2.2	\$4.7	\$6.2	\$13.8	\$27.4
Business, Personal Property	\$5.4	\$26.9	\$21.5	\$16.1	\$74.1	\$144.1
Personal Income	\$2.0	\$5.1	\$20.0	\$31.1	\$34.4	\$92.5
Social Insurance	\$0.2	\$0.5	\$2.1	\$3.2	\$3.6	\$9.6
Other Taxes	\$4.3	\$21.1	\$17.3	\$13.4	\$58.6	\$114.7
Fines, Fees and Non-taxes	\$0.4	\$1.6	\$2.3	\$2.7	\$6.1	\$13.1
Total State and Local	\$12.9	\$57.5	\$67.7	\$72.7	\$190.6	\$401.5
Federal						
Corporate Profits, Dividends	\$1.5	\$5.3	\$11.3	\$15.1	\$33.5	\$66.7
Personal Income	\$4.7	\$12.1	\$47.3	\$73.6	\$81.4	\$219.2
Business Other Taxes, Fees	\$0.4	\$2.1	\$1.7	\$1.2	\$5.7	\$11.1
Social Insurance	\$7.3	\$19.0	\$73.4	\$115.0	\$127.2	\$341.8
Total Federal	\$13.9	\$38.5	\$133.7	\$205.0	\$247.8	\$638.8
Total All Taxes	\$26.8	\$96.0	\$201.4	\$277.7	\$438.4	\$1,040.2

Sources: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.

As discussed previously, TEconomy/BIO's definition of the bioscience industry changed in 2014 and is different from that used in the earliest four studies, four subsectors have been removed and one new major sector has been added. To accommodate this change and provide the most consistent measure of industry changes between 2002 and 2023, the current study adjusts (or removes) the four subsectors from the previous study results and adds the new major sector but reports industry changes without the new sector.

Table 9

Direct Economic Impacts of Private Bioscience in Oregon, by Sector, 2002–2023 (nominal dollars)

Impact Measure / Subsector								2002–2023	
	2002	2007	2009	2014	2017	2020	2023	Change	% Change
Total Jobs									
Agricultural Feedstocks & Chemicals	265	345	404	503	581	562	508	+243	+91.5%
Drugs & Pharmaceuticals	752	799	911	1,018	1,121	1,399	1,416	+664	+88.4%
Medical Devices & Equipment	2,973	4,056	4,012	4,718	4,827	4,614	4,924	+1,951	+65.6%
Research, Testing & Medical Labs	2,242	2,869	3,383	4,526	4,496	4,926	7,305	+5,063	+225.8%
Bioscience-related Distribution	NA	NA	NA	3,024	3,578	5,319	6,630	NA	NA
Total Private Bioscience	6,232	8,069	8,710	13,789	14,603	16,820	20,783		
Total Private Bioscience Less Distribution				10,765	11,025	11,501	14,153	+7,921	+127.1%
Total Wages (\$ millions)									
Agricultural Feedstocks & Chemicals	\$10.1	\$16.7	\$21.1	\$30.2	\$36.8	\$43.3	\$42.6	+\$32.5	+321.7%
Drugs & Pharmaceuticals	\$26.8	\$30.4	\$38.1	\$67.3	\$69.7	\$88.0	\$108.5	+\$81.7	+305.3%
Medical Devices & Equipment	\$133.9	\$252.4	\$236.4	\$342.8	\$350.7	\$341.4	\$421.1	+\$287.2	+214.5%
Research, Testing & Medical Labs	\$104.7	\$160.3	\$210.0	\$301.9	\$307.9	\$396.0	\$739.8	+\$635.1	+606.7%
Bioscience-related Distribution	NA	NA	NA	\$228.0	\$263.7	\$618.8	\$816.7	NA	NA
Total Private Bioscience	\$275.4	\$459.9	\$505.6	\$970.3	\$1,028.8	\$1,487.6	\$2,128.7		
Total Private Bioscience Less Distribution				\$742.2	\$765.1	\$868.8	\$1,312.0	+\$1,036.6	+376.3%
Average Annual Wages									
Agricultural Feedstocks & Chemicals	\$38,099	\$48,383	\$52,284	\$60,043	\$63,303	\$77,125	\$83,888	+\$45,789	+120.2%
Drugs & Pharmaceuticals	\$35,610	\$38,094	\$41,824	\$66,171	\$62,147	\$62,901	\$76,617	+\$41,007	+115.2%
Medical Devices & Equipment	\$45,038	\$62,231	\$58,936	\$72,647	\$72,660	\$74,007	\$85,517	+\$40,479	+89.9%
Research, Testing & Medical Labs	\$46,691	\$55,886	\$62,060	\$66,715	\$68,486	\$80,387	\$101,273	+\$54,582	+116.9%
Bioscience-related Distribution	NA	NA	NA	\$75,403	\$73,702	\$116,331	\$123,186	NA	NA
Total Private Bioscience	\$44,200	\$56,993	\$58,052	\$70,367	\$70,451	\$88,440	\$102,426		
Total Private Bioscience Less Distribution				\$68,952	\$69,396	\$75,541	\$92,701	\$48,501	+109.7%

Source: Pinnacle calculations using 2023 Oregon Employment Department QCEW data.

Note: In order to consistently compare the private bioscience industry over time, data for 2002 through 2009 has been adjusted to reflect changes in the definition of the industry.

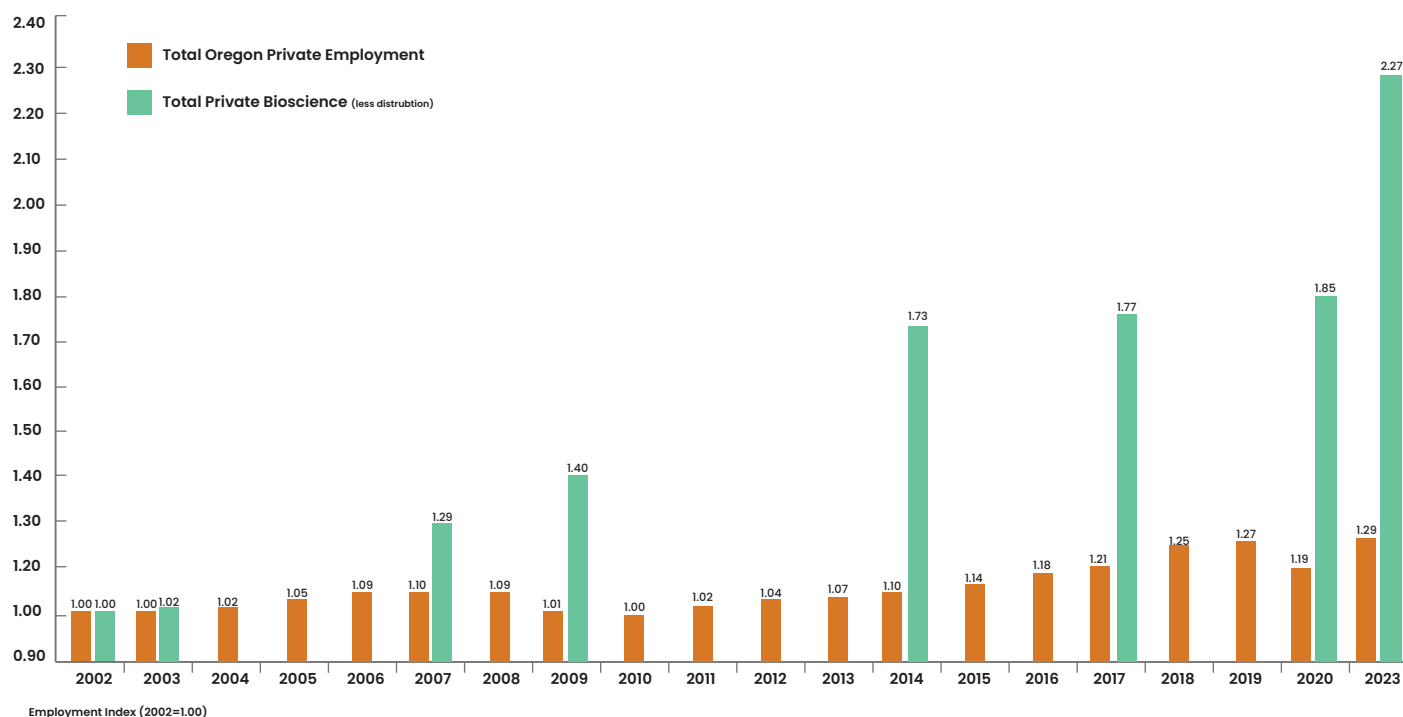
Table 9 reports QCEW employment, wage, and average annual wage data for Oregon's private bioscience industry from all seven studies. In 2023, private bioscience in Oregon employed 20,783 persons, generated \$2.1 billion in wages, and had an average annual wage of \$102,426. These results include bioscience-related distribution, a sector added in Battelle/BIO's 2014 national study.

Even after controlling for definitional changes by removing bioscience-related distribution (see totals in blue font in Table 9), private bioscience in Oregon experienced significant growth over the 21-year period. Between 2002 and 2023, private bioscience employment increased 127.1 percent (+7,921 jobs), total industry wages increased 376.3 percent (+\$1.03 billion), and average annual wages increased 109.7 percent (+\$48,501).

Figure 2 compares private bioscience employment with total private employment in Oregon since the first report for the Oregon Bio. (Employment levels are indexed to 2002). Between 2002 and 2023, private bioscience employment in Oregon increased 127.1 percent. This compares to a 29 percent increase in total private employment in Oregon over the same time period.²¹

Figure 2

Private Bioscience and Total Private Employment in Oregon, 2002–2023 (Employment Index, 2002 = 1.00)

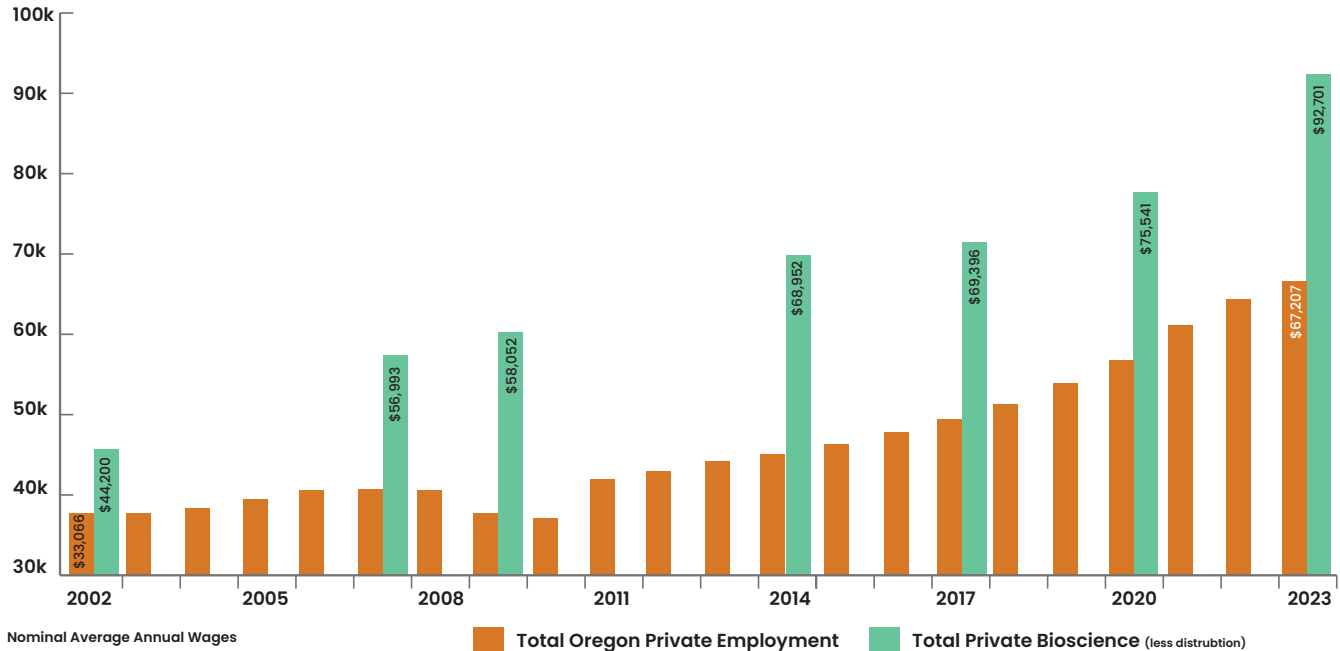


Source: Pinnacle Economics using 2023 Oregon Employment Department QCEW data.

Figure 3 compares nominal average annual wages for private bioscience and all private employers in Oregon between 2002 and 2023. Average annual wages in private bioscience—excluding bioscience related distribution—a new sector added in 2014 to Battelle/BIO’s private bioscience definition—increased 109.7 percent since 2002. Bioscience-related distribution, with average annual wage of \$123,186, is the highest wage sector of the five bioscience sectors. According to OED’s QCEW data, the average annual wage across all five private bioscience sectors is \$102,426 in 2023.

²¹ It’s important to recall that the coronavirus pandemic hit the Oregon economy in early 2020, thus, comparing recent changes in employment and wages should be conducted with caution. However, our previous report showed that the decline in private bioscience employment was largely transient and mostly constrained to just one (medical devices and equipment manufacturing) of the five private bioscience sectors. In addition, employment levels in private bioscience were largely restored within six months following the March 2020 shut down.

Figure 3

Private Bioscience and Total Private Average Annual Wages in Oregon, 2002–2023 (nominal dollars)

Source: Pinnacle Economics using 2023 Oregon Employment Department QCEW data.

Figure 4 summarizes the key findings for each of the five sectors in private bioscience in Oregon. Statistics are provided for 2023, historical changes between 2002–2023, and recent changes between 2020–2023.

Figure 4

Summary of Key Findings for Private Bioscience Sectors, 2023**Medical Devices and Equipment**

- \$2.3 billion in output, \$550.7 million in wages and 4924 jobs in 2023 (all up slightly since 2020)
- With 2.3 billion in exports, largest exporter in private bioscience
- Exports 97.7% of output
- Largest racially and ethnically diverse employer (1,433 jobs or 31% of sector employment)

Drug and Pharmaceuticals

- 1,416 jobs and \$108.5 million in wages in 2023
- \$1.1 billion in exports (rank #2) in 2023, with 98.8 percent of output for domestic or foreign markets
- Though wage growth has slowed recently, average annual wages are up \$27,291 or 77% (rank #2) since 2002

Agricultural Feedstocks and Chemicals

- Smallest sector
- 10% job losses between 2020 and 2023
- Wage growth remains strong with average annual salaries up 8.8% since 2020
- #1 in average annual wage growth since 2020
- #1 in output per worker at \$1.1 million in 2023

Research, Testing and Medical Laboratories

- 926 firms (#1 rank), and a 66% increase since 2023
- R&D biotechnology subsector is the fastest growing sector in private bioscience
- 7,305 jobs in 2023 (#1 rank) in 2023
- \$739.8 million in wages and \$101,273 in average annual wages in 2023 (#2 rank in both)
- Largest employer of women (4,041 jobs or 55% of sector employment)

Bioscience-related Distribution

- Sector added to bioscience definition in 2014
- 6,630 jobs and \$816.7 million in wages in 2023 (both rank #1)
- Average annual wage of \$123,186 (rank #1) in 2023 or 83% greater than statewide average annual wage
- Generated \$190.6 million in state and local taxes and fees in 2023 (rank #1)
- Largest employer of Racially and Ethnically Diverse Groups and second largest employer of women

**Oregon's Private Bioscience Industry**

Sources: Pinnacle calculations using 2023 Oregon Employment Department QCEW data and 2022 IMPLAN model of Oregon.

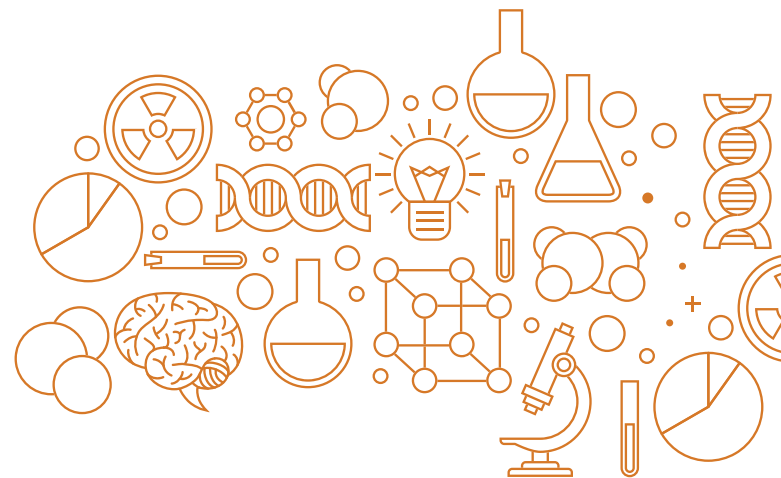
Agricultural feedstocks and chemicals consists of 38 establishments and is the smallest bioscience sector in Oregon accounting for just 2.4 percent and 2.3 percent of total bioscience jobs and wages, respectively, in 2023. In 2023, this sector generated \$569.3 million in output, employed 508 persons and paid \$42.6 million in wages. In addition, with \$348.2 million in exports, this sector accounts for 6.2 percent of private bioscience exports. The average annual wage was \$83,888 in 2023, or 24.8 percent above the average annual wage among private employers in Oregon, and increased 8.8 percent between 2020 and 2023. Job growth in this sector has stalled recently. Between 2020 and 2023, employment decreased by -9.3 percent.

Drugs and pharmaceuticals consists of 88 establishments that produced \$1.3 billion in output and employed 1,416 persons with \$108.5 million in wages in 2023. This is the second largest export sector in private bioscience, with exports of \$1.3 billion (98.8 percent of total output) in 2023. The average annual wage was \$76,617 or 14.0 percent above the average wage among private employers in Oregon in 2023. This sector shows a modest 1.2 percent increase in jobs and a 23.3 percent increase in wages between 2020 and 2023. This translates into a 21.8 percent increase in average annual wages over the last three years (rank #2).

Medical devices and equipment includes 150 establishments that generated \$2.3 billion in output, including \$421.1 million in wages and 4,924 jobs in 2023. With exports of just under \$2.3 billion, approximately 97.7 percent of this sector's output was exported. In 2023, the average annual wage for employees in medical devices and equipment was \$85,517 or 27.2 percent above the average annual wage among private employers in Oregon. Between 2020 and 2023, total employment increased by 6.7 percent (+310 jobs) and total wages increased by 23.3 percent (+\$79.7 million).

Research, testing and medical laboratories includes activities carried out by 926 firms (46.4 percent of private bioscience), that collectively produced \$2.1 billion in output, paid \$739.8 million in wages and employed 7,305 persons (rank #1) in 2023. The average annual wage in this sector was \$101,273 in 2023, or 50.7 percent above the average annual wage for private employers in Oregon. Between 2020 and 2023, total wages increased by 86.8 percent and the average annual wage increased by \$20,886 or by 26.0 percent. Importantly, with 4,041 female employees, this sector is the largest employer of women in private bioscience.

Bioscience-related distribution is a new sector that was added to Battelle/BIO's definition of private bioscience in 2014. In 2023, bioscience-related distribution consists of 793 establishments that employed 6,630 persons (rank #2) and generated \$816.7 million in wages (rank #1). The average annual wage in bioscience-related distribution was \$123,186 in 2023, or 83.3 percent greater than the statewide average among private employers (rank #1). In addition, in 2023, this sector generated \$190.6 million in tax and fee revenues for state and local governments (rank #1).



Total Impacts of Private Bioscience in Oregon in 2023

The previous section measured the direct dimensions of private bioscience in Oregon in 2023. This section provides measures of the total economic impacts or “contributions” of the private bioscience industry to Oregon’s economy. The total economic impacts of an industry include the direct economic activity plus secondary or multiplier effects generated as a result of supply-chain (indirect impacts) and consumption-driven (induced impacts) spending that can be linked back to the industry.

Table 10 reports the economic impacts of private bioscience in 2023, by type of impact. (Detailed economic and fiscal contributions for each sector of private bioscience are reported in the appendix to this report.)

Source: Pinnacle using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.

Table 10

Economic Impacts of Private Bioscience in Oregon, by Type of Impact, 2023 (\$ millions*)

Impact Measure	Direct	Indirect	Induced	Total
Jobs	20,783	22,169	19,162	62,114
Output	\$10,306.7	\$5,046.7	\$3,550.2	\$18,903.6
Gross State Product	\$4,430.8	\$2,744.3	\$2,121.0	\$9,296.0
• Income	\$2,565.7	\$1,827.1	\$1,187.0	\$5,579.8
• Other Income	\$1,591.7	\$790.0	\$797.9	\$3,179.6
• Indirect Business Taxes	\$273.4	\$127.2	\$136.1	\$536.7

The **total** economic impacts of private bioscience in Oregon in 2023 amounted to \$18.9 billion in output, including \$9.3 billion in gross State Product (“GSP”), \$5.6 billion in income, \$3.2 billion in other income, and 62,114 jobs. The economic impacts, by type of impact, in 2023 include

- Private bioscience **directly** contributed \$10.3 billion in output, including \$4.4 billion in value-added or GSP, \$2.6 billion in income, \$1.6 billion in other income and 20,783 jobs. (These are the direct dimensions of the industry also reported in Table 2.) The average annual income (wages and benefits) was \$123,500 per employee.
- The **indirect** impacts of private bioscience consist of \$5.0 billion in economic activity, including \$2.7 billion in GSP, \$1.9 billion in income and 22,169 jobs. Approximately 22 percent of indirect job impacts benefit employees and firms in professional and technical services, such as marketing, management services, accounting, legal, advertising, and architectural and engineering. These are high-paying sectors. The average annual income for all supply-chain employees who are indirectly linked to private bioscience was \$82,400 per employee in 2023.
- The **induced** impacts of private bioscience consist of \$3.6 billion in economic activity, including \$2.1 billion in GSP, \$1.2 billion in income and 19,162 jobs. These relatively large induced impacts are attributed to the high-paying jobs in private bioscience, as well as indirect impacts that accrue to high-wage sectors. Sectors benefiting from consumption-driven spending linked private bioscience include health care and social assistance (20 percent of induced job impacts), retail trade (16 percent), and food services (15 percent).

PROFESSIONAL SERVICES INDIRECT JOB IMPACTS

Marketing (585 jobs)

Management consulting (500 jobs)

Accounting, tax prep, bookkeeping (430 jobs)

Legal (450 jobs)

Advertising and public relations (410 jobs)

Architectural and engineering (340 jobs)

Environmental and other technical services (220 jobs)

Computer system design services (165 jobs)

The total economic impacts attributed to the five major sectors in private bioscience are shown in Table 11. The bioscience-related distribution sector generates the largest total impacts of all private bioscience sectors in Oregon. Depending on the measure, this sector accounts for between 40–43 percent of total private bioscience impacts. The medical devices and equipment manufacturing sector ranked second across all measures of total economic impacts.²¹

²¹ In the previous study, medical devices and equipment manufacturing had the largest total impacts on the Oregon economy, and bioscience-related distribution ranked third among the five bioscience sectors. In this study, bioscience-related distribution has the largest total impacts with medical devices and equipment manufacturing ranking second. This position shift between 2017 and 2020 is attributed to: 1) the slight decrease in direct employment, income, and output for medical devices and equipment manufacturing, 2) the increase in direct employment, income, and output for bioscience-related distribution, and 3) IMPLAN's new industry sector scheme that expands the wholesale trade sector from one industry in 2017 to nine industries in 2020. This last factor had the effect of significantly increasing the multiplier spending effects attributed to bioscience-related distribution. For example, IMPLAN's job multiplier for the wholesale trade sector in Oregon was 2.20 in 2017. The new job multipliers for detailed wholesale trade sectors that align with bioscience-related distribution are 2.70, 3.00, and 5.70 in 2020. Changes such as these suggest that caution must be exercised with time series analyses, especially with structural or definitional changes in industries (OED data) or the input-output modeling framework (IMPLAN).

The total economic impacts attributed to the five major sectors in private bioscience are shown in Table 11. The bioscience-related distribution sector generates the largest total impacts of all private bioscience sectors in Oregon. Depending on the measure, this sector accounts for between 42–43 percent of total private bioscience impacts in Oregon in 2023.²²

Table 11

Total Economic Impacts of Private Bioscience, by Major Sector, 2023 (\$ millions)

Impact Measure	Agricultural Feedstocks and Chemicals	Drugs and Pharma	Medical Devices and Equipment	Research, Testing and Medical Labs	Bioscience-related Distribution	Total All Private Bioscience
Jobs	1,948	4,264	12,650	16,564	26,688	62,114
Output	\$977.4	\$2,050.9	\$4,085.7	\$3,917.7	\$7,871.9	\$18,903.6
Income	\$156.4	\$379.2	\$1,167.7	\$1,515.5	\$2,361.0	\$5,579.8

Source: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.

As shown in Table 12, the total employment attributed to private bioscience consist of 53,503 jobs, including 22,372 jobs held by women (42 percent of total employment impacts) and 12,063 jobs held by Racially and Ethnically Diverse Groups (23 percent).

Table 12

Private Bioscience Employment Impacts, by Type of Impact and Demographic Group, 2023

Demographic Group	Direct	Indirect	Induced	Total	Percent of Total	Percent of Total (2020)
Gender						
Men	12,965	12,974	8,963	34,901	56.2%	58.2%
Women	7,818	9,195	10,200	27,212	43.8%	41.8%
Total	20,783	22,169	19,162	62,114	100.0%	100.0%
Race						
White	14,688	15,935	13,481	44,104	71.0%	77.5%
Total All Racially and Ethnically Diverse Groups	6,095	6,234	5,681	18,010	29.0%	22.5%
• Black	635	788	758	2,180	3.5%	2.8%
• Hispanic	2,183	2,770	2,594	7,547	12.2%	9.6%
• Asian	2,172	1,416	1,192	4,780	7.7%	6.3%
• All Other Races	1,105	1,261	1,136	3,503	5.6%	4.0%
Total	20,783	22,169	19,162	62,114	100.0%	100.0%

Source: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon augmented with 2021 EEOC data for Oregon.

Note: Employment impacts by gender and race are estimates. They have not been rounded in order to allow readers to fully trace all job impacts reported in this analysis.

Private bioscience is concentrated in manufacturing (three sectors), wholesale trade (one), and services (one). From an economic impact perspective, the spending and income directly generated by private bioscience begins a multiplier effect that spreads economic activity to every major sector of the Oregon economy. Table 13 reports the total economic impacts associated with private bioscience in Oregon by aggregate industry sector and shows how the direct economic activity associated with private bioscience is linked to other sectors of the Oregon economy.

Table 13
**Total Economic Impacts of Private Bioscience by
Aggregate Industry Sector, 2023**

Aggregate Industry Sector	Output (\$ millions)	Income (\$ millions)	Jobs
Agriculture, forestry, fishing and hunting	\$27.4	\$8.1	290
Mining	\$10.7	\$0.7	23
Utilities	\$195.7	\$25.8	103
Construction	\$70.0	\$21.5	264
Manufacturing	\$4,516.5	\$805.5	7,465
Wholesale trade	\$4,970.9	\$1,224.2	8,448
Retail trade	\$399.1	\$149.1	3,235
Transportation and warehousing	\$525.9	\$216.1	5,376
Information services	\$483.7	\$101.0	726
Finance, insurance, and real estate	\$1,942.0	\$336.0	6,227
Professional and technical services	\$2,603.8	\$1,081.1	10,011
Management of companies and enterprises	\$584.7	\$322.2	1,546
Administrative and waste services	\$548.5	\$271.6	4,174
Educational services	\$41.9	\$25.7	586
Health care and social assistance	\$1,070.2	\$565.4	6,397
Arts, entertainment, and recreation	\$80.4	\$25.8	1,102
Accommodation and food services	\$313.6	\$123.3	2,610
Other services, except public administration	\$285.5	\$165.1	2,620
Government and unclassified sectors	\$233.0	\$111.7	911
Total All Industry Sectors	\$18,903.6	\$5,579.8	62,114

The economic activity linked to private bioscience generates tax and fee revenues for local, state and federal governments. These fiscal impacts are shown in Table 14, by type of impact. In total, private bioscience contributed approximately \$815.7 million in tax and fee revenues for state and local taxing jurisdictions in 2023. Approximately 49.2 percent (or \$401.5 million) of this total was directly generated by the private bioscience industry or its employees. In total, private bioscience is linked to \$1.4 billion in tax and fee revenues for the federal government in 2023.

Table 14

Fiscal Impacts of Private Bioscience, by Type of Impact, 2023 (\$ millions)

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local				
Corporate Profits and Dividends	\$27.4	\$13.6	\$13.8	\$54.7
Business and Personal Property	\$144.1	\$67.0	\$71.7	\$282.9
Personal Income	\$92.5	\$68.8	\$44.8	\$206.0
Social Insurance	\$9.6	\$6.0	\$3.9	\$19.5
Other Taxes	\$114.7	\$54.0	\$57.1	\$225.8
Fines, Fees and Non-taxes	\$13.1	\$7.3	\$6.4	\$26.8
Total State and Local	\$401.5	\$216.7	\$197.6	\$815.7
Federal Government				
Corporate Profits and Dividends	\$66.7	\$33.2	\$33.5	\$133.4
Personal Income	\$219.2	\$165.4	\$107.7	\$492.3
Business Other Taxes and Fees	\$11.1	\$5.1	\$5.5	\$21.7
Social Insurance	\$341.8	\$224.2	\$144.9	\$710.9
Total Federal	\$638.8	\$428.0	\$291.6	\$1,358.4
Total All Taxes and Fees	\$1,040.2	\$644.7	\$489.2	\$2,174.1

Source: Pinnacle Economics using Oregon Employment Department QCEW data and the IMPLAN model.

All the impact measures described previously can be summarized across direct, indirect, and/or induced impact categories using mathematical formulae to measure and explain what economists refer to as the “multiplier effect.” Multipliers are a shorthand way to better understand the linkages between an activity or policy and other sectors of the economy, i.e., the larger the multipliers, the greater the interdependence between private bioscience and the rest of the state economy. Table 15 reports the economic and fiscal impact multipliers associated with private bioscience in Oregon.

Table 15

Private Bioscience Impact Multipliers, 2023

Impact Measure	Multiplier
Output	1.8
Income	2.2
Jobs	3.0
State and Local Taxes	2.0

Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.

In 2023, the private bioscience industry has the following multiplier effects on the Oregon economy:

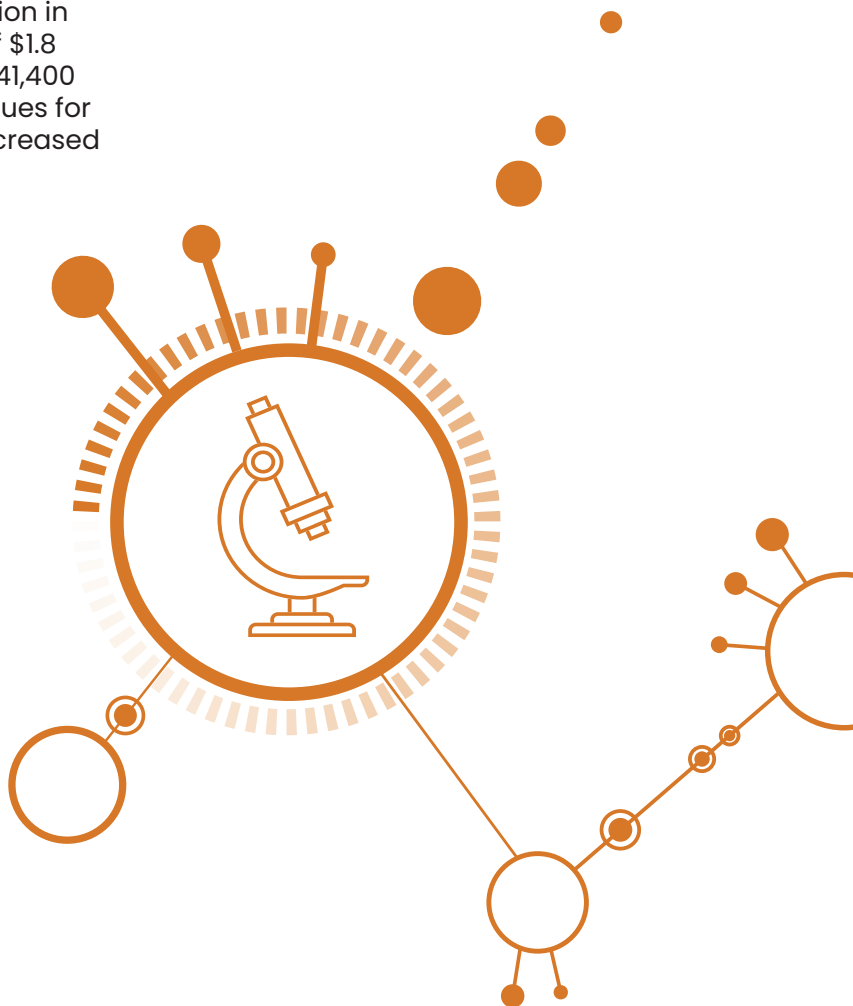
- **Income multiplier equals 2.2.** Thus, every \$1.0 million in income paid to private bioscience employees generates another \$1.2 million in income for workers in other sectors of the state economy.
- **Employment multiplier equals 3.0.** Thus, every ten direct private bioscience jobs are linked, on average, to another 20 jobs elsewhere in the state economy.
- **State and local tax multiplier of 2.0.** Thus, every \$1.0 million in tax and fee revenues directly generated by private bioscience companies or their employees is linked, on average, to another \$1.0 million in tax and fee revenues for state and local governments.

The linkages between private bioscience and the rest of the Oregon economy can be assessed or quantified by calculating how much economic activity is supported by \$1.0 million in private bioscience output (or spending). This measure is particularly useful for bioscience stakeholders as they explain the contributions of the industry to government officials, industry members, and other audiences. As shown in Table 16, on average, \$1 million in output from private bioscience is linked to a total of \$1.8 million in statewide economic activity, including \$541,400 in income, 6.0 jobs, and \$79,100 in tax and fee revenues for state and local governments. All measures have increased slightly since the previous study for 2020.

Table 16
Total Economic and Fiscal Impacts Per \$1 Million in Private Bioscience Output, 2023

Impact Measure	Per \$1 Million in Direct Output
Output	\$1,834,000
Income	\$541,400
Jobs	6.0
State and Local Taxes	\$79,100

Source: Pinnacle Economics using 2023 Oregon Employment Department QCEW data and a 2022 IMPLAN model of Oregon.



Life Science Research in Oregon

This section describes the direct and total impacts of life science research in Oregon in 2023. The direct impacts of life science research institutions were measured using data gathered by Pinnacle and, in some cases, from employment and payroll data for life science research institutions observed in the QCEW data. This data is then augmented with output, value-added, tax, and trade data from an economic impact model of Oregon developed using the IMPLAN economic impact modeling software. All of this information is then used to develop custom production functions for life science research in an IMPLAN model of Oregon to measure the total economic impacts.

Defining Life Science Research

In addition to private bioscience, bioscience or life science research activities occur at universities and hospitals in Oregon. According to Battelle/BIO,

“A fifth (now sixth) subsector of the biosciences might include research hospitals, academic health centers, and other research-driven medical institutions. Many U.S. hospitals partner with universities and other research centers to further advances in the biosciences with a particular focus on healthcare applications.”²³

Life science research institutions include Oregon Health & Science University (“OHSU”), Oregon State University, University of Oregon, Portland State University, Pacific University, the University of Portland, the National University of Natural Medicine (“NUNM”), Portland Community College, the Center for Health Research at Kaiser Permanente, Providence Health & Services Research Centers, and Legacy Research Institute.²⁴

Funding, employment, and payroll data for life science research institutions has historically not been available by NAICS codes. This year, however, QCEW data included employment and payroll data for life science research at Legacy, Kaiser and Providence. In addition, Pinnacle was able to obtain life science research funding for OHSU for 2023.²⁵ For the others, Pinnacle relied on life science research funding levels from the National Institute of Health (“NIH”) for Oregon universities and hospitals in 2023 and economic measures from previous studies to estimate some activity levels for these research institutions.²⁶

²³Battelle/BIO, Growing the Nation’s Bioscience Sector: A Regional Perspective, January 2007. p. 3. Battelle also describes the inherent difficulty of measuring this segment of the bioscience industry. “From a data perspective, however, under the current NAICS system it is not possible to isolate the relevant bioscience research-oriented establishments within the larger hospitals sector. Thus, while Battelle acknowledges the critical role these research institutions play in advancing life sciences research and the bioscience industry, we are unable to accurately isolate this activity in the current federal data framework.”

²⁴Reed College received NIH funding in 2020 and was included in our previous report, but did not receive NIH funding in 2023.

²⁵Please see OHSU’s presentation entitled, “OHSU Public Finance and Audit Committee Meeting,” April 12, 2024 at <https://www.ohsu.edu/sites/default/files/2024-04/OHSU-Public-Finance-Audit-Committee-Meeting-Agenda-April-12-2024.pdf>. In previous reports, Pinnacle and Oregon Bio worked closely with OHSU staff to get life science grant funding, which doesn’t include gifts and state support and represents only about 65 percent of total life science research funding. This is the first year that we were able to obtain a fuller picture of life science research funding at OHSU.

²⁶This is difficult information for life science research institutions to collect. However, this seventh study and Pinnacle has historical, known survey data provided by some life science research institutions



The direct impacts of life science research in Oregon in 2023 are reported in Table 17. In 2023, life science research directly generated \$1.2 billion in economic activity, including \$667.5 million in wages and 7,246 jobs. The average annual wage for life science research across all universities, colleges, and hospitals was \$92,114 in 2023, or 37.1 percent greater than the statewide average wage for all private sector employment.

Table 17
Direct Economic Impacts of Life Science Research, 2023 (\$ millions*)

Impact Measure	Life Science Research
Jobs	7,246
Output	\$1,230.4
Gross State Product (a+b+c)	\$912.2
a) Income	\$822.0
• Wages	\$667.5
b) Other Income	\$72.5
c) Indirect Business Taxes	\$17.7
Exports	\$38.9
Exports % of Output	3.2%

Table 18
**Direct Life Science Research Employment
by Demographic Group, 2023**

Demographic Group	Jobs	% of Life Science Jobs
Gender		
Men	2,057	28.4%
Women	5,189	71.6%
Total	7,246	100.0%
Race		
White	5,391	74.4%
Total All Racially and Ethnically Diverse Groups	1,855	25.6%
• Black	279	3.8%
• Hispanic	711	9.8%
• Asian	483	6.7%
• All Other Races	381	5.3%
Total	7,246	100.0%

30

Life science research institutions and their employees pay taxes and fees that support local, state, and federal taxing jurisdictions. Table 19 reports the fiscal impacts directly attributable to life science research in Oregon in 2023. In total, life science research directly generated \$53.5 million in tax and fee revenues for state and local taxing jurisdictions and \$184.4 million in tax and fee revenues for the federal government.

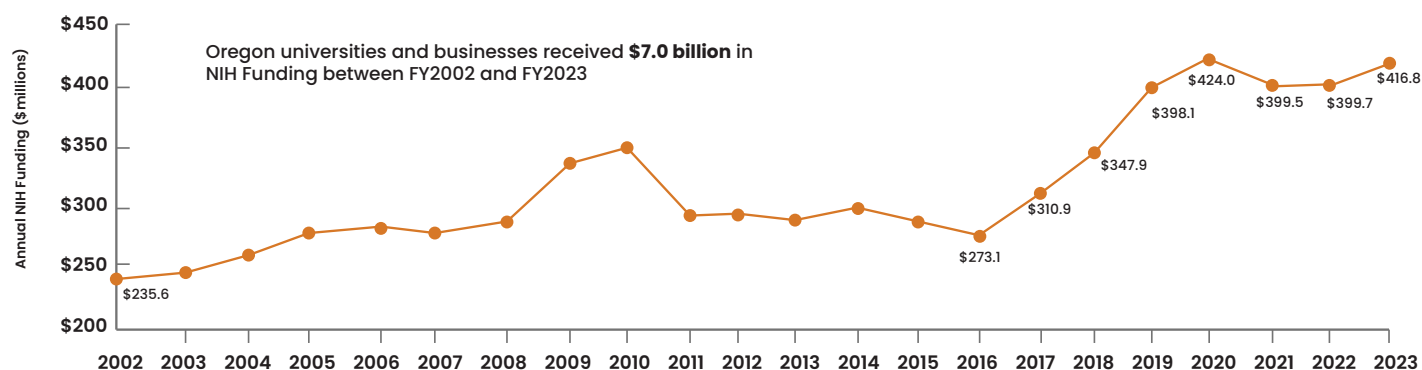
Table 19
Direct Fiscal Measures of Life Science Research, 2023 (\$ millions)

Taxing Jurisdiction/ / General Tax or Fee Category	Life Science Research
State and Local	
Corporate Profits and Dividends	\$1.3
Business and Personal Property	\$9.4
Personal Income	\$29.8
Social Insurance	\$3.1
Other Taxes	\$8.1
Fines, Fees and Non-taxes	\$1.9
Total State and Local	\$53.5
Federal	
Corporate Profits and Dividends	\$3.1
Personal Income	\$70.5
Business Other Taxes and Fees	\$0.7
Social Insurance	\$110.2
Total Federal	\$184.4
Total All Taxes	\$238.0

Sources: Pinnacle Economics using 2023 life science research data as inputs into a 2022 IMPLAN model of Oregon.

Life science research in Oregon is funded by a mix of revenues, private grants or gifts, state and local awards, and federal awards. The largest funding source of life science research funding in Oregon is awards (grants) from the U.S. Department of Health & Human Services' National Institutes of Health ("NIH"). Between 2002 and 2023, life science research institutions in Oregon received \$7.0 billion in NIH funding (on average \$318.6 million per year). All else the same, this funding would likely not accrue to the state but for the presence of life science research in Oregon. In this way, federal funding that supports life science research is similar to private bioscience's exports of goods and services in that it brings "new" money to the state. Life science research in Oregon is healthy and growing.

Figure 5
NIH Awards to Oregon, 2002–2023 (nominal dollars)



Source: U.S. Department of Health & Human Services, NIH Research Portfolio Online Reporting Tool, <https://www.nih.gov>.

Table 20 reports life science research direct jobs, wages, and average annual wages from all seven studies. Between 2002 and 2023, employment increased by 4,616 jobs (+176 percent), total wages increased by \$521.9 million (+359 percent), and average annual wages increased by \$36,779 (+67 percent).²⁷

Table 20

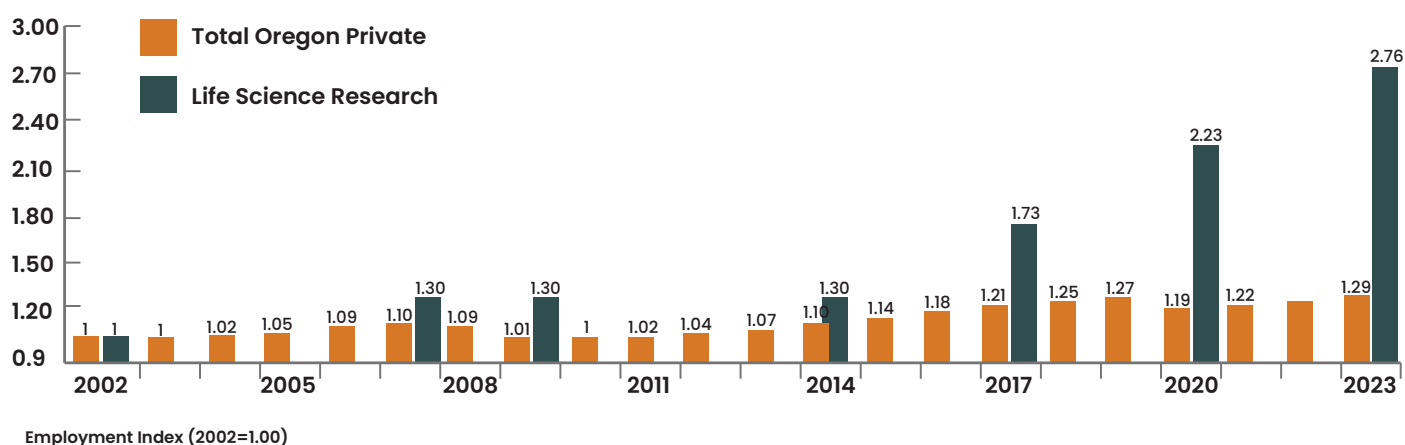
Direct Economic Measures of Life Science Research, 2002–2023 (nominal dollars)

Economic Measure	2002	2007	2009	2014	2017	2020	2023	Change 2002–2023	% Change 2002–2023
Jobs	2,630	3,418	3,406	4,085	4,554	5,870	7,246	4,616	175.5%
Total Wages (\$ millions)	\$145.6	\$237.8	\$273.9	\$355.7	\$402.4	\$522.8	\$667.5	\$521.9	358.6%
Average Annual Wages (\$)	\$55,335	\$69,567	\$80,400	\$87,085	\$88,357	\$89,074	\$92,114	\$36,779	66.5%

Sources: Pinnacle Economics using life science research data.

Figure 6 compares life science research employment with total private employment in Oregon between 2002 and 2023. Over this 21-year period, life science employment increased by almost 176 percent compared to 29 percent for all private employers in Oregon.

Figure 6

Life Science Research and Total Private Employment in Oregon, 2002–2023 (Employment Index, 2002 = 1.00)

Sources: Pinnacle Economics using 2023 life science research data and Oregon Employment Department data.

²⁷Although this report does not use historical data to forecast future outcomes, it's important to emphasize caution with time series analyses due to changes in factors that are outside of the researchers' control. For example, the previous study looked at private bioscience and life science research in Oregon in 2020—the first year of the coronavirus pandemic. In that study, great care was taken to evaluate monthly employment and payroll data before using annual averages for 2020. In the previous analysis, life science research activities at OHSU were estimated using life science research grant funding. Simply put, it was the best data available at that time. This study uses life science research spending to estimate OHSU's life science research activities in 2023. Simply put, it is the best data available at this time.

Figure 7 compares nominal average annual wages for life science research and all private employers in Oregon between 2002 and 2023. In 2023, the average annual wage in life science research was \$92,114 (+66.5 percent since 2002). While average annual wages for life science research have plateaued since 2017, average annual wages for private employees in Oregon surged in the last three years. As a result, the gap between the two has narrowed. In 2023, the average annual wage for private-sector employees in Oregon was \$67,207.

Figure 7

Life Science Research and Total Private Average Annual Wages in Oregon, 2002–2023 (nominal dollars)



Sources: Pinnacle Economics using 2023 life science research data and Oregon Employment Department data.



Total Impacts of Life Science Research in Oregon in 2023

This section presents the total impacts or “**contributions**” of life science research in Oregon in 2023. The **total** economic impacts of life science research in Oregon amounted to \$2.3 billion in output, including \$1.5 billion in value-added production (GSP), \$1.2 billion in income, \$291.9 million in other income, and 12,811 jobs in 2023. Life science research is linked to the following types of impacts in Oregon in 2023:

- **Direct** impacts of \$1.2 billion in economic activity, including \$822.0 million in income (wages and benefits) and 7,246 jobs (this is the same information as reported previously in Table 17);
- **Indirect** or supply-chain impacts of \$318.3 million in output, \$110.5 million in income and 1,525 jobs; and
- **Induced** or consumption-driven impacts of \$748.7 million in output, \$251.4 million in income, and 4,040 jobs.²⁸

Table 21

Economic Impacts of Life Science Research, by Type of Impact, 2023 (\$ millions*)

Impact Measure	Direct	Indirect	Induced	Total
Jobs	7,246	1,525	4,040	12,811
Output*	\$1,230.4	\$318.3	\$748.7	\$2,297.3
Gross State Product*	\$912.2	\$168.7	\$448.3	\$1,529.2
• Income*	\$822.0	\$110.5	\$251.4	\$1,183.9
• Other Income*	\$72.5	\$51.1	\$168.3	\$291.9
• Indirect Business Taxes*	\$17.7	\$7.0	\$28.7	\$53.4

Source: Pinnacle Economics using 2023 life science research data and a 2022 IMPLAN model of Oregon.

Table 22 reports the direct, indirect, and induced jobs generated by life science research by demographic group. In 2023, life science research directly employed an estimated 5,189 women and, through multiplier spending effects, is linked to employment for 8,078 women in Oregon. Similarly, in 2023, life science research directly employed an estimated 1,855 racially and ethnically diverse employees and, through multiplier spending effects, is linked to employment for 3,495 racially and ethnically diverse workers in Oregon.

Sources: Economics using 2023 life science research data, a 2022 IMPLAN model of Oregon, and 2021 EEOC data for Oregon.

Table 22

Life Science Research Employment Impacts by Demographic Group and Type of Impact, 2023

Demographic Group	Direct	Indirect	Induced	Total	% of Total Jobs	% of Total Jobs (2020)
Gender						
Men	2,057	787	1,890	4,734	36.9%	39.6%
Women	5,189	739	2,150	8,078	63.1%	60.4%
Total	7,246	1,525	4,040	12,811	100.0%	100.0%
Race						
White	5,391	1,083	2,842	9,316	72.7%	80.9%
Total All Racially and Ethnically Diverse Groups	1,855	442	1,198	3,495	27.3%	19.1%
• Black	279	66	160	505	3.9%	2.9%
• Hispanic	711	194	547	1,453	11.3%	8.0%
• Asian	483	94	251	829	6.5%	4.5%
• All Other Races	381	88	240	709	5.5%	3.8%
Total	7,246	1,525	4,040	12,811	100.0%	100.0%

²⁸Despite increased overall direct economic activity for life science research, the indirect or supply-chain impacts declined slightly since the previous study and the induced or consumption-driven impacts increased modestly.

Life science research activities are concentrated at universities and hospitals. However, the spending and income directly generated by life science research generate additional economic activity in other sectors of the Oregon economy. Table 23 reports the total economic impacts associated with life science research in Oregon by aggregate industry sector and shows how the direct economic activity associated with life science research benefits other sectors of the Oregon economy.

Table 23

Total Economic Impacts of Life Science Research by Aggregate Industry Sector, 2023 (\$ millions)

Aggregate Industry Sector	Output	Income	Jobs
Agriculture, forestry, fishing and hunting	\$4.1	\$1.1	40
Mining	\$0.9	\$0.0	2
Utilities	\$21.0	\$3.0	12
Construction	\$10.8	\$3.4	42
Manufacturing	\$28.5	\$4.9	59
Wholesale trade	\$59.9	\$16.3	125
Retail trade	\$79.1	\$29.8	652
Transportation and warehousing	\$32.7	\$12.1	283
Information services	\$49.2	\$11.4	85
Finance, insurance and real estate	\$321.4	\$51.1	964
Professional and technical services	\$78.8	\$36.0	436
Management of companies and enterprises	\$22.6	\$12.5	63
Administrative and waste services	\$65.0	\$30.9	482
Educational services	\$243.1	\$166.3	1,564
Health care and social assistance	\$1,123.3	\$735.4	6,686
Arts, entertainment and recreation	\$12.5	\$4.0	168
Accommodation and food services	\$63.5	\$25.1	530
Other services, except public administration	\$52.1	\$30.6	518
Government and unclassified sectors	\$28.9	\$10.1	102
Total All Sectors	\$2,297.3	\$1,183.9	12,811

Source: Pinnacle Economics using 2023 life science research data and a 2022 IMPLAN model of Oregon.

The economic activity linked to life science research generates tax and fee revenues for local, state and federal governments. These fiscal impacts are shown in Table 24, by type of impact. In total, life science research contributed \$107.7 million in tax and fee revenues for state and local taxing jurisdictions in 2023. In addition, the economic activity associated with life science research is linked to \$271.5 million in tax and fee revenues for the federal government in 2023.

Table 24

Fiscal Impacts of Life Science Research, by Type of Impact, 2023
(\$ millions)

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local				
Corporate Profits and Dividends	\$1.3	\$0.9	\$2.9	\$5.0
Business and Personal Property	\$9.4	\$3.7	\$15.1	\$28.2
Personal Income	\$29.8	\$4.2	\$9.4	\$43.4
Social Insurance	\$3.1	\$0.3	\$0.8	\$4.3
Other Taxes	\$8.1	\$3.0	\$12.0	\$23.1
Fines, Fees and Non-tax- es	\$1.9	\$0.4	\$1.4	\$3.7
Total State and Local	\$53.5	\$12.5	\$41.7	\$107.7
Federal Government				
Corporate Profits and Dividends	\$3.1	\$2.1	\$7.1	\$12.3
Personal Income	\$70.5	\$10.2	\$22.7	\$103.4
Other Business	\$0.7	\$0.3	\$1.2	\$2.2
Social Insurance	\$110.2	\$12.9	\$30.5	\$153.6
Total Federal	\$184.4	\$25.5	\$61.5	\$271.5
Total All Taxes and Fees	\$238.0	\$38.1	\$103.2	\$379.2

Source: Pinnacle Economics using 2023 life science research data and a 2022 IMPLAN model of Oregon.

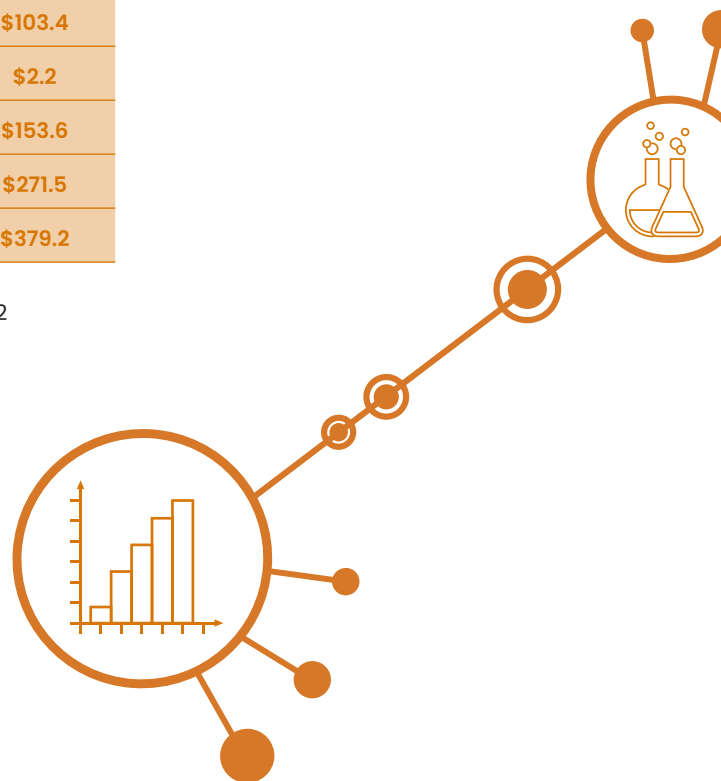


Table 25 reports the economic and fiscal impact multipliers associated with life science research in Oregon in 2023. According to data provide by life science research institutions and the IMPLAN model of the Oregon economy, life science research has the following multiplier effects:

- **Income multiplier equals 1.4.** Thus, every \$1.0 million in income paid to life science research employees generates another \$400,000 in income for workers in other sectors of the state economy.
- **Employment multiplier equals 2.0.** Thus, every ten direct life science research jobs are linked, on average, to another 10 jobs elsewhere in the state economy.

Table 25

Life Science Impact Multipliers, 2023

Impact Measure	Multiplier
Output	1.9
Income	1.4
Jobs	1.8
State and Local Taxes	2.0
Total All Taxes and Fees	\$177.7

Source: Pinnacle Economics using 2023 life science research data and a 2022 IMPLAN model of Oregon.

An alternate measure of the linkages between life science research and the rest of the Oregon economy can be assessed or quantified by calculating how much total activity is supported by \$1.0 million in life science research spending. (See Table 26.) On average, \$1 million in spending by life science research supports a total of \$1.9 million in statewide economic activity, including \$962,300 in income, 10.4 jobs, and \$87,500 in tax and fee revenues for state and local governments.

Table 26

Total Economic and Fiscal Contributions Per \$1 Million in Life Science Research Spending, 2023

Impact Measure	Per \$1 Million in Direct Spending
Output	\$1,867,200
Income	\$962,300
Jobs	10.4
State and Local Taxes	\$87,500
Total All Taxes and Fees	\$177.7

Source: Pinnacle Economics using 2023 life science research data and a 2022 IMPLAN model of Oregon.

The Combined Bioscience Industry in Oregon in 2023

This section of the report combines the results of private bioscience and life science research and describes the direct and total economic impacts of the bioscience industry in Oregon in 2023.

Direct Impacts of the Bioscience Industry in Oregon 2023

Altogether, the bioscience industry in Oregon directly generated \$11.5 billion in economic activity, including \$5.3 billion in value-added production or GSP, \$3.4 billion in income (wages and benefits), and 28,029 jobs in Oregon in 2023. Oregon's bioscience industry exported over \$5.6 billion in output (48.7 percent of direct industry output) in 2023.

Sources: Pinnacle Economics using 2023 QCEW data and life science research data, and a 2022 IMPLAN model of Oregon.

Table 27

Direct Economic Impacts of the Bioscience Industry in Oregon, 2023 (\$ millions)

Impact Measure	Private Bioscience	Life Science Research	Total
Jobs	20,783	7,246	28,029
Output	\$10,306.7	\$1,230.4	\$11,537.1
Gross State Product (a+b+c)	\$4,430.8	\$912.2	\$5,343.0
a) Income	\$2,565.7	\$822.0	\$3,387.7
• Wages	\$2,128.7	\$667.5	\$2,796.2
b) Other Income	\$1,591.7	\$72.5	\$1,664.2
c) Indirect Business Taxes	\$273.4	\$17.7	\$291.1
Exports	\$5,583.6	\$38.9	\$5,622.5
Exports % of Output	54.2%	3.2%	48.7%
Average Annual Wage \$ (a)	\$102,426	\$92,114	\$99,760
Average Annual Benefits \$ (b)	\$21,026	\$21,325	\$21,103
Average Annual Income \$ (c = a + b)	\$123,452	\$113,439	\$120,863



Table 28

Direct Bioscience Employment by Demographic Group, 2023

Demographic Group	Private Bioscience	Life Science Research	Total Bioscience	% of Total Bioscience
Gender				
Men	12,965	2,057	15,022	53.6%
Women	7,818	5,189	13,007	46.4%
Total	20,783	7,246	28,029	100.0%
Race				
White	14,688	5,391	20,080	71.6%
All Racially and Ethnically Diverse Groups	6,095	1,855	7,949	28.4%
• Black	635	279	913	3.3%
• Hispanic	2,183	711	2,894	10.3%
• Asian	2,172	483	2,655	9.5%
• All Other Races	1,105	381	1,487	5.3%
Total	20,783	7,246	28,029	100.0%

Table 28 shows the direct employment of Oregon's bioscience industry by gender and race. In 2023, Oregon's bioscience industry directly employed 13,007 women (46.4 percent of total bioscience employment) and 7,949 racially and ethnically diverse (28.4 percent) persons.

Sources: Pinnacle Economics using 2023 QCEW data and life science research data, and a 2022 IMPLAN model of Oregon augmented with 2021 EEOC data.

The direct tax and fee revenues generated by the bioscience industry and its employees are shown in Table 29, by taxing jurisdiction. In 2023, the bioscience industry directly generated \$455.0 million in tax and fee revenues for state and local governments and \$823.2 million in tax and fee revenues for the federal government.

Table 29

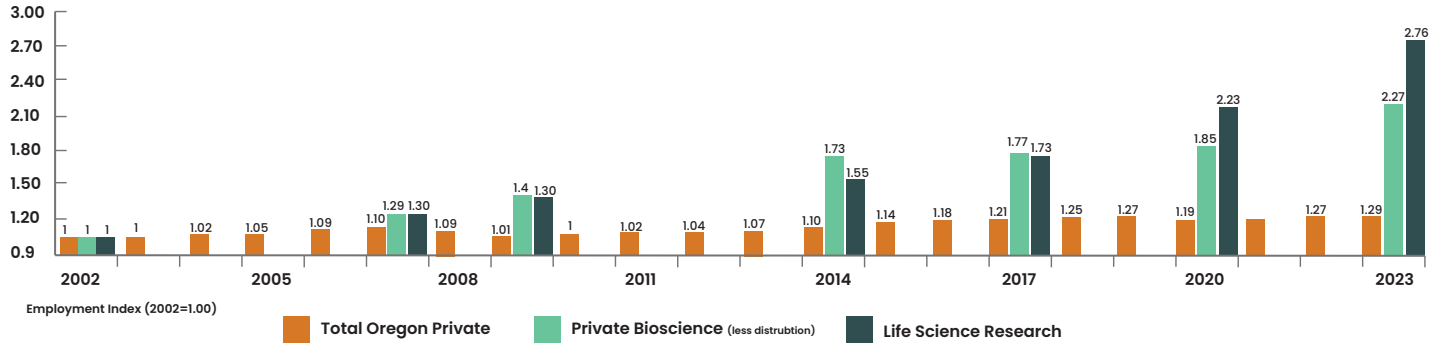
Direct Fiscal Impacts of Bioscience in Oregon, 2023 (\$ millions)

Taxing Jurisdiction / General Tax or Fee Category	Private Bioscience	Life Science Research	Total Bioscience
State and Local			
Corporate Profits and Dividends	\$27.4	\$1.3	\$28.6
Business and Personal Property	\$144.1	\$9.4	\$153.5
Personal Income	\$92.5	\$29.8	\$122.3
Social Insurance	\$9.6	\$3.1	\$12.7
Other Taxes	\$114.7	\$8.1	\$122.8
Fines, Fees and Non-taxes	\$13.1	\$1.9	\$15.0
Total State and Local	\$401.5	\$53.5	\$455.0
Federal			
Corporate Profits and Dividends	\$66.7	\$3.1	\$69.8
Personal Income	\$219.2	\$70.5	\$289.7
Business Other Taxes and Fees	\$11.1	\$0.7	\$11.8
Social Insurance	\$341.8	\$110.2	\$452.0
Total Federal	\$638.8	\$184.4	\$823.2
Total All Taxes	\$1,040.2	\$238.0	\$1,278.2

Sources: Pinnacle Economics using 2023 QCEW data and life science research data, and a 2022 IMPLAN model of Oregon.

The following two figures compare employment and average annual wages of private bioscience and life science research to all private employment in Oregon between 2002 and 2023.

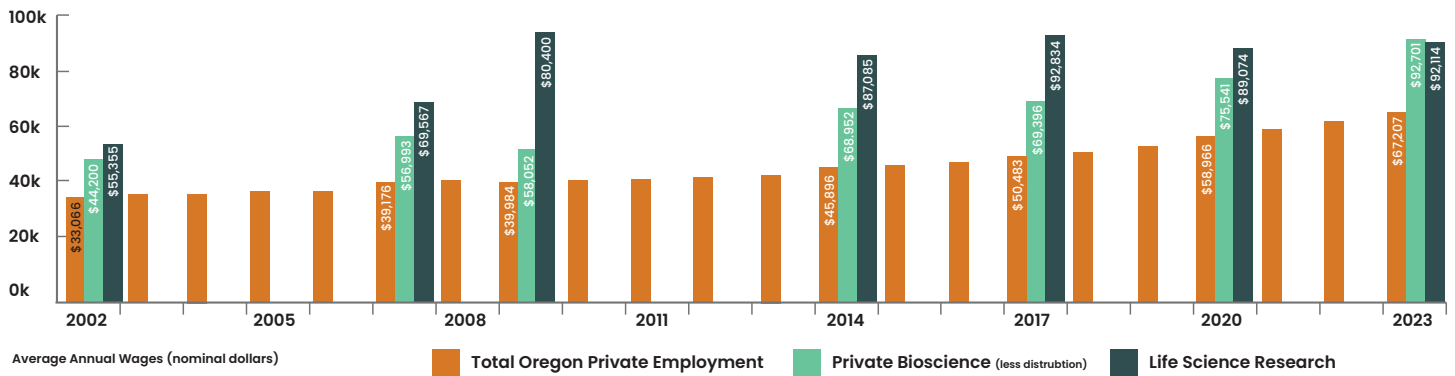
Figure 8
Bioscience Sectors and All Private Sector Employment, 2002–2023



Note: In order to accommodate changes to the industry definition in 2014, bioscience-related distribution and four subsectors are not included in private bioscience when making comparisons to 2002.

Sources: Pinnacle Economics using 2023 QCEW data and life science research data.

Figure 9
Bioscience Sectors and All Private Sector Average Annual Wages, 2002–2023 (nominal dollars)



Note: In order to accommodate changes to the industry definition in 2014, bioscience-related distribution and four subsectors are not included in private bioscience when making comparisons to 2002.

Sources: Pinnacle Economics using 2023 QCEW data and life science research data.

In 2023, the bioscience industry in Oregon directly employed 28,029 persons and paid \$3.4 billion in income or employee compensation including \$2.8 billion in wages and \$591.5 million in benefits such as health and welfare, pension, and other benefits. Employment growth in the industry has been steady and significant over the last 23 years. Between 2002 and 2023, after removing bioscience-related distribution (a new sector added in the 2014 study), bioscience added over 12,500 jobs (+141 percent) and increased payrolls (wages only) by \$1.6 billion (+370 percent).

Total Impacts of the Bioscience Industry in Oregon in 2023

This section presents the total impacts of the combined (private bioscience plus life science research) bioscience industry in Oregon in 2023. The direct, indirect, and induced impacts associated with the bioscience industry in Oregon are shown in Table 30. **In 2023, the bioscience industry in Oregon is associated with \$21.2 billion in output, including \$6.8 billion in income (wages and benefits), \$3.5 billion in other income, and 74,925 jobs.** The secondary impacts include:

- **Indirect** or supply-chain impacts of \$5.4 billion in economic activity, including \$1.9 billion in income, and 23,694 jobs. Approximately 22 percent of these indirect impacts accrue to the professional and technical services sectors, benefiting employees and firms in marketing, management services, accounting, legal, advertising, and architectural and engineering services.
- **Induced** or consumption-driven impacts of \$4.3 billion in output, including \$1.4 billion in income, and 23,202 jobs. Induced impacts are concentrated in the state's trade and service sectors. As a result, additional economic activity is generated in sectors with relatively high concentrations of women and racially and ethnically diverse employment, as well as workers of various skill levels.

Table 30

Total Economic Impacts of the Bioscience Industry in Oregon, by Type of Impact, 2023 (\$ millions*)

Impact Measure	Direct	Indirect	Induced	Total
Jobs	28,029	23,694	23,202	74,925
Output*	\$11,537.1	\$5,365.0	\$4,298.9	\$21,200.9
Gross State Product*	\$5,343.0	\$2,912.9	\$2,569.3	\$10,825.3
• Income*	\$3,387.7	\$1,937.6	\$1,438.4	\$6,763.7
• Other Income*	\$1,664.2	\$841.1	\$966.2	\$3,471.5
• Indirect Business Taxes*	\$291.1	\$134.2	\$164.8	\$590.1

Source: Pinnacle Economics using 2023 QCEW data and life science research data, and a 2022 IMPLAN model of Oregon.

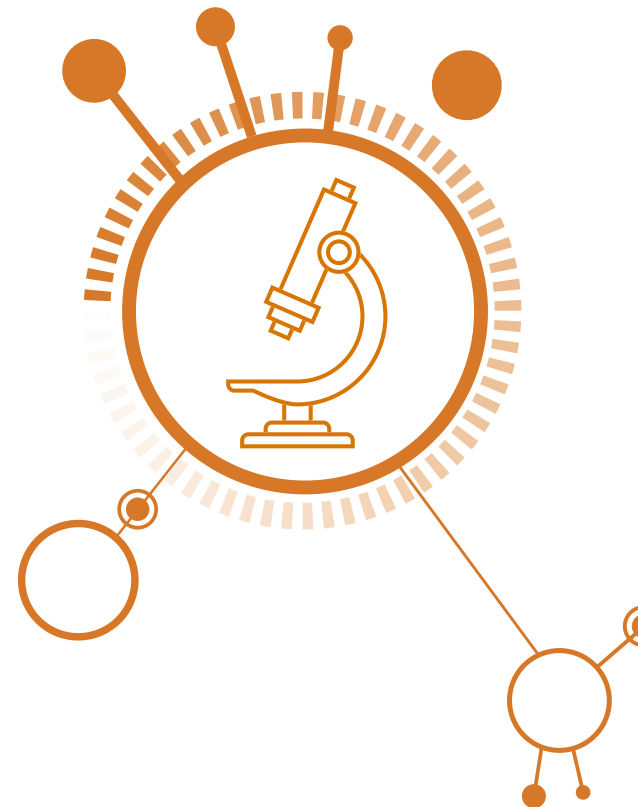


Table 31 reports the total economic impacts, by aggregate industry sector, and demonstrates how the direct economic activity attributed to Oregon's bioscience industry benefits other sectors of the economy.

Table 31

Total Economic Impacts of the Bioscience Industry by Aggregate Industry Sector, 2023 (\$ millions)

Aggregate Industry Sector	Output	Income	Jobs
Agriculture, forestry, fishing and hunting	\$31.5	\$9.2	329
Mining	\$11.6	\$0.7	25
Utilities	\$216.6	\$28.7	114
Construction	\$80.8	\$24.9	307
Manufacturing	\$4,545.0	\$810.3	7,525
Wholesale trade	\$5,030.8	\$1,240.5	8,572
Retail trade	\$478.1	\$178.9	3,887
Transportation and warehousing	\$558.6	\$228.2	5,658
Information services	\$532.9	\$112.4	811
Finance, insurance and real estate	\$2,263.4	\$387.1	7,191
Professional and technical services	\$2,682.5	\$1,117.2	10,447
Management of companies and enterprises	\$607.4	\$334.7	1,609
Administrative and waste services	\$613.5	\$302.4	4,656
Educational services	\$285.0	\$192.0	2,150
Health care and social assistance	\$2,193.5	\$1,300.8	13,083
Arts, entertainment and recreation	\$92.9	\$29.8	1,270
Accommodation and food services	\$377.1	\$148.4	3,140
Other services, except public administration	\$337.7	\$195.7	3,138
Government and unclassified sectors	\$261.9	\$121.8	1,013
Total All Sectors	\$21,200.9	\$6,763.7	74,925

Sources: Pinnacle Economics using 2023 QCEW data and life science research data, and a 2022 IMPLAN model of Oregon.

The bioscience industry in Oregon directly employed 13,007 women and 7,949 racially and ethnically diverse workers in 2023. Through supply-chain and consumption-driven spending, the bioscience industry is associated with jobs for women and racially and ethnically diverse workers in other industry sectors. In total, the bioscience industry is linked to 35,290 jobs (47.1 percent of total job impacts) for women and 21,505 jobs (28.7 percent) for racially and ethnically diverse workers in Oregon in 2023.

Table 32

Bioscience Industry Employment Impacts by Demographic Group and Type of Impact, 2023

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Gender					
Men	15,022	13,760	10,852	39,635	52.9%
Women	13,007	9,933	12,350	35,290	47.1%
Total	28,029	23,694	23,202	74,925	100.0%
Race					
White	20,080	17,018	16,323	53,420	71.3%
Total All Racially and Ethnically Diverse Groups	7,949	6,676	6,879	21,505	28.7%
• Black	913	854	918	2,685	3.6%
• Hispanic	2,894	2,964	3,141	9,000	12.0%
• Asian	2,655	1,510	1,444	5,608	7.5%
• All Other Races	1,487	1,349	1,376	4,211	5.6%
Total	28,029	23,694	23,202	74,925	100.0%

Sources: Pinnacle Economics using 2023 QCEW data and life science research data, and a 2022 IMPLAN model of Oregon augmented with 2021 EEOC data for Oregon.

The fiscal impacts attributed to Oregon's bioscience industry are shown in Table 33. The direct, indirect, and induced economic activity associated with the bioscience industry is linked to a total of \$923.4 million in state and local tax revenues and \$1.6 billion in federal tax revenues.

Table 33

Fiscal Impacts of the Bioscience Industry in Oregon, by Type of Impact, 2023 (\$ millions)

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local				
Corporate Profits and Dividends	\$28.6	\$14.5	\$16.7	\$59.8
Business and Personal Property	\$153.5	\$70.7	\$86.9	\$311.1
Personal Income	\$122.3	\$73.0	\$54.2	\$249.5
Social Insurance	\$12.7	\$6.3	\$4.7	\$23.7
Other Taxes	\$122.8	\$57.0	\$69.1	\$248.8
Fines, Fees and Non-taxes	\$15.0	\$7.7	\$7.8	\$30.5
Total State and Local	\$455.0	\$229.2	\$239.3	\$923.4
Federal				
Corporate Profits and Dividends	\$69.8	\$35.3	\$40.6	\$145.7
Personal Income	\$289.7	\$175.7	\$130.5	\$595.8
Other Business	\$11.8	\$5.4	\$6.7	\$23.9
Social Insurance	\$452.0	\$237.1	\$175.4	\$864.5
Total Federal	\$823.2	\$453.5	\$353.1	\$1,629.9
Total All Taxes and Fees	\$1,278.2	\$682.7	\$592.4	\$2,553.3

Sources: Pinnacle Economics using QCEW and life science research data, and IMPLAN.

THE BIOSCIENCE INDUSTRY IN CLARK COUNTY, WASHINGTON

This study continues with our previous efforts and measures the bioscience industry in Clark County, Washington. The data sources, industry definition, and modeling framework are similar to that used for Oregon's bioscience industry. Although private bioscience and life science research are measured separately, they are combined in this section given the relatively limited nature of life science research activities in Clark County. Direct impacts are reported first, followed by the total economic impacts.

Private bioscience data. The Washington Employment Security Department's Labor Market and Economic Analysis ("LMEA") department provided QCEW establishment, payroll, and employment data for NAICS codes included in private bioscience for Clark County, Washington. This NAICS code definition is based on TEconomy/BIO's 2022 report and is the same definition of private bioscience used in the Oregon analysis.²⁹

Life science research data. Washington State University ("WSU") provided life science research funding at their Vancouver campus for CY2023. Pinnacle used data for life science research at universities in Oregon to estimate the direct employment and payroll for life science research at WSU's Vancouver campus.

Direct Impacts of the Bioscience Industry in Clark County in 2023

In 2023, private bioscience in Clark County consisted of 312 firms that directly generated \$1.9 billion in output, including \$411.1 million in income and 3,725 jobs. Income includes \$343.4 million in wages (as reported by LMEA's QCEW data) and \$67.8 million in benefits (as estimated using IMPLAN). The average annual wage in private bioscience is \$92,200 or 34 percent greater than the average annual wage (\$68,840) for all private employers in Clark County.³⁰ Private bioscience in Clark County exported \$1.5 billion in goods and services (81.9 percent of direct output) in 2023. Traded sectors and exports are important to the Clark County economy because it brings new money into the county rather than simply recycling existing dollars or purchasing power.

Table 34

Direct Economic Impacts of Private Bioscience in Clark County, by Sector, 2023 (\$ millions)

Economic Measure	Drugs and Pharmaceuticals	Medical Devices and Equipment	Research, Testing and Medical Laboratories	Bioscience-related Distribution	Total All Private Bioscience
# Establishments	20	54	119	119	312
Jobs	694	670	1,530	831	3,725
Output*	\$552.4	\$326.5	\$552.4	\$437.8	\$1,869.1
Gross Regional Product (a+b+c)*	\$155.4	\$103.2	\$317.8	\$171.8	\$748.3
a) Income*	\$57.5	\$65.7	\$215.4	\$72.6	\$411.1
• Wages*	\$44.1	\$51.0	\$186.2	\$62.0	\$343.4
b) Profits*	\$83.5	\$33.5	\$96.3	\$75.2	\$288.6
c) Business Taxes*	\$14.4	\$4.0	\$6.1	\$24.0	\$48.6
Exports (d+e)*	\$522.6	\$311.5	\$390.0	\$306.9	\$1,530.9
d) Domestic Exports*	\$475.0	\$258.3	\$217.8	\$256.4	\$1,207.5
e) Foreign Exports*	\$47.5	\$53.2	\$172.1	\$50.5	\$323.4
Exports % of Output	94.6%	95.4%	70.6%	70.1%	81.9%

Sources: Pinnacle Economics Gender and Race Employment Calculator, QCEW and life science data, and IMPLAN.

²⁹Due to confidentiality concerns, LMEA combined data for NAICS 32531 and 32541. The first NAICS code is in agricultural feedstocks and chemicals manufacturing. The second NAICS code is in drugs and pharmaceutical manufacturing. Pinnacle's review of IMPLAN 2022 base data for Clark County reveals that there is no economic activity in agricultural feedstocks and chemicals manufacturing, except for a very small amount of activity in the pesticide and other agricultural chemical manufacturing (NAICS 325320) subsector. However, to honor LMEA's confidentiality rules, Pinnacle did not adjust the LMEA data or parse out the jobs and income across these two sectors. Instead, all jobs and wages were allocated to drugs and pharmaceutical manufacturing knowing that it would slightly overestimate direct jobs and wages in that sector. As a result, similar to 2020, the feedstock and chemicals manufacturing sector is not included in this analysis. In addition, it's important to point out that there are four subsectors—two in research, testing and medical laboratories and two in bioscience-related distribution—that can include firms that are not related to bioscience. Pinnacle does not have access to firm-level QCEW data, so was not able to identify and exclude these firms for those subsectors.

³⁰In 2023, the average annual wage for private bioscience declined slightly from average annual wage of \$93,000 in 2020. This is likely due to sectoral changes in employment and wages. Clark County average annual wage is preliminary. Revised data was not ready at the time this report was prepared. See <https://esd.wa.gov/labormarketinfo/covered-employment>.

As shown in Table 35, similar to Oregon, private bioscience in Clark County experienced significant growth across all economic measures since the previous study. Between 2020 and 2023, the number of firms increased 107.4 percent, employment increased 51.7 percent, and wages increased 50.4 percent. Given that total wages lagged employment growth, the average annual wage declined slightly from \$93,000 in 2020 to \$92,200 in 2023. Lastly, exports increased by \$346.4 million, or by 29.2 percent, between 2020 and 2023.

Sources: Pinnacle Economics using 2023 QCEW data and a 2022 IMPLAN model of Clark County.

Table 35

Changes in the Direct Economic Impacts of Private Bioscience in Clark County, 2020–2023 (nominal, \$ millions)

Economic Measure	2020	2023	Change	%Change
# Establishments	150	312	162	107.4%
Jobs	2,456	3,725	1,269	51.7%
Output*	\$1,382.3	\$1,869.1	\$486.8	35.2%
Gross Regional Product (a+b+c)*	\$536.0	\$748.3	\$212.3	39.6%
a) Income*	\$271.8	\$411.1	\$139.3	51.3%
• Wages*	\$228.4	\$343.4	\$115.0	50.4%
b) Profits*	\$233.2	\$288.6	\$55.3	23.7%
c) Business Taxes*	\$30.9	\$48.6	\$17.7	57.1%
Exports (d+e)*	\$1,184.5	\$1,530.9	\$346.4	29.2%
d) Domestic Exports*	\$888.7	\$1,207.5	\$318.8	35.9%
e) Foreign Exports*	\$295.7	\$323.4	\$27.6	9.3%
Exports % of Output	85.7%	83.5%	85.7%	\$1,187.0

In 2023, private bioscience and their employees generated \$37.3 million in tax and fee revenues for state and local governments, and \$101.3 million in tax and fee revenues for the federal government. (See Table 37.)

Table 36

Direct Fiscal Impacts of Private Bioscience in Clark County, by Sector, 2023

Taxing Jurisdiction / General Tax or Fee Category	Drugs and Pharmaceuticals	Medical Devices and Equipment	Research, Testing and Medical Laboratories	Bioscience-related Distribution	Total All Private Bioscience
State and Local					
Business and Personal Property	\$3,842,400	\$1,068,300	\$1,655,500	\$3,882,400	\$10,448,600
Sales Taxes	\$8,762,900	\$2,415,900	\$3,696,500	\$5,463,800	\$20,339,100
Social Insurance	\$374,700	\$425,600	\$1,396,000	\$337,200	\$2,533,500
Other Taxes	\$1,271,400	\$364,500	\$590,300	\$976,300	\$3,202,500
Fines, Fees and Non-taxes	\$217,600	\$102,900	\$257,200	\$240,700	\$818,400
Total State and Local	\$14,469,000	\$4,377,400	\$7,595,600	\$10,900,300	\$37,342,100
Federal					
Corporate Profits and Dividends	\$3,525,900	\$1,401,300	\$4,041,600	\$1,685,700	\$10,654,500
Personal Income	\$5,866,100	\$6,642,800	\$21,856,800	\$3,121,700	\$37,487,400
Business Other Taxes and Fees	\$528,100	\$145,600	\$222,800	\$837,400	\$1,733,900
Social Insurance	\$7,851,800	\$8,913,500	\$29,255,400	\$5,420,000	\$51,440,700
Total Federal	\$17,771,900	\$17,103,300	\$55,376,600	\$11,064,800	\$101,316,500
Total All Taxes	\$32,240,900	\$21,480,700	\$62,972,200	\$21,965,100	\$138,658,600

Sources: Pinnacle Economics using 2023 QCEW data and a 2022 IMPLAN model of Clark County.

Life science research at WSU Vancouver received \$8.5 million in NIH grants and other agency awards in 2023.³¹ This represents a \$5.4 million increase (+174 percent) in funding since 2020. In addition, as further evidence of the potential future growth of bioscience research, WSU Vancouver is completing the construction of a \$63.8 million, 60,000 square foot Life Sciences Building at their Vancouver campus. This project was financed, in part, by an initial \$57.1 million grant from the Washington State Legislature. Once completed, the WSU Vancouver's "Life Science Building will house lab space for programming in biology and chemistry, serving general educational need for all students and foundational courses for an array of STEM degrees. It will also house basic, translational, applied and clinical health programs including biology, chemistry, neuroscience and nursing."³²

Pinnacle estimated the employment and income associated with WSU Vancouver's life science research using metrics for similar life science research at universities in Oregon. The direct economic impacts for life science research consist of \$8.5 million in output, including \$5.8 million in income and an estimated 52 full- and part-time jobs.

Total Impacts of Bioscience Industry in Clark County in 2023

Table 37 reports the economic impacts, by type of impact, for private bioscience and life science research in Clark County in 2023.

Table 37

Economic Impacts of Private Bioscience and Life Science Research in Clark County, by Type of Impact, 2023

BIOSCIENCE SEGMENT / Impact Measure	Direct	Indirect	Induced	Total
PRIVATE BIOSCIENCE				
Jobs	3,725	2,285	1,353	7,363
Output	\$1,869,066,200	\$422,450,600	\$250,290,500	\$2,541,807,300
Gross State Product	\$748,266,500	\$218,825,400	\$160,795,500	\$1,127,887,400
• Income	\$411,131,600	\$130,208,600	\$76,763,400	\$618,103,600
• Other Income	\$288,551,500	\$68,585,300	\$63,260,100	\$420,396,900
• Indirect Business Taxes	\$48,583,400	\$20,031,500	\$20,772,000	\$89,386,900
LIFE SCIENCE RESEARCH				
Jobs	52	8	16	76
Output	\$8,500,000	\$1,599,700	\$2,832,700	\$12,932,400
Gross State Product	\$6,390,700	\$705,100	\$1,819,800	\$8,915,600
• Income	\$5,842,000	\$309,700	\$868,800	\$7,020,500
• Other Income	\$380,200	\$346,100	\$715,900	\$1,442,200
• Indirect Business Taxes	\$168,500	\$49,300	\$235,100	\$452,900
TOTAL BIOSCIENCE				
Jobs	3,777	2,293	1,368	7,439
Output	\$1,877,566,200	\$424,050,300	\$253,123,200	\$2,554,739,700
Gross State Product	\$754,657,200	\$219,530,500	\$162,615,300	\$1,136,803,000
• Income	\$416,973,600	\$130,518,300	\$77,632,200	\$625,124,100
• Other Income	\$288,931,700	\$68,931,400	\$63,976,000	\$421,839,100
• Indirect Business Taxes	\$48,751,900	\$20,080,800	\$21,007,100	\$89,839,800

Sources: Pinnacle Economics using 2023 QCEW data, 2023 life science research funding from WSU Vancouver, and 2022 IMPLAN model of Clark County.

³¹Pinnacle researched NIH's grant funding website and could not find any NIH grants to other life science researchers in Vancouver or Clark County in 2023.

³²Please see <https://www.vancouver.wsu.edu/sciences-building-glance>.

The total economic impacts of the combined bioscience industry in Clark County in 2023 amount to \$2.6 billion in output, including \$625.1 million in income and 7,439 jobs. The economic impacts, by type of impact, of the combined bioscience industry in Clark County in 2023 include:

- **Direct** impacts of \$1.9 billion in output, including \$417.0 million in income, \$289.0 million in other income and 3,777 jobs.
- **Indirect** or supply-chain impacts of \$424.1 million in economic activity, including \$130.5 million in income and 2,293 jobs.
- **Induced** or consumption-driven impacts of \$253.1 million in economic activity, including \$77.6 million in income and 1,368 jobs.

The total economic impacts of the combined bioscience industry in Clark County in 2023 are shown by aggregate industry sector in Table 38.

Table 38

Total Economic Impacts of the Combined Bioscience Industry in Clark County, by Aggregate Industry Sector, 2023

Aggregate Industry Sector	Output	Income	Jobs
Agriculture, forestry, fishing and hunting	\$771,100	\$221,600	30
Mining	\$502,900	\$14,500	1
Utilities	\$1,186,000	\$106,000	1
Construction	\$9,159,000	\$2,620,500	35
Manufacturing	\$888,418,200	\$125,229,400	1,391
Wholesale trade	\$500,509,600	\$85,925,100	966
Retail trade	\$33,118,100	\$10,594,500	231
Transportation and warehousing	\$25,361,900	\$8,357,400	447
Information services	\$26,723,000	\$4,557,900	43
Finance, insurance and real estate	\$173,396,200	\$16,737,500	523
Professional and technical services	\$599,407,800	\$228,726,100	1,649
Management of companies and enterprises	\$15,144,300	\$8,101,000	66
Administrative and waste services	\$71,997,500	\$36,403,500	599
Educational services	\$10,759,500	\$6,982,000	78
Health care and social assistance	\$100,327,400	\$52,950,800	683
Arts, entertainment and recreation	\$4,395,500	\$1,326,800	53
Accommodation and food services	\$28,799,000	\$9,465,900	274
Other services, except public administration	\$28,912,100	\$14,916,800	245
Government and unclassified sectors	\$35,850,600	\$11,887,000	124
	\$2,554,739,700	\$625,124,100	7,439

Sources: Pinnacle Economics using 2023 QCEW data, 2023 life science research funding from WSU Vancouver, and 2022 IMPLAN model of Clark County.

Table 40 summarizes the fiscal impacts, by type of impact, for each segment of Clark County's bioscience industry. Table 41 then offers additional details regarding the fiscal impacts for Clark County's bioscience industry as a whole.

Table 40
Detailed Fiscal Impacts of the Combined Bioscience Industry in Clark County, by Type of Impact, 2023

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
STATE AND LOCAL				
Business and Personal Property	\$10,494,200	\$4,573,000	\$5,112,200	\$20,179,400
Sales Taxes	\$20,441,000	\$9,681,100	\$10,979,100	\$41,101,200
Social Insurance	\$2,571,500	\$619,100	\$418,000	\$3,608,600
Other Taxes	\$3,218,700	\$1,457,000	\$1,629,600	\$6,305,300
Fines, Fees and Non-taxes	\$825,400	\$298,900	\$290,800	\$1,415,100
Total State and Local	\$37,550,800	\$16,629,100	\$18,429,600	\$72,609,500
FEDERAL				
Corporate Profits and Dividends	\$10,670,400	\$2,278,500	\$2,297,600	\$15,246,500
Personal Income	\$38,080,500	\$10,845,500	\$7,214,300	\$56,140,300
Business Other Taxes and Fees	\$1,740,000	\$692,800	\$763,700	\$3,196,500
Social Insurance	\$52,234,400	\$12,869,400	\$8,768,200	\$73,872,000
Total Federal	\$102,725,300	\$26,686,300	\$19,043,700	\$148,455,300
Total All Taxes	\$140,276,100	\$43,315,400	\$37,473,400	\$221,064,900

Sources: Pinnacle Economics using 2023 QCEW data, 2023 life science research funding from WSU Vancouver, and a 2022 IMPLAN model of Clark County.

The economic and fiscal impact multipliers for each segment of the bioscience industry in Clark County's in 2023 are reported in Table 41. Impact multipliers are used to assess the linkages between a given activity and other sectors of the local economy. In this analysis, impact multipliers are used to quantify the linkages between the bioscience industry in Clark County and other sectors of the county economy. Importantly, all else the same, economic and fiscal impact multipliers will be smaller for economic study areas that are defined more narrowly. This is because multipliers are inversely related to leakages or imports, i.e., the greater the propensity to import, the lower the multipliers.

Table 41
Economic Impact Multipliers for Each Segment of Clark County's Bioscience Industry, 2023

Impact Measure	Total Private Bioscience	Life Science Research
Output	1.4	1.5
Income	1.5	1.2
Jobs	2.0	1.4
State and Local Taxes	1.9	1.2

Sources: Pinnacle Economics using 2023 QCEW data, 2023 life science research funding from WSU Vancouver, and a 2022 IMPLAN model of Clark County.

According to the economic impact model of Clark County, the private bioscience industry has the following multipliers:

- An **income multiplier of 1.5**, which shows that every \$1 million in income directly generated in the bioscience industry is linked to another \$500,000 in income for workers and business owners in other industries in Clark County.
- An **employment multiplier of 2.0**, which suggests that every 10 jobs in the bioscience industry supports an additional 10 jobs in other sectors of the Clark County economy.

Table 43
Economic Impacts Per \$1 Million in Output, 2023

Impact Measure	Total Private Bioscience	Life Science Research
Output	\$1,359,900	\$1,521,500
Income	\$330,700	\$825,900
Jobs	3.9	8.9
State and Local Taxes	\$38,600	\$57,868

Sources: Pinnacle Economics using 2023 QCEW data, 2023 life science research funding from WSU Vancouver, and a 2022 IMPLAN model of Clark County.

APPENDIX

The following tables report the economic contributions for each of the five sectors of private bioscience in Oregon in 2023.

Table A1: Impacts of Agricultural Feedstocks and Chemicals (\$ millions*)

Table A1 | Summary Table

Impact Measure	Direct	Indirect	Induced	Total
Output*	\$569.3	\$298.8	\$109.3	\$977.4
Gross State Product*	\$101.3	\$135.4	\$60.4	\$297.2
• Income*	\$55.5	\$69.2	\$31.6	\$156.4
• Other Income*	\$35.4	\$51.7	\$24.6	\$111.6
• Indirect Business Taxes*	\$10.5	\$14.5	\$4.2	\$29.2
Jobs	508	1,214	738	2,459

Table A2 | Diversity Impacts

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Gender					
Men	409	740	345	1,494	60.8%
Women	99	473	393	965	39.2%
Total	508	1,214	738	2,459	100.0%
Race					
White	353	829	519	1,700	69.1%
All Racially and Ethnically Diverse Groups	155	385	219	759	30.9%
• Black	10	45	29	84	3.4%
• Hispanic	92	204	100	396	16.1%
• Asian	25	71	46	142	5.8%
• All Other Races	28	65	44	137	5.6%
Total	508	1,214	738	2,459	100.0%

Impacts of Agricultural Feedstocks and Chemicals (\$ millions)

Table 3: Fiscal Impacts

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local Governments	\$12.9	\$18.4	\$6.1	\$37.4
Corporate Profits and Dividends Taxes	\$0.6	\$0.9	\$0.4	\$1.9
Business and Personal Property Taxes	\$5.4	\$7.7	\$2.2	\$15.3
Personal Income Taxes	\$2.0	\$3.0	\$1.4	\$6.3
Social Insurance Taxes	\$0.2	\$0.3	\$0.1	\$0.6
Other Taxes	\$4.3	\$6.1	\$1.8	\$12.1
Fines, Fees and Non-taxes	\$0.4	\$0.6	\$0.2	\$1.1
Federal Government	\$13.9	\$19.7	\$9.0	\$42.5
Corporate Profits and Dividends Taxes	\$1.5	\$2.2	\$1.0	\$4.7
Personal Income Taxes	\$4.7	\$7.2	\$3.3	\$15.2
Business Other Taxes and Fees	\$0.4	\$0.6	\$0.2	\$1.2
Social Insurance Taxes	\$7.3	\$9.7	\$4.5	\$21.5
Total All Taxes and Fees	\$26.8	\$38.1	\$15.1	\$79.9

Table 4: Multipliers

Impact Measure	Multiplier
Output	1.7
Gross State Product	2.9
• Income	2.8
• Other Income	3.2
• Indirect Business Taxes	2.8
Jobs	4.8

Table A2: Impacts of Drugs and Pharmaceuticals (\$ millions*)

Table 1: Summary Table

Impact Measure	Direct	Indirect	Induced	Total
Output*	\$1,303.0	\$507.5	\$240.4	\$2,050.9
Gross State Product*	\$317.7	\$255.5	\$144.0	\$717.2
• Income*	\$141.3	\$157.1	\$80.7	\$379.2
• Other Income*	\$125.6	\$85.6	\$54.0	\$265.3
• Indirect Business Taxes*	\$50.8	\$12.8	\$9.2	\$72.7
Jobs	1,416	2,215	1,622	5,253

Table 2 | Diversity Impacts

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Gender					
Men	1,140	1,301	759	3,199	60.9%
Women	276	914	863	2,054	39.1%
Total	1,416	2,215	1,622	5,253	100.0%
Race					
White	983	1,583	1,141	3,708	70.6%
All Racially and Ethnically Diverse Groups	433	632	481	1,545	29.4%
• Black	28	81	64	173	3.3%
• Hispanic	257	279	220	755	14.4%
• Asian	69	148	101	318	6.0%
• All Other Races	79	124	96	300	5.7%
Total	1,416	2,215	1,622	5,253	100.0%

Impacts of Drugs and Pharmaceuticals (\$ millions)

Table 3: Fiscal Impacts

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local Governments	\$57.5	\$20.6	\$13.4	\$91.6
Corporate Profits and Dividends Taxes	\$2.2	\$1.5	\$0.9	\$4.6
Business and Personal Property Taxes	\$26.9	\$6.7	\$4.9	\$38.5
Personal Income Taxes	\$5.1	\$5.8	\$3.0	\$14.0
Social Insurance Taxes	\$0.5	\$0.5	\$0.3	\$1.3
Other Taxes	\$21.1	\$5.4	\$3.9	\$30.4
Fines, Fees and Non-taxes	\$1.6	\$0.7	\$0.4	\$2.8
Federal Government	\$38.5	\$37.7	\$19.7	\$95.9
Corporate Profits and Dividends Taxes	\$5.3	\$3.6	\$2.3	\$11.2
Personal Income Taxes	\$12.1	\$14.0	\$7.3	\$33.4
Business Other Taxes and Fees	\$2.1	\$0.5	\$0.4	\$3.0
Social Insurance Taxes	\$19.0	\$19.6	\$9.8	\$48.3
Total All Taxes and Fees	\$96.0	\$58.3	\$33.1	\$187.4

Table 4: Multipliers

Impact Measure	Multiplier
Output	1.6
Gross State Product	2.3
• Income	2.7
• Other Income	2.1
• Indirect Business Taxes	1.4
Jobs	3.7

Impacts of Medical Devices and Equipment (\$ millions*)

Table 1: Summary Table

Impact Measure	Direct	Indirect	Induced	Total
Output*	\$2,329.1	\$1,014.5	\$742.1	\$4,085.7
Gross State Product*	\$862.7	\$547.5	\$444.4	\$1,854.6
• Income*	\$550.7	\$367.9	\$249.2	\$1,167.7
• Other Income*	\$271.1	\$151.5	\$166.8	\$589.4
• Indirect Business Taxes*	\$40.9	\$28.1	\$28.4	\$97.4
Jobs	4,924	5,316	5,006	15,246

Table A2 | Diversity Impacts

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Gender					
Men	3,753	3,069	2,342	9,164	60.1%
Women	1,171	2,247	2,665	6,082	39.9%
Total	4,924	5,316	5,006	15,246	100.0%
Race					
White	3,193	3,818	3,522	10,533	69.1%
All Racially and Ethnically Diverse Groups	1,731	1,498	1,484	4,714	30.9%
• Black	142	200	198	540	3.5%
• Hispanic	484	606	678	1,768	11.6%
• Asian	894	391	311	1,597	10.5%
• All Other Races	211	302	297	810	5.3%
Total	4,924	5,316	5,006	15,246	100.0%

Impacts of Medical Devices and Equipment (\$ millions)

Table 3: Fiscal Impacts

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local Governments	\$67.7	\$45.7	\$41.3	\$154.7
Corporate Profits and Dividends Taxes	\$4.7	\$2.6	\$2.9	\$10.1
Business and Personal Property Taxes	\$21.5	\$14.8	\$15.0	\$51.3
Personal Income Taxes	\$20.0	\$13.7	\$9.4	\$43.0
Social Insurance Taxes	\$2.1	\$1.2	\$0.8	\$4.1
Other Taxes	\$17.3	\$11.9	\$11.9	\$41.1
Fines, Fees and Non-taxes	\$2.3	\$1.5	\$1.3	\$5.1
Federal Government	\$133.7	\$85.9	\$61.0	\$280.5
Corporate Profits and Dividends Taxes	\$11.3	\$6.4	\$7.0	\$24.7
Personal Income Taxes	\$47.3	\$32.8	\$22.5	\$102.6
Business Other Taxes and Fees	\$1.7	\$1.1	\$1.2	\$3.9
Social Insurance Taxes	\$73.4	\$45.6	\$30.3	\$149.2
Total All Taxes and Fees	\$201.4	\$131.5	\$102.3	\$435.2

Table 4: Multipliers

Impact Measure	Multiplier
Output	1.8
Gross State Product	2.1
• Income	2.1
• Other Income	2.2
• Indirect Business Taxes	2.4
Jobs	3.1

Impacts of Research, Testing, and Medical Labs (\$ millions*)

Table 1: Summary Table

Impact Measure	Direct	Indirect	Induced	Total
Output*	\$2,061.2	\$896.3	\$960.2	\$3,917.7
Gross State Product*	\$1,252.2	\$488.1	\$575.0	\$2,315.3
• Income*	\$862.4	\$330.6	\$322.4	\$1,515.5
• Other Income*	\$359.1	\$139.3	\$215.8	\$714.2
• Indirect Business Taxes*	\$30.6	\$18.2	\$36.8	\$85.6
Jobs	7,305	5,824	6,478	19,607

Table A2 | Diversity Impacts

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Gender					
Men	3,264	3,128	3,030	9,421	48.1%
Women	4,041	2,696	3,448	10,186	51.9%
Total	7,305	5,824	6,478	19,607	100.0%
Race					
White	5,467	4,200	4,557	14,224	72.5%
All Racially and Ethnically Diverse Groups	1,838	1,624	1,921	5,383	27.5%
• Black	219	236	256	711	3.6%
• Hispanic	623	677	877	2,177	11.1%
• Asian	610	383	403	1,396	7.1%
• All Other Races	386	329	384	1,098	5.6%
Total	7,305	5,824	6,478	19,607	100.0%

Impacts of Research, Testing, and Medical Labs (\$ millions)

Table 3: Fiscal Impacts

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local Governments	\$72.7	\$34.5	\$53.4	\$160.7
Corporate Profits and Dividends Taxes	\$6.2	\$2.4	\$3.7	\$12.3
Business and Personal Property Taxes	\$16.1	\$9.6	\$19.4	\$45.1
Personal Income Taxes	\$31.1	\$12.5	\$12.1	\$55.7
Social Insurance Taxes	\$3.2	\$1.0	\$1.0	\$5.3
Other Taxes	\$13.4	\$7.8	\$15.4	\$36.6
Fines, Fees and Non-taxes	\$2.7	\$1.2	\$1.7	\$5.6
Federal Government	\$205.0	\$75.9	\$78.9	\$359.8
Corporate Profits and Dividends Taxes	\$15.1	\$5.8	\$9.1	\$30.0
Personal Income Taxes	\$73.6	\$30.3	\$29.1	\$133.1
Business Other Taxes and Fees	\$1.2	\$0.7	\$1.5	\$3.5
Social Insurance Taxes	\$115.0	\$39.0	\$39.2	\$193.2
Total All Taxes and Fees	\$277.7	\$110.4	\$132.3	\$520.4

Table 4: Multipliers

Impact Measure	Multiplier
Output	1.9
Gross State Product	1.8
• Income	1.8
• Other Income	2.0
• Indirect Business Taxes	2.8
Jobs	2.7

Impacts of Bioscience-related Distribution (\$ millions*)

Table 1: Summary Table

Impact Measure	Direct	Indirect	Induced	Total
Output*	\$4,044.1	\$2,329.6	\$1,498.2	\$7,871.9
Gross State Product*	\$1,896.9	\$1,317.7	\$897.2	\$4,111.9
• Income*	\$955.7	\$902.2	\$503.1	\$2,361.0
• Other Income*	\$800.4	\$361.8	\$336.7	\$1,499.0
• Indirect Business Taxes*	\$140.7	\$53.7	\$57.4	\$251.8
Jobs	6,630	17,101	10,109	33,840

Table A2 | Diversity Impacts

Demographic Group	Direct	Indirect	Induced	Total	% of Total
Gender					
Men	4,400	10,295	4,728	19,424	57.4%
Women	2,230	6,805	5,381	14,416	42.6%
Total	6,630	17,101	10,109	33,840	100.0%
Race					
White	4,692	12,334	7,112	24,138	71.3%
All Racially and Ethnically Diverse Groups	1,938	4,766	2,997	9,701	28.7%
• Black	237	564	400	1,200	3.5%
• Hispanic	726	2,192	1,369	4,287	12.7%
• Asian	574	1,029	629	2,232	6.6%
• All Other Races	401	982	600	1,982	5.9%
Total	6,630	17,101	10,109	33,840	100.0%

Impacts of Bioscience-related Distribution (\$ millions)

Table 3: Fiscal Impacts

Taxing Jurisdiction / General Tax or Fee Category	Direct	Indirect	Induced	Total
State and Local Governments	\$190.6	\$97.5	\$83.4	\$371.4
Corporate Profits and Dividends Taxes	\$13.8	\$6.2	\$5.8	\$25.8
Business and Personal Property Taxes	\$74.1	\$28.3	\$30.3	\$132.7
Personal Income Taxes	\$34.4	\$33.8	\$18.9	\$87.0
Social Insurance Taxes	\$3.6	\$3.0	\$1.6	\$8.2
Other Taxes	\$58.6	\$22.9	\$24.1	\$105.6
Fines, Fees and Non-taxes	\$6.1	\$3.3	\$2.7	\$12.2
Federal Government	\$247.8	\$208.9	\$123.1	\$579.8
Corporate Profits and Dividends Taxes	\$33.5	\$15.2	\$14.1	\$62.9
Personal Income Taxes	\$81.4	\$81.2	\$45.5	\$208.1
Business Other Taxes and Fees	\$5.7	\$2.2	\$2.3	\$10.2
Social Insurance Taxes	\$127.2	\$110.4	\$61.1	\$298.6
Total All Taxes and Fees	\$438.4	\$306.4	\$206.5	\$951.2

Table 4: Multipliers

Impact Measure	Multiplier
Output	1.9
Gross State Product	2.2
• Income	2.5
• Other Income	1.9
• Indirect Business Taxes	1.8
Jobs	5.1

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Oregon Bio, a member trade association, was formally established as a 501(c)(6) non-profit in 1989 by a consortium of universities, public officials, educators and bioscience executives to cultivate a regionally synergistic climate in which to build a bioscience community. Today, Oregon Bio supports the regional bioscience community through advocacy, workforce development, educational programs, enterprise support, networking and the promotion of research collaborations. As the collective voice for our bioscience community, Oregon Bio is responsible for communicating the industry's economic impact, issues and challenges to the public sector, educators and the general public. Oregon Bio continually seeks ways to promote and support sustainability and growth in the life science, biotechnology, digital health and device manufacturing sectors. Oregon Bio offers a host of member services to lower operational costs and promote partnering, so members can achieve their scientific, economic and social potential.

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