

# 2022

## EVIDENCE & OPPORTUNITY

Impact of Life Sciences in North Carolina

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## Executive Summary

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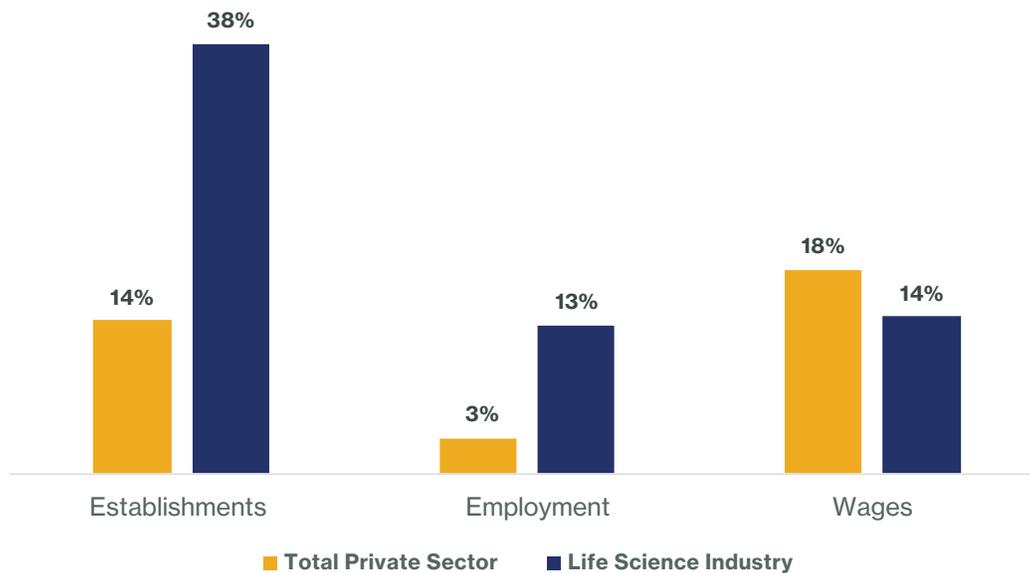
North Carolina has nurtured its life sciences industry over several decades, firmly establishing itself as a leading U.S. life sciences cluster. Characterized by steady growth, the industry today is large, with a significant statewide employment and establishment footprint, highly specialized in its employment concentration relative to the national average, and especially diverse, with several specialized subsectors of the industry serving varied global markets. Amidst the pandemic and economic challenges of the prior two-and-a-half years, North Carolina's life sciences growth has accelerated, outpacing national industry growth, and placing itself among the fastest growing top-tier life sciences states. At the same time, the industry has played a crucial role as a high-growth, high-impact economic engine for North Carolina as private sector growth stalled during the pandemic-related economic shutdowns of 2020.

This seventh biennial edition of the *Evidence and Opportunity* series presents an updated assessment and evaluation of the economic position, performance, and impacts of the life sciences industry in North Carolina and the progress and impacts of the North Carolina Biotechnology Center (NCBiotech) in achieving its vision of "North Carolina: a global life sciences leader." NCBiotech represents a nearly four-decade commitment to growing the state's life sciences industry and its supportive innovation ecosystem through intentional, targeted development programs, initiatives, and strategic investments. The industry's standing and position today has been hard-earned and can be traced back, in part, to the early foresight and consistent dedication of NCBiotech, with annual funding allocated by the State of North Carolina.

## North Carolina's Diverse Life Sciences Industry Accelerates its Growth, Outpacing the Nation, and Most Top-Tier States

### Key findings and highlights from the industry performance analysis include:

- In 2021, life science industry firms employed more than 92,000 across 5,863 business establishments throughout North Carolina.
- Since 2018 – the focal period for the trend analyses presented in this report – life sciences employment in North Carolina has grown by 13%, while the state's overall private sector grew just 3% (see Figure ES-1).
- North Carolina's life sciences companies have not only substantially increased their payrolls but have also expanded their operational footprint with a very large increase in business establishments since 2018 (38%), well outpacing national growth.
- During the last two years, the primary pandemic period, the life sciences averaged 5% annual growth while the private sector was flat overall (averaging 0.6% growth annually) as it clawed back the steep job losses from 2020 during 2021.
- Life sciences employment growth has not only far outpaced that for North Carolina's private sector, but the industry's growth rate has accelerated and outperformed national growth – growing by 13% versus 11% growth for the U.S. overall.
- Overall, the life sciences represent a highly “specialized” industry for North Carolina that is 39% more concentrated in the state compared with the national average.
- North Carolina's life science industry base is notably diverse. The state has much greater levels of employment concentration than the nation and is in fact specialized in drugs and pharmaceuticals; research, testing, and medical labs; and in agricultural feedstock and industrial biosciences. In addition, its employment concentration in bioscience-related distribution also exceeds the national average.
- Three of the industry's five major subsectors are driving the state's strong growth in the life sciences with double-digit job gains since 2018 – research, testing, and medical labs; bioscience-related distribution; and drugs and pharmaceuticals. Running counter to this trend are recent employment declines in medical device manufacturing.
- The life sciences continually generate high-quality jobs with family-sustaining wages, an attribute that further solidifies the industry's importance as an economic engine for North Carolina. Average annual wages for the life sciences reached nearly \$112,000 in 2021, a significant wage premium nearly double that for North Carolina's overall private sector workforce at \$60,000.

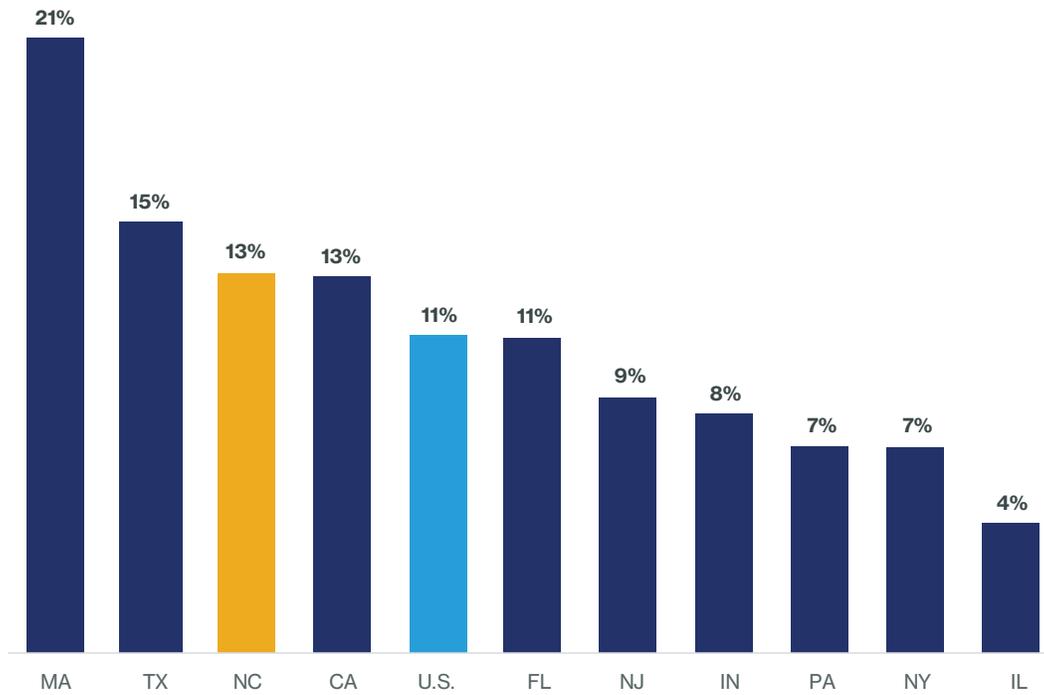
**FIGURE ES-1:** NC LIFE SCIENCE INDUSTRY GROWTH TRENDS RELATIVE TO THE PRIVATE SECTOR, 2018-21

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Datarun 2022.3).

North Carolina is performing well relative to the nation and continuing to deliver on its economic promise of steady growth and high-quality jobs for North Carolinians. But the competition for life sciences development is global...and it is fierce. The state's long-term job growth and its 92,000 jobs have positioned North Carolina's life sciences industry as eighth largest among all U.S. states, a shift up one place from ninth in recent years. Key findings from comparisons against other top-tier life sciences states include:

- North Carolina is one of just five among the nation's top ten with a specialized employment concentration, a reminder of the life sciences' outsized economic importance to North Carolina.
- North Carolina's 13% growth rate since 2018 places it among the top performing states (Figure ES-2). The state has matched the recent growth rate for California and stands just behind that for Texas. Massachusetts has continued its impressive industry growth by increasing life sciences employment by 21%. Strong, double-digit growth among these leading states is especially significant because they are adding to an already large base of jobs, and they continue to exhibit strong growth across multiple multi-year assessments.

**FIGURE ES-2:** LIFE SCIENCE INDUSTRY EMPLOYMENT TRENDS, NC AND COMPARISON STATES, 2018-21



Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Datarun 2022.3).

## The Far-Reaching Economic Impacts of the Life Sciences Industry in North Carolina Total \$88 Billion, Nearly Doubling Since 2008

Data utilized to measure the life science industry's impacts in North Carolina are from NCBiotech's unique detailed database of companies developed and maintained by the Center's research team. As of 2022, the NCBiotech database contains 807 companies employing 73,775 workers and serves as the input to the economic impact modeling effort.

In 2022, the economic contributions of the life sciences sector to the North Carolina economy are as follows<sup>1</sup> (see Figure ES-3):

- Including multiplier effects, these 807 companies generate \$88.3 billion in statewide economic activity and support 225,206 jobs earning \$17.6 billion in labor income, with the following multiplier impacts:
  - The life sciences industry's purchases of goods and services to support their operations generate \$18.3 billion in economic activity and support 79,477 jobs earning \$5.7 billion in labor income in the form of indirect impacts.
  - The wages and salaries directly paid or supported by the life sciences industry generate \$11.4 billion in economic activity and support 71,955 jobs earning \$3.5 billion in labor income in the form of induced impacts.
- The economic activity supported by the life sciences sector generates \$2.4 billion in combined state and local government revenues, consisting of \$1.5 billion in state and \$0.9 billion in local government revenues. The 807 life sciences companies directly generate \$1.1 billion in combined state and local government revenues.

**Including Multiplier Effects, the life science industry's economic impact accounts for 4% of total North Carolina employment and 8% of overall state output.**

**The number of in-state supplier companies tracked by NCBiotech totals more than 2,500 and has increased by 206, or 9%, since 2018, indicating that the growth of the life sciences industry is supporting substantial growth in other sectors of the North Carolina economy.**

<sup>1</sup> The preceding industry analysis is based on federal data, which allow TEconomy to make key comparisons across all states. The data utilized here to measure the industry's impacts in North Carolina are from NCBiotech's detailed database of companies regularly maintained by the Center's research team. NCBiotech's data are available with no time lag, unlike the federal data, and therefore represent the situation for life sciences in 2022.

The life science industry has a significant impact on the North Carolina economy. In total, the industry directly accounts for more than 1% of all jobs in North Carolina and, when multiplier effects are included, accounts for 4% of state employment. The industry’s impact is even larger in terms of the level of business activity in the state, with the life sciences directly accounting for more than 5% of state output and for just over 8% when multiplier effects are included.

**FIGURE ES-3: THE ECONOMIC CONTRIBUTION OF THE LIFE SCIENCE INDUSTRY TO THE NC ECONOMY, 2022**



Source: TEconomy Partners’ analysis of NCBiotech data using IMPLAN.

*TEconomy Partners and its predecessor organization, Battelle’s Technology Partnership Practice, have been engaged with NCBiotech since 2008. Since that first report, the estimated revenues of the North Carolina life sciences sector have more than doubled and the economic contribution of the sector has effectively doubled. Sector employment has increased by 39% and the total North Carolina jobs supported by the sector increased by 25%. The life sciences sector remains an important and growing driver of the North Carolina economy.*

## NCBiotech Delivers Impactful Programs and Initiatives Targeting Ecosystem Needs and Gaps, Catalyzing Life Sciences Development

For nearly four decades, NCBiotech has effectively designed and implemented programs and initiatives that span the broad set of unique development requirements for the life sciences and provide a competitive advantage for North Carolina. The Center has established itself as a trusted partner, working to ensure life sciences companies of all sizes and stages of development are able to access and effectively leverage the research, technology, talent, and capital resources across North Carolina and beyond.

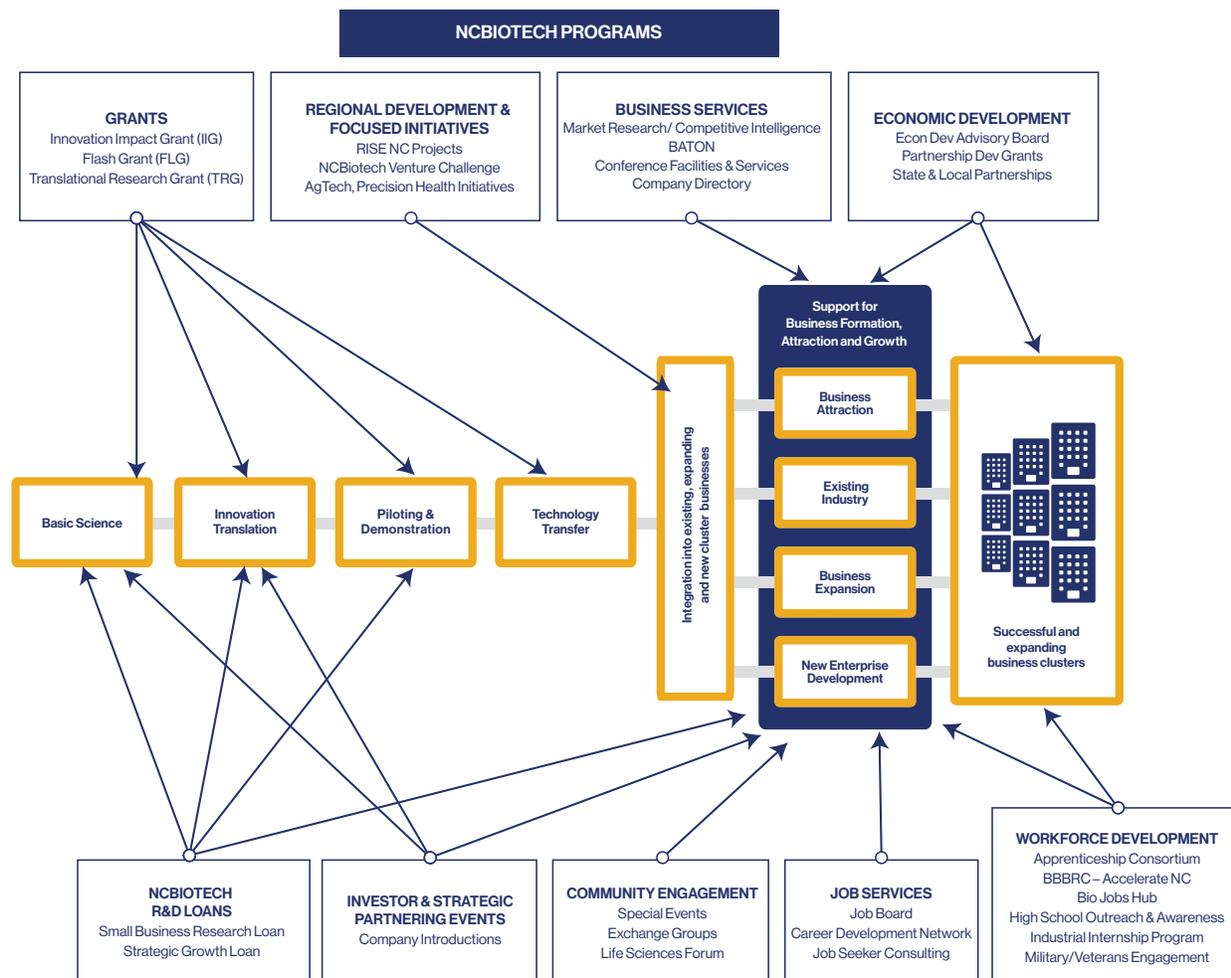
Since its founding 39 years ago, NCBiotech has distributed 3,206 grants totaling \$160 million.

Today, NCBiotech plays this role and delivers its extensive programming through five primary domain areas:

- Funds for commercializing university research and boosting early-stage company development;
- Talent development initiatives and career networking;
- Investor and industry connections to fill gaps;
- Unique spaces to accelerate company growth; and
- Access to high-value information resources.

These domain areas and their corresponding programs are highly intentional, designed by NCBiotech to target critical elements of a high-functioning technology-based or innovation-driven development ecosystem. To illustrate, the specific programs of the Center can be assigned along the chain of activities and phases of technology commercialization and cluster development that are necessary in this context – aligned to NCBiotech with program examples in Figure ES-4. The comprehensive and strategic nature of the programming to address every key element of the technology-based economic development or “TBED” chain is impressive and especially notable.

**FIGURE ES-4: TECHNOLOGY-BASED ECONOMIC DEVELOPMENT (TBED) CHAIN AND NCBIOTECH PROGRAMS AND INITIATIVES\***



\*Note: for program descriptions and links to further information on each, see the Appendix to this report.

Source: TEconomy Partners, LLC and NCBiotech.

## The Economic Impact of NCBiotech on the Development of the North Carolina Life Science Industry

In addition to NCBiotech's broad strategic impact on the industry through its role as connector and facilitator, the Center has directly supported the growth and development of the life science industry in North Carolina in two principal areas:

1. NCBiotech directly supports the growth and development of the industry through its Emerging Company Development program, through which the Center invests in promising, emerging life science companies across the state; and
2. NCBiotech also supports industry growth and development via retention, expansion, and recruitment activities, largely by providing its specialized life sciences capabilities, knowledge, and relationships to the North Carolina Department of Commerce, regional economic development organizations, and city and county economic development departments.

In the first domain, targeted, early-stage loans to life science firms help create and support business activity in the companies receiving loans, which has a long-term impact on the state's economy. As a result, NCBiotech's loan programs create a "portfolio" of businesses assisted by the Center, and the operations of these businesses represent the economic development impacts associated with NCBiotech. Since 1989, NCBiotech has made business loans to 246 companies. Of the 246 companies that have received loans, 126 are currently active in some form and these companies employ 3,797 workers. The portfolio firms have the following impacts across North Carolina in 2022:

- Generate \$5.1 billion in economic activity in the state;
- Create or support 12,484 jobs earning \$959 million in labor income; and
- Generate an estimated \$124.1 million in state and local tax revenues.

**North Carolina receives a strong return on its investment in NCBiotech. The estimated state government revenue portion of the combined fiscal revenues generated by the active loan recipient companies (through direct, indirect, and induced impacts) totals \$77.0 million, an amount nearly five times greater than the state's Fiscal Year 2022 appropriation to NCBiotech of \$17.1 million.**

In addition to its role in directly supporting commercialization and business growth through its Emerging Company Development program, NCBiotech supports the broader business recruitment and expansion efforts of the Economic Development Partnership of North Carolina and other state, regional, and local economic development organizations. With offices across the state, NCBiotech's team provides expert knowledge of the industry to support state and regional life science business attraction, expansion, and retention efforts.

**NCBiotech has tracked an impressive 63 expansion and relocation growth announcement during the last two fiscal years with the potential to create a total of 9,115 new jobs in North Carolina.**

Assessing the expected economic impacts of 63 expansion and relocation announcements made by life sciences companies during Fiscal Years 2021 and 2022 finds they have the potential to:<sup>2</sup>

- Create a total of 9,115 jobs once they reach their projected employment levels;
- Generate \$10.8 billion in total economic activity; and
- Support 26,544 jobs earning \$2.1 billion in labor income, further generating \$284 million in combined state and local government revenues.

This seventh biennial assessment finds the industry in a strong position, with growth accelerating in recent years, and keeping pace nationally with leading peer states. Strong hiring and high-quality jobs are generating extensive impacts, including an expanding supply chain impact across North Carolina. But these gains are hard-earned, and economic headwinds have emerged with respect to inflation, slower economic growth, continued supply chain challenges, and a competition for talent that is especially fierce. The life sciences industry will continue to lead from both an economic and public health perspective, but its supportive ecosystem requires continued investment and connectivity, and NCBiotech must continue to lead in this capacity.

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<sup>2</sup> This analysis does not include projects that were formally cancelled after being announced, as they will not contribute to job creation or economic activity. The 63 announcements include some instances of multiple announcements made by the same company.

I.

## North Carolina's Diverse Life Sciences Industry Accelerates its Growth, Outpacing the Nation, and Most Top-Tier States

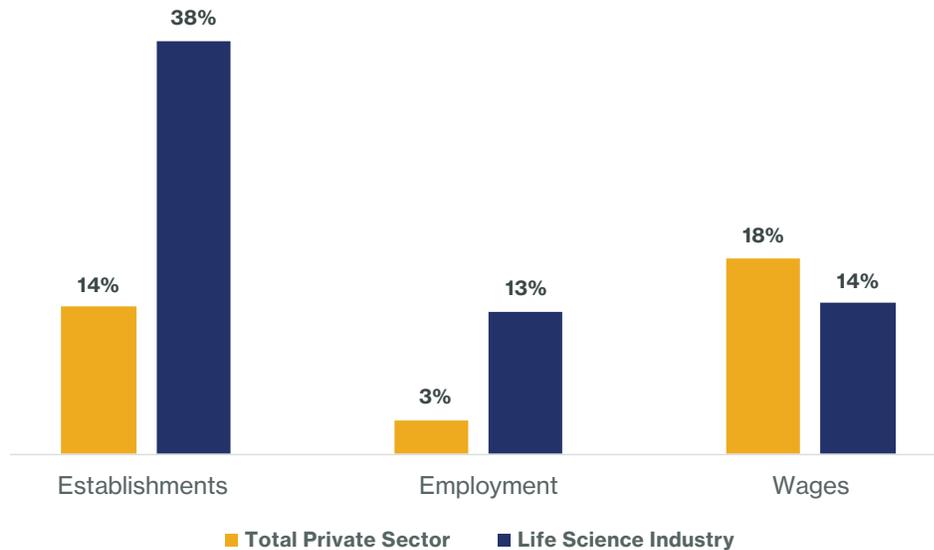
North Carolina's life sciences jobs have grown at a double-digit pace since 2018 and saw strong and even accelerating growth during the pandemic years – far outpacing the state's private sector which was hit hard in 2020 amidst economic shutdowns and challenges during the pandemic.

The life sciences industry has long represented a vital economic growth engine for North Carolina, and this role has been especially apparent during the economic challenges of the last two years amidst the global pandemic. Since 2018 – the focal period for the trend analyses presented in this report – life sciences employment in North Carolina has grown by 13%, while the state's overall private sector grew just 3% (Figure 1). And during the last two years, the primary pandemic period, the life sciences averaged 5% annual growth while the private sector was flat overall (averaging 0.6% growth annually) as it clawed back the steep job losses from 2020 during 2021.

By 2021, life science industry firms employed more than 92,000 across 5,863 business establishments throughout the state. North Carolina's life sciences companies have not only substantially increased their payrolls but have also expanded their operational footprint with a very large increase in establishments since 2018 (38%), well outpacing national growth.

**The life sciences industry has long represented a vital economic growth engine for North Carolina, and this role has been especially apparent during the economic challenges of the last two years amidst the global pandemic.**

**FIGURE 1:** NC LIFE SCIENCE INDUSTRY GROWTH TRENDS RELATIVE TO THE PRIVATE SECTOR, 2018-21



Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Datarun 2022.3).

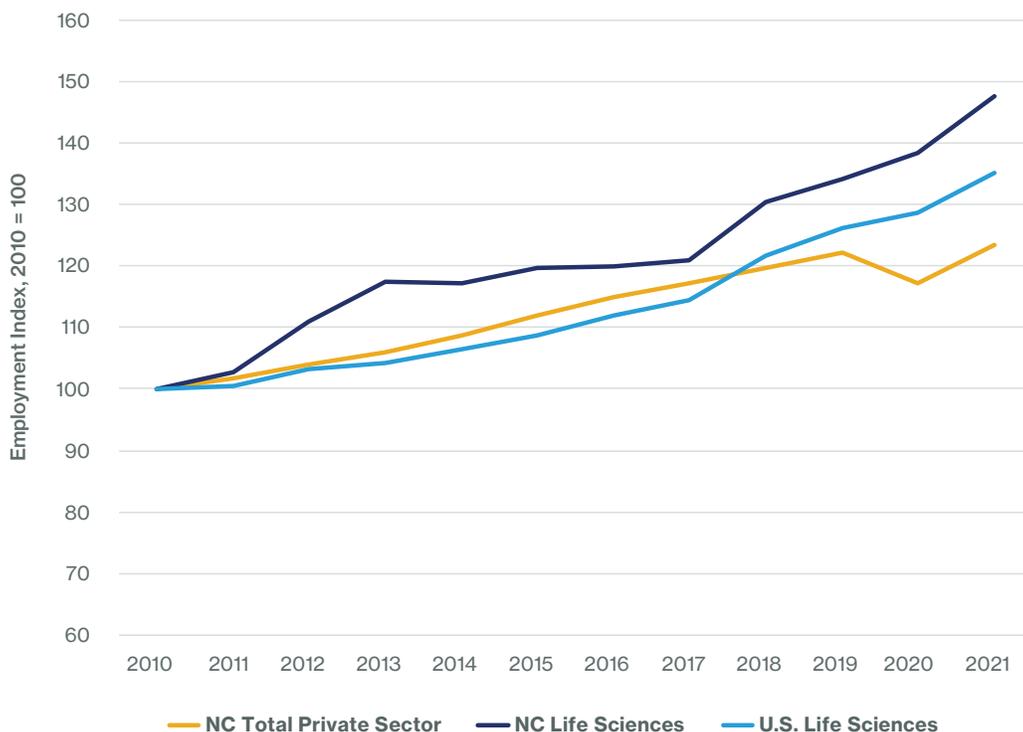
**Life sciences employment growth has not only far outpaced that for North Carolina's private sector, but the industry's growth rate has accelerated and outperformed national growth** (Figure 2). From 2018 through 2021, the average annual growth rate for life sciences industry employment was 4.2%, compared with 2.9% for the industry during the prior 3-year period. This acceleration has helped North Carolina outpace even the strong industry growth rates seen nationally since 2018 – growing by 13% versus 11% growth for the U.S. life sciences sector.

**TABLE 1:** SUMMARY EMPLOYMENT METRICS, NORTH CAROLINA AND U.S., 2021

Life Sciences & Major Subsectors	NC Establishments		NC Employment		U.S. Employment	NC Location Quotient
	Count, 2021	Change, 2018-21	Count, 2021	Change, 2018-21	"Change, 2018-21"	
<b>Total Life Sciences</b>	<b>5,863</b>	<b>38.3%</b>	<b>92,223</b>	<b>13.2%</b>	<b>11.0%</b>	<b>1.39</b>
Agricultural Feedstock & Industrial Biosciences	49	14.1%	2,482	0.7%	1.9%	1.15
Bioscience-related Distribution	2,528	27.5%	20,473	15.2%	6.6%	1.09
Drugs & Pharmaceuticals	130	7.2%	23,967	10.4%	11.9%	2.24
Medical Devices & Equipment	186	-3.4%	8,258	-3.4%	5.5%	0.67
Research, Testing, & Medical Laboratories	2,971	56.4%	37,042	19.6%	19.3%	1.66

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

**FIGURE 2:** LIFE SCIENCE INDUSTRY EMPLOYMENT TRENDS, NORTH CAROLINA AND THE UNITED STATES, 2010–2021



Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

**Overall, the life sciences represent a highly “specialized” industry for North Carolina that is 39% more concentrated in the state compared with the national average.** A state is considered to have a specialized industry base when its employment concentration in an industry, in this case the life sciences, significantly exceeds the national average. This is measured using a location quotient (LQ), where a value of 1.0 means the state meets the national average concentration relative to its private sector, whereas a value of 1.2 or more represents a specialized concentration at least 20% or more greater than the U.S. average. This outsized importance represents the outcomes of the state’s long-term focus on life sciences industry development and ecosystem advancement.

## North Carolina's Life Sciences Subsectors: Diverse Strengths Serving Varied Global Markets

In addition to the industry's overall size and growth and its outsized overall importance to North Carolina, what stands out for North Carolina are its diverse strengths in the life sciences. While numerous states have an outsized concentration and even "specialization" in one of the industry's five major subsectors (see Defining the Life Sciences sidebar), North Carolina boasts essentially three and nearly four specialized subsectors, namely:

- Drugs & Pharmaceuticals, which has more than twice the national concentration (LQ is 2.24);
- Research, Testing, & Medical Labs, which is 66% more concentrated in North Carolina (LQ is 1.66); and
- Agricultural Feedstock & Industrial Biosciences, which is 15% more concentrated in North Carolina, essentially meeting the threshold (LQ is 1.15).

Beyond these three industry subsectors is a highly concentrated bioscience-related distribution subsector, 9% more concentrated than the national average.

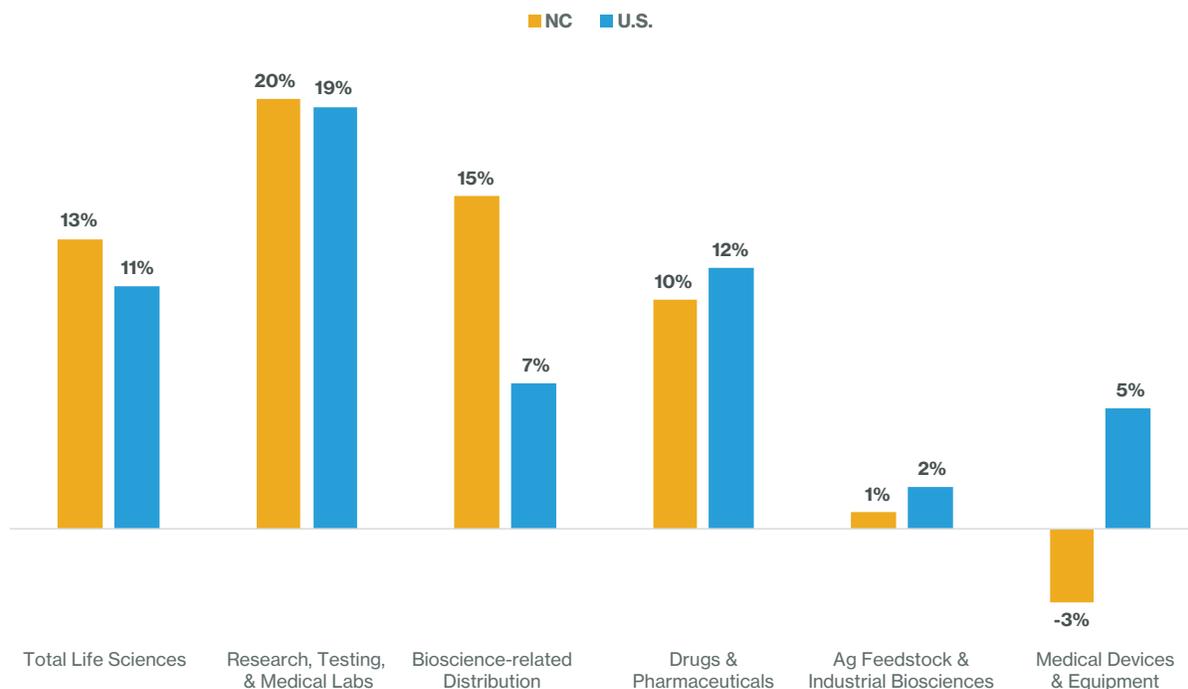
### Defining the Life Science Industry

The latest (2022) biennial TEconomy/Biotechnology Innovation Organization (BIO) State Initiatives report, *The U.S. Bioscience Industry: Fostering Innovation and Driving America's Economy Forward*, continues the nearly two-decade development and reporting out of an evolving set of major aggregated groupings that organize the life science industry into five major subsectors shown here. The definition allows for comparable analysis of industry performance across states and metro regions. For a detailed list of the North American Industry Classification System (NAICS) industry codes that define each subsector, see the Appendix to this report.



**Three of the five major subsectors are driving the state's strong growth in the life sciences with double-digit job gains since 2018 – research, testing, and medical labs; bioscience-related distribution; and drugs and pharmaceuticals** (Figure 3). While the research and testing and the pharmaceutical sectors have kept pace with very strong national growth, the distribution subsector has significantly outpaced the U.S. By contrast and acting to temper the broader job gains, employment declines in medical device production occurred despite growth at the national level.

**FIGURE 3:** LIFE SCIENCE INDUSTRY EMPLOYMENT TRENDS, OVERALL AND BY MAJOR SUBSECTOR, NC AND THE U.S., 2018-21

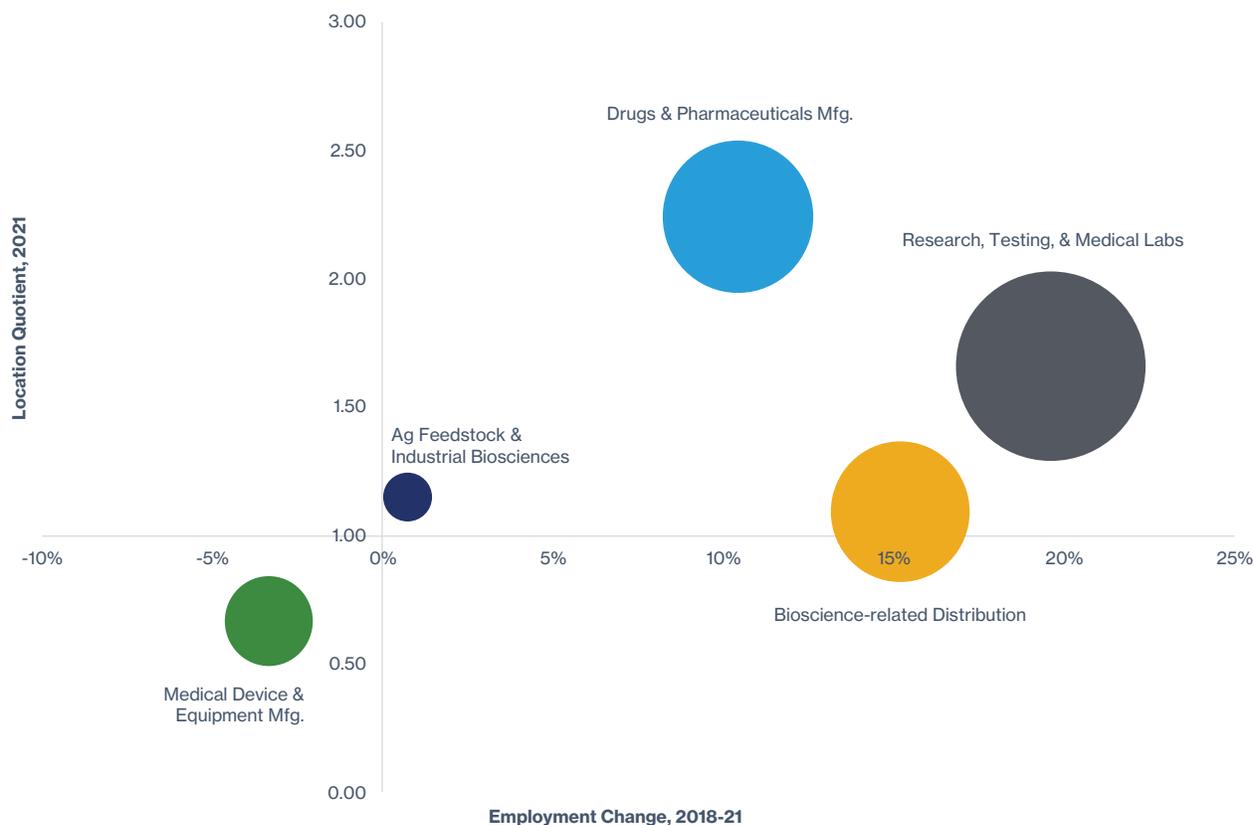


Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

North Carolina’s subsector employment size, concentration, and recent trends are summarized in the bubble chart in Figure 4, positioning each major subsector based on its current status and recent performance.

The specialized concentration of three subsectors and the above-average concentration of a fourth results in four of five subsector bubbles positioned above the horizontal axis where the LQ equals 1.0. Likewise, those four are positioned to the right of the vertical axis, indicating the net job growth they’ve experienced since 2018. These four subsectors that are both highly concentrated and growing can be characterized as statewide “stars” for North Carolina. Medical device manufacturing, with its relative under concentration and recent modest job declines is in a more divergent position within the state.

**FIGURE 4: NC LIFE SCIENCE INDUSTRY SUBSECTORS: EMPLOYMENT SIZE, CONCENTRATION, AND RECENT GROWTH TREND**



Note: the size of each bubble represents its total employment level in 2021.

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

**North Carolina is among the top tier of leading states nationally in most industry subsectors based on sheer employment levels.** Figure 5 highlights the state's national ranking in terms of employment, as well as its current status based on the assessment of its relative concentration as measured by location quotients, its growth from 2018 through 2021, and that growth relative to U.S. trends – a key indicator of whether the state is gaining in its competitive share nationally. In addition, Figure 5 presents those detailed, underlying component industries in which North Carolina has a specialized concentration with location quotients meeting or exceeding the 1.20 threshold.

**FIGURE 5:** NORTH CAROLINA'S LIFE SCIENCE SUBSECTORS, NATIONAL RANKINGS, CURRENT STATUS AND SPECIALIZED DETAILED COMPONENTS



Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

Underlying the five major life sciences subsectors are twenty-five detailed industries and their recent performance and growth trajectory is driving the aforementioned top-line trends. The bubble chart in Figure 6 highlights the position and recent performance among those detailed sectors with a sizable statewide employment base of 1,000 jobs or more. Each is color-coded by industry subsector to align with the previous bubble chart. Several insights emerge from examining these detailed sectors:

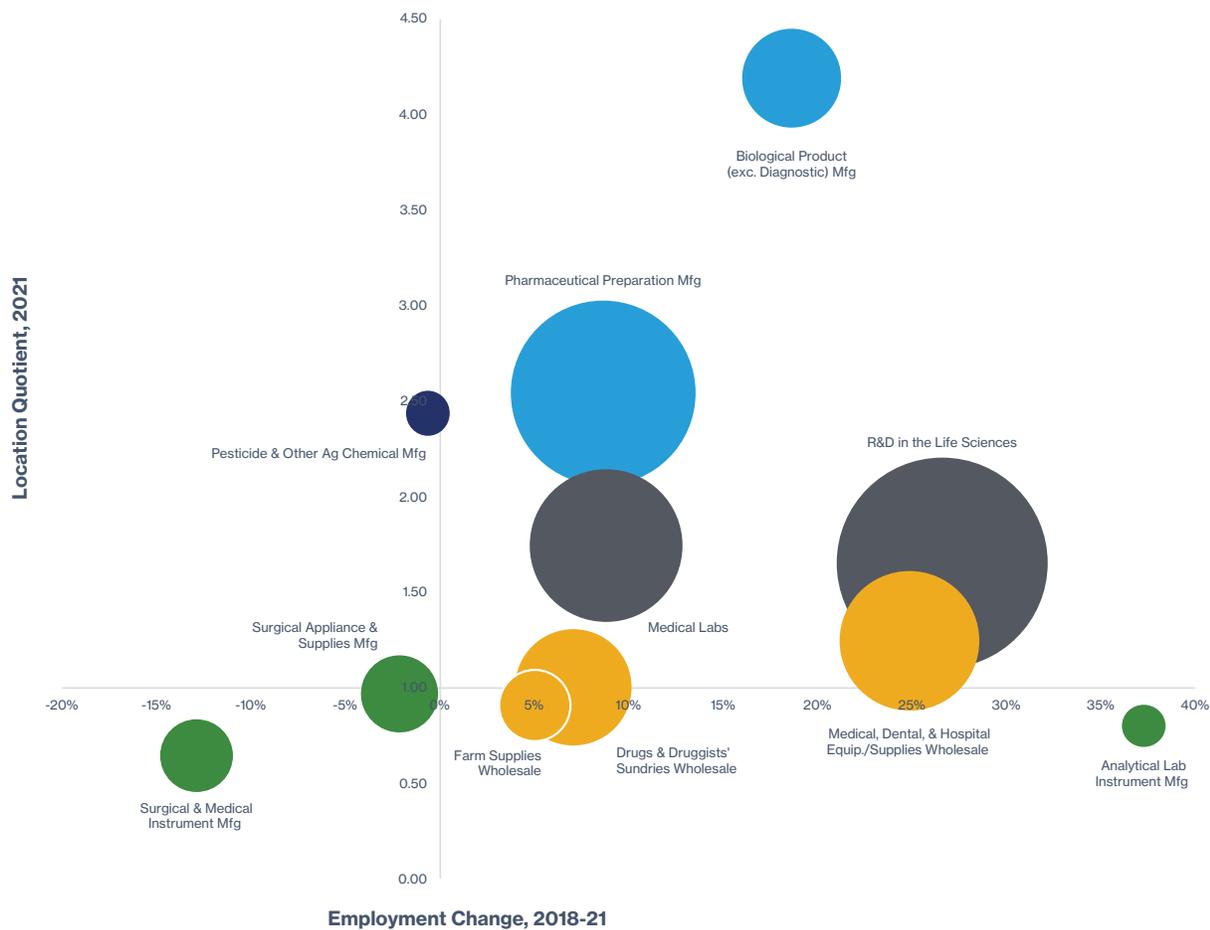
- Drugs and pharmaceutical manufacturing has significant, highly specialized strengths in both traditional small molecule pharmaceutical preparation manufacturing as well as a rapidly growing

Drugs and pharmaceutical manufacturing in North Carolina has significant, highly specialized strengths in both traditional small molecule pharmaceutical preparation manufacturing as well as a rapidly growing biologics production sector reflecting the state's long-term focus on and attention to the emergence of "biomanufacturing," where it is a national leader.

biologics production sector reflecting the state's long-term focus on and attention to the emergence of "biomanufacturing," where it is a national leader. North Carolina has more than 4 times the national average concentration of jobs in what is classified as "Biological Products Manufacturing" within the broader pharmaceutical industry (LQ is 4.19 in 2021).

- North Carolina's strong recent growth in research, testing, and medical labs is driven by both of its major component sectors – commercial R&D in the life sciences and medical labs. The former has grown at a rapid 27% rate over the latest 3-year period and now exceeds 24,000 jobs, representing the single largest detailed life sciences industry in the state. The sector's R&D activities span all facets of life sciences R&D including those business establishments driving innovation and new product development in biotechnology, pharmaceuticals, medical devices, and the agbiosciences (see sidebar).
- The strong overall growth in bioscience-related distribution reflects underlying hiring in each of the three major components – medical, dental, and hospital equipment; drugs wholesaling; and farm supplies distribution, where the analysis isolates relevant development and distribution of seeds and ag chemicals.
- The detailed industry performance reveals that the medical device manufacturing subsector is not monolithic, and while two large components have shed jobs in recent years, North Carolina has seen strong job growth in analytical lab instrument production.
- In the agbiosciences, the position of pesticide and other ag chemicals manufacturing illuminates the state's specialized overall position and strength.

**FIGURE 6:** DETAILED NC LIFE SCIENCES INDUSTRIES: EMPLOYMENT SIZE, CONCENTRATION, AND RECENT GROWTH TREND



Note: detailed industries presented here are limited to those with 1,000+ jobs in North Carolina in 2021. The size of each bubble represents its total employment level in 2021.

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

## The Agbiosciences and AgTech in North Carolina: Broad-based Strengths Spanning R&D, Production, and Distribution

The size and breadth of agbiosciences strengths in North Carolina cannot be summarized or fully accounted for by examining the agricultural feedstock and industrial biosciences subsector alone. The diverse activities of firms in this space span three of the five major subsectors – both the aforementioned manufacturing- and bioprocessing-centric subsector, as well as agricultural-related R&D establishments within the research and testing subsector, and wholesaling activities, which often captures agricultural innovations in seed development as well as distribution on-site.

Examples of specific companies operating in North Carolina that span these multiple subsectors based on their primary activities at various establishments include:

- Ingredion, operating in Winston-Salem, is a leading global ingredients company that manufactures ingredients for foods, beverages and drugs from corn, tapioca, wheat, and potatoes. It is an example of the bioprocessing activities and type of company captured in the agricultural feedstock and industrial biosciences subsector.
- Syngenta Crop Protection works to increase plant yield by developing products for disease, insect, and weed control as well as drought tolerance. Syngenta's Innovation Center in Research Triangle Park represents the company's seeds center of excellence and includes the Advanced Crop Lab. It is an example of the R&D and innovation-led companies captured in the research, testing, and medical labs subsector.
- Phytobiotics, with operations in Cary, produces and distributes botanical and phytogetic supplements and flavors for plant and animal nutrition, an example of ag-related distribution.

Beyond the industry establishments and employment are agbioscience-related highlights that illuminate the strong contributions to innovation and North Carolina's broader life sciences ecosystem. These highlights are excerpted from the national TEconomy/BIO 2022 biosciences report and include:

- \$121 million in agricultural sciences academic R&D expenditures in 2020 performed by state colleges and universities;
- \$171 million in venture capital investments in emerging North Carolina agricultural chemicals and biofuels companies, cumulatively from 2018 through 2021;
- 339 patents awarded to state inventors in technology classifications that span agricultural chemicals and novel plant varieties, cumulatively from 2018 through 2021.

Agbiosciences and AgTech are one of the selected focus areas of strength for NCBiotech and its programming and resources. The Center has identified:

- 195+ AgTech companies operating statewide, including 5 of the 6 leading global AgTech companies;
- Clusters of AgTech companies and market solutions spanning plant, animal, food, support, and related technology;
- 2 Land Grant Universities in the state combined with 18 research stations; and
- A \$92.9 billion ag economy statewide.

NCBiotech is providing robust support for the industry, having awarded 443 AgTech grants and 40 AgTech loans totaling \$21.4M and \$3.2M, respectively.

**The life sciences continually generate high-quality jobs with family-sustaining wages, an attribute that further solidifies the industry's importance as an economic engine for North Carolina.** Average annual wages for the life sciences reached nearly \$112,000 in 2021, a significant wage premium nearly double that for North Carolina's overall private sector workforce at \$60,000 (Table 2). The high wages paid to the life science industry's workforce reflect the strong value-adding nature of the sector, its outsized productivity, and the corresponding skills and breadth of "STEM" roles demanded by its firms.

A recent national assessment of life sciences talent by TEconomy and the Coalition of State Bioscience Institutes (CSBI) highlighted the especially intensive employment within the industry of STEM-related roles, finding that:

*"The life sciences are among the most intensive in their deployment of STEM talent—nearly one-in-three industry workers is employed in a STEM occupation, a concentration five times that of all U.S. industries."<sup>3</sup>*

The TEconomy/CSBI study found that not only is the industry especially STEM-intensive in its jobs requirements but also has a much greater concentration of both high- and middle-skilled roles requiring postsecondary credentials, including certifications and associate's degrees. Specifically, the study found:

*"In 2020, nearly half (47%) of life science industry employment was in high-skilled occupations compared with 27% for all other industries. These include the vast majority of scientist, engineering, IT, and data sciences roles, or "STEM"-related talent and reinforce the critical need for robust national postsecondary education degree programs to meet industry talent needs.*

*At the same time, about one-in-three life science industry jobs fall in the middle skills categories, again well above the share for all industries. As a leading advanced manufacturing industry, life science companies rely heavily on the skilled technician workforce, both in engineering and scientific domains; production workers with varied skills; transportation and material moving occupations; installation, maintenance, and repair; and more. These workers are operating in increasingly digital and automated manufacturing environments, a shift represented by "Industry 4.0" with significant and important implications for community colleges and other training providers."<sup>4</sup>*

As shown in Table 2, average annual wages for each of the major industry subsectors exceed those for their in-state counterparts in the private sector. Compared with the national industry, North Carolina's life science wages are generally lower, with the overall national average reaching nearly \$126,000. This relationship generally holds among the subsectors, with the exception being in the agricultural biosciences where North Carolina's workers earn considerably more than their counterparts nationally.

3 TEconomy Partners LLC and CSBI, "2021 Life Sciences Workforce Trends Report: Taking Stock of Industry Talent Dynamics Following a Disruptive Year," June 2021.

4 Ibid.

**TABLE 2: AVERAGE ANNUAL WAGES IN THE LIFE SCIENCE INDUSTRY AND MAJOR SUBSECTORS, NORTH CAROLINA AND THE UNITED STATES, 2021**

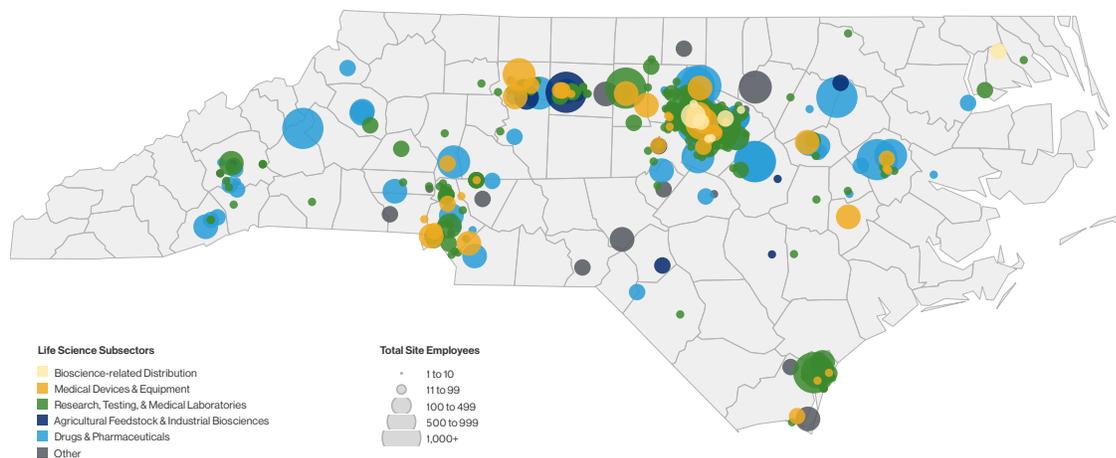
Life Science Industry and Subsectors	North Carolina	United States
Research, Testing, & Medical Laboratories	\$122,390	\$147,396
Bioscience-related Distribution	\$118,681	\$121,606
<b>Total Life Sciences</b>	<b>\$111,993</b>	<b>\$125,750</b>
Agricultural Feedstock & Industrial Biosciences	\$109,301	\$91,989
Drugs & Pharmaceuticals	\$104,160	\$126,153
Medical Devices & Equipment	\$72,324	\$98,481
<b>Total Private Sector</b>	<b>\$60,083</b>	<b>\$67,826</b>

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

## A Statewide Industrial Footprint: The Life Sciences Span Every Region of North Carolina

The diversity of North Carolina's life science industry is not only inherent in the breadth of industry strengths, but further by its geographic reach across every region of the state. NCBiotech, its partner organizations, and stakeholders across the state have worked and invested deliberately to establish a life sciences cluster that reaches every corner of North Carolina. The map in Figure 7 utilizes firm-level data from NCBiotech's company database that pinpoints the locations of North Carolina life science firms by region, by industry subsector (color), and by employment level (size).

**FIGURE 7: NORTH CAROLINA'S LIFE SCIENCE COMPANY LOCATIONS BY INDUSTRY SUBSECTOR AND EMPLOYMENT LEVEL**



Source: NCBiotech company database, 2022.

## Benchmarking North Carolina against Other Top-Tier Life Science States

North Carolina is performing well relative to the nation and continuing to deliver on its economic promise of steady growth and high-quality jobs for North Carolinians. But the competition for life sciences development is global... and it is fierce. Other states, regions, and nations are competing for the industry's unique dual value proposition of an innovation-led industry that saves and improves lives through leading-edge innovations, while at the same time acting as a key growth driver and high-value targeted industry for economic development and growth. While national comparisons provide useful context for North Carolina's performance, the state is firmly positioned within the top tier of life science states, and it is important to assess its competitive position against its peers.

**The state's long-term job growth and its 92,000 jobs have positioned North Carolina's life sciences industry as eighth largest among all states, a shift up one place from ninth in recent years** (Table 3). The state is one of just five among the nation's top 10 with a specialized employment concentration, a reminder of the life sciences' outsized economic importance to North Carolina.

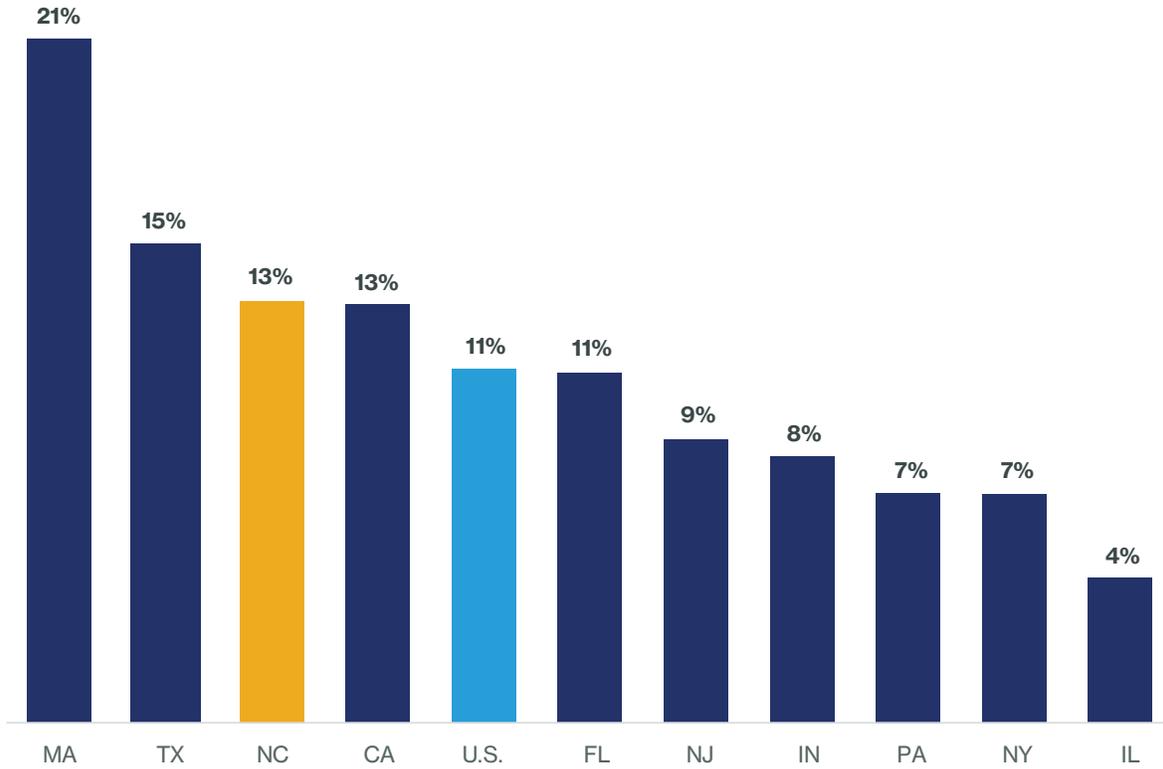
**TABLE 3:** LIFE SCIENCE INDUSTRY EMPLOYMENT METRICS, NC AND OTHER LEADING LIFE SCIENCES STATES, 2021

State	Establishments	Employment	Employment Change, 2018-21	Location Quotient
California	14,268	334,690	13.1%	1.33
Massachusetts	4,612	131,800	21.4%	2.50
Texas	7,462	116,473	15.0%	0.63
New York	5,314	110,259	7.1%	0.85
Florida	8,599	106,688	11.0%	0.79
New Jersey	4,340	104,989	8.9%	1.79
Pennsylvania	3,123	93,105	7.2%	1.08
North Carolina	5,863	92,223	13.2%	1.39
Illinois	4,297	90,941	4.5%	1.06
Indiana	2,713	65,290	8.3%	1.43

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

**North Carolina's 13% growth rate since 2018 places it among the top performing states** (Figure 8). The state has matched the recent growth rate for California and stands just behind that for Texas. Massachusetts has continued its impressive industry growth by increasing life sciences employment by 21%. Strong, double-digit growth among these leading states is especially significant because they are adding to an already large base of jobs, and they continue to exhibit strong growth across multiple multi-year assessments.

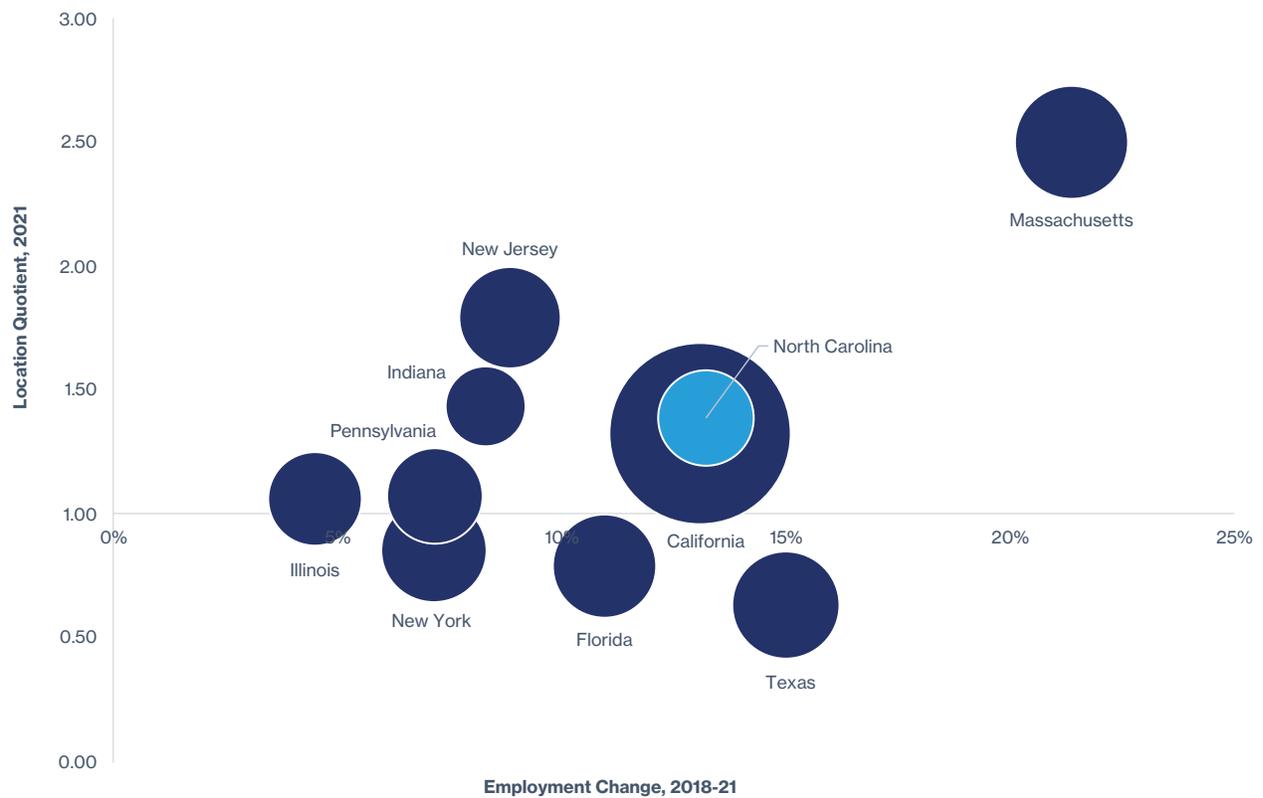
**FIGURE 8:** LIFE SCIENCE INDUSTRY EMPLOYMENT TRENDS, NC AND COMPARISON STATES, 2018-21



Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

Considering each of the three employment-related metrics, North Carolina is positioned well among the leading states in its specialized and fast-growing industry performance (Figure 9). Massachusetts' growth context stands out versus the other leading states. Several leading states are emerging in the life sciences with high growth though not yet specialized concentration in their respective states, including Texas, Florida, and New York.

**FIGURE 9:** LIFE SCIENCE INDUSTRY POSITIONING AMONG TOP-TIER STATES: EMPLOYMENT SIZE, CONCENTRATION, AND RECENT TRENDS



Note: the size of each bubble represents its total employment level in 2021.

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

North Carolina's diverse industry strengths stand out nationally with three specialized subsector concentrations and a fourth that has a concentration well above average. Among the leading states, six can claim this distinction of having 3 or more subsector specializations in 2021 (Table 4).

**TABLE 4:** SPECIALIZED LIFE SCIENCES SUBSECTORS AMONG THE TOP-TIER STATES

State	Agricultural Feedstock & Industrial Biosciences	Bioscience-related Distribution	Drugs & Pharmaceuticals	Medical Devices & Equipment	Research, Testing, & Medical Laboratories	Number of Specialized Subsectors
New Jersey		●	●	●	●	4
California			●	●	●	3
Illinois	●	●	●			3
Indiana	●		●	●		3
Massachusetts		●		●	●	3
North Carolina	●		●		●	3
Pennsylvania			●		●	2
Florida		●				1
New York			●			1
Texas						0

Source: TEconomy Partners' analysis of Bureau of Labor Statistics, QCEW data from Lightcast (Data run 2022.3).

While the competition is fierce, and several of the leading states are leveraging significant, well-funded, and long-term public-private life sciences initiatives, North Carolina continues to invest in its ecosystem. The state's long-standing, steady attention to and investments in its life sciences ecosystem continue to pay dividends, particularly with respect to workforce and talent development in which it represents a world-class best practice. As will be outlined in a subsequent section, the state continues to attract new companies, as well as benefit from major expansions of existing companies which are investing significantly for new facilities and growth. It is clear that leading companies from across the globe have found a valuable partner in North Carolina with respect to siting both R&D and manufacturing operations.

## II.

## The Far-Reaching Economic Impacts of the Life Sciences Industry in North Carolina Total \$88 Billion, Nearly Doubling Since 2008

North Carolina's life science industry not only directly creates significant employment opportunities and large numbers of high-paying jobs, but also generates new employment opportunities through its intra-state purchases of goods and services from North Carolina's diverse and extensive supply chain network as well as the personal spending of its high-income workforce.

This 14th anniversary edition of *Evidence and Opportunity* provides both an updated assessment of the broad-based economic impacts of the life sciences industry today, as well as allows for longer-term perspectives gained by conducting and tracking regular, biennial impact assessments. This section assesses the impacts of the life sciences industry as well as the growth in the estimated statewide impacts of the sector since the inception of this report and goes on to examine impacts broken out across the major life sciences subsectors.

**It is important to understand key differences between the industry employment data utilized in this section of the report and those presented in the prior section.** Section I is based on federal data, which allow for key comparisons across all states to inform North Carolina's position in a competitive industry landscape, as well as for TEconomy's biennial national industry reports with BIO. In contrast, data utilized in this section to measure the industry's impacts in North Carolina are from NCBiotech's unique detailed database of companies developed and maintained by the Center's research team.

NCBiotech's data are available with no time lag, unlike the federal data, and therefore represent the situation for life sciences in 2022. In addition, though they mostly overlap, the two datasets define the life science industry somewhat differently – the NCBiotech database does not include a focus on distribution establishments and jobs, whereas the TEconomy/BIO concept includes this as its own major subsector. Therefore, the employment data presented in this section represents lower totals than in the prior section – specifically, the NCBiotech database counts more than 18,000 fewer jobs.

## Impacts of North Carolina's Life Sciences Industry Surpass \$88 Billion, More than 225,000 Jobs Statewide

Including Multiplier Effects, the life science industry's economic impact accounts for 4% of total North Carolina employment and 8% of overall state output.

As of 2022, the NCBiotech database contains 807 companies employing 73,775 workers and serves as the input to the economic impact modeling effort. These companies and their associated jobs were classified into their appropriate detailed industry segments, were then modelled to estimate the broader supply chain and employee spending impacts associated with the life science industry using the IMPLAN input-output model for North Carolina. Input-output modeling allows for the estimation of both the linkages between and impacts of the

industry on the larger North Carolina economy as well as the fiscal returns to the State. These linkages, referred to as "multiplier effects," measure the industry's contribution to the overall state economy.<sup>5</sup>

**In 2022 the economic contributions of the life sciences sector to the North Carolina economy are as follows** (see Table 5):

- The 807 North Carolina life sciences companies directly employ 73,775 workers and have estimated revenues of \$58.6 billion.
- **Including multiplier effects, these 807 companies generate \$88.3 billion in statewide economic activity and support 225,206 jobs earning \$17.6 billion in labor income**, with the following multiplier impacts:
  - The life sciences industry's purchases of goods and services to support their operations generate \$18.3 billion in economic activity and support 79,477 jobs earning \$5.7 billion in labor income in the form of indirect impacts.
  - The wages and salaries directly paid or supported by the life sciences sector generate \$11.4 billion in economic activity and support 71,955 jobs earning \$3.5 billion in labor income in the form of induced impacts.
- **The economic activity supported by the life sciences sector generates \$2.4 billion in combined state and local government revenues**, consisting of \$1.5 billion in State and \$0.9 billion in local government revenues. The 807 life sciences companies directly generate \$1.1 billion in combined state and local government revenues.

The life science industry has a significant impact on the North Carolina economy. In total, the industry directly accounts for more than 1% of all jobs in North Carolina and, when multiplier effects are included, accounts for 4% of state employment. The industry's impact is even larger in terms of the level of business activity in the state, with the life sciences directly accounting for more than 5% of state output and for just over 8% when multiplier effects are included.

<sup>5</sup> For more information on the economic impact methodology and approach, see the Appendix to this report.

**Since the initial impact assessment in the first edition of *Evidence and Opportunity* in 2008:**

- The direct employment of the life science industry has increased by 39% and the estimated revenues of the industry have grown even more rapidly, more than doubling since 2008 (Figure 10).
- The total impact on state output estimated for the life science industry has increased by 93% to more than \$88 billion in 2022.
- The life science industry generated \$2.4 billion in state and local government revenues in 2022, up from \$1.4 billion in 2008, even as the corporate tax rate has decreased.

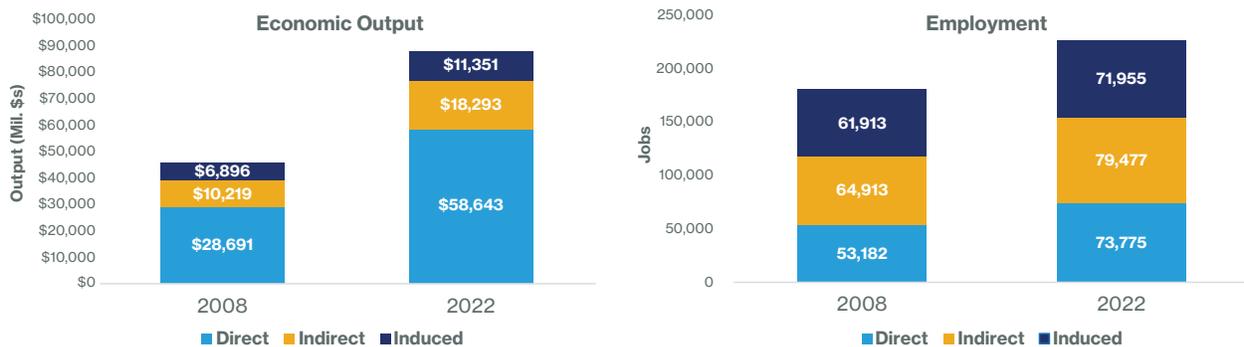
*TEconomy Partners and its predecessor organization, Battelle's Technology Partnership Practice, have been engaged with NCBiotech since 2008. Since that first report, the estimated revenues of the North Carolina life sciences sector have more than doubled and the economic contribution of the sector has effectively doubled. Sector employment has increased by 39% and the total North Carolina jobs supported by the sector increased by 25%. The life sciences sector remains an important and growing driver of the North Carolina economy.*

**TABLE 5: THE ECONOMIC CONTRIBUTION OF THE LIFE SCIENCE INDUSTRY TO THE NC ECONOMY, 2008 TO 2022**

Economic Impact	2008	2022	Change 2008-22	% Change 2008-22
Direct Impact (Output Mil. \$s)	\$28,691	\$58,643	\$29,952	104%
Total Impact (Output Mil. \$s)	\$45,806	\$88,286	\$42,480	93%
State Impact Multiplier	1.60	1.51		
Direct Impact (Employment)	53,182	73,775	20,593	39%
Indirect Impact (Employment)	64,913	79,477	14,564	22%
Induced Impact (Employment)	61,913	71,955	10,042	16%
Total Impact (Employment)	180,007	225,206	45,199	25%
State Impact Multiplier	3.38	3.05		
State and Local Tax Revenues (Mil. \$)	\$1,436	\$2,381	\$945	66%

Source: TEconomy analysis of NCBiotech data using IMPLAN.

**FIGURE 10: ECONOMIC OUTPUT AND EMPLOYMENT IMPACTS OF NORTH CAROLINA'S LIFE SCIENCES INDUSTRY: 2008 VS. 2022**

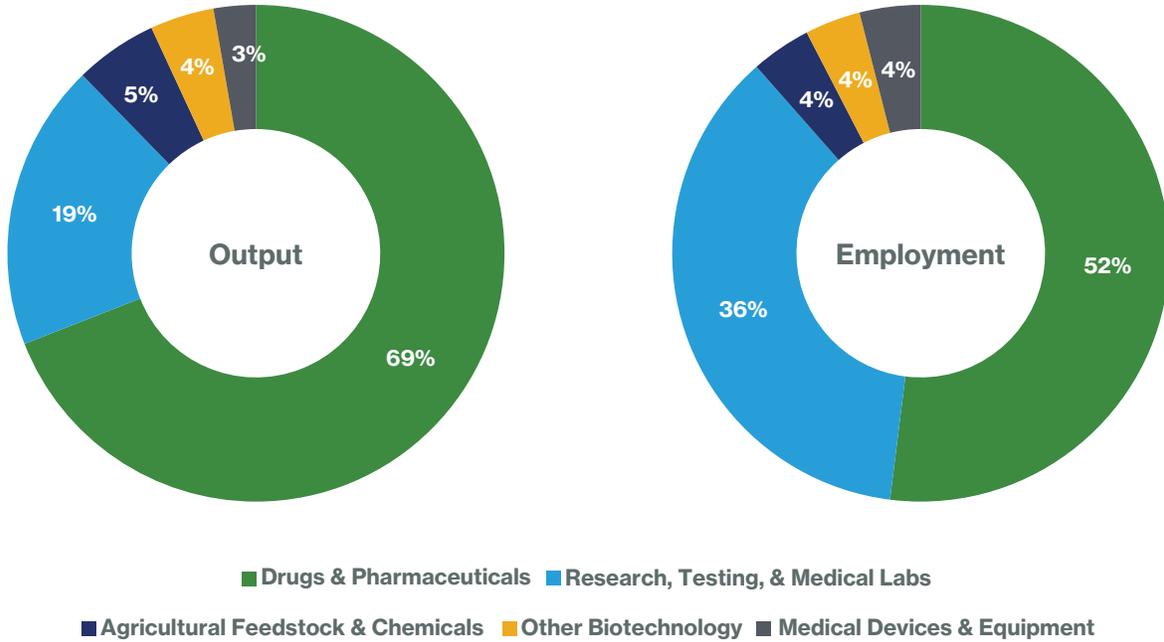


Source: TEconomy Partners' analysis of NCBiotech data using IMPLAN.

In addition to the total economic impacts described above, the economic contribution of each of the major life sciences subsectors was calculated and is presented in Table 6 and broken down by contributing shares in Figure 11, and are as follows:

- The **drugs and pharmaceuticals** subsector has the largest impact, generating \$61.0 billion in economic activity and supporting 117,056 jobs earning \$9.9 billion in labor income and generating \$1.6 billion in state and local government revenues.
- The **research, testing, and medical laboratories** subsector, has the second-largest impact, generating \$16.5 billion in economic activity and supporting 82,283 jobs earning \$5.8 billion in labor income and generating \$533 million in state and local government revenues.
- The **agricultural feedstock and industrial biosciences** subsector has the third-largest impact, generating \$4.8 billion in economic activity and supporting 8,783 jobs earning \$706 million in labor income and generating \$100 million in state and local government revenues.
- The **medical devices and equipment** subsector generates \$2.4 billion in economic activity and supports 8,936 jobs earning \$601 million in labor income and generating \$73 million in state and local government revenues; and
- The **other life sciences** subsector, which includes some limited life science–related distribution activity, as well as life science companies active in sectors not included in TEconomy's industry-based definition, generates \$3.7 billion in economic activity and supports 8,148 jobs earning \$576 million in labor income and generating \$81 million in state and local government revenues.

**FIGURE 11: ECONOMIC OUTPUT AND EMPLOYMENT IMPACT SHARES BY LIFE SCIENCES SUBSECTOR, 2022**



Source: TEconomy Partners' analysis of NCBiotech data using IMPLAN.

**TABLE 6: ECONOMIC CONTRIBUTION OF THE LIFE SCIENCE INDUSTRY TO THE NORTH CAROLINA ECONOMY BY MAJOR INDUSTRY SUBSECTOR, 2022**

Item	Output (Mil. \$s)	Labor Income (Mil. \$s)	Employment	State/Local Tax Revenue (Mil. \$s)
<b>Total Life Sciences Industry</b>				
Direct Effect	\$58,643.1	\$8,408.0	73,775	\$1,111.4
Indirect Impacts	\$18,292.6	\$5,661.2	79,477	\$663.6
Induced Impacts	\$11,350.5	\$3,483.2	71,955	\$605.8
Total Impact	\$88,286.2	\$17,552.4	225,206	\$2,380.8
State Impact Multiplier	1.51	2.09	3.05	
<b>Ag Feedstock &amp; Industrial Biosciences</b>				
Direct Effect	\$3,392.2	\$289.6	1,715	\$34.7
Indirect Impacts	\$915.5	\$279.7	4,239	\$41.4
Induced Impacts	\$446.4	\$137.0	2,830	\$23.8
Total Impact	\$4,754.1	\$706.3	8,783	\$99.8
State Impact Multiplier	1.40	2.44	5.12	
<b>Drugs &amp; Pharmaceuticals</b>				
Direct Effect	\$42,720.0	\$4,355.5	31,049	\$811.6
Indirect Impacts	\$11,871.9	\$3,567.5	45,613	\$441.5
Induced Impacts	\$6,372.6	\$1,955.3	40,394	\$340.6
Total Impact	\$60,964.6	\$9,878.4	117,056	\$1,593.7
State Impact Multiplier	1.43	2.27	3.77	
<b>Medical Devices &amp; Equipment</b>				
Direct Effect	\$1,441.4	\$273.2	3,733	\$27.0
Indirect Impacts	\$590.6	\$209.2	2,748	\$25.5
Induced Impacts	\$387.5	\$118.9	2,456	\$20.6
Total Impact	\$2,419.5	\$601.3	8,936	\$73.2
State Impact Multiplier	1.68	2.20	2.39	
<b>Research, Testing, &amp; Medical Laboratories</b>				
Direct Effect	\$8,620.1	\$3,263.7	35,331	\$207.7
Indirect Impacts	\$4,075.6	\$1,367.2	23,003	\$123.6
Induced Impacts	\$3,777.1	\$1,159.3	23,949	\$201.2
Total Impact	\$16,472.7	\$5,790.2	82,283	\$532.6
State Impact Multiplier	1.91	1.77	2.33	
<b>Other Life Sciences</b>				
Direct Effect	\$2,469.4	\$226.1	1,947	\$30.3
Indirect Impacts	\$839.0	\$237.4	3,875	\$31.6
Induced Impacts	\$367.0	\$112.6	2,327	\$19.6
Total Impact	\$3,675.3	\$576.2	8,148	\$81.5
State Impact Multiplier	1.49	2.55	4.19	

Source: TEconomy Partners' analysis of NCBiotech data using IMPLAN.

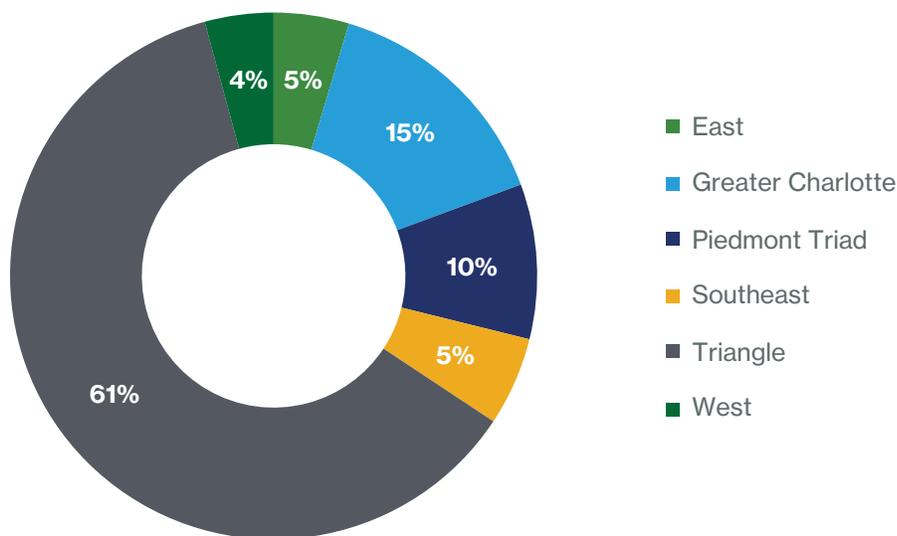
## Life Science Industry Supply Chain Impacts

The economic activity supported by the life science industry impacts other industries across North Carolina through the industry’s purchases of goods and services from the state’s robust supply chain. NCBIotech maintains a database of identified suppliers to the life science industry. The Center’s BioAssets Database contains data on 2,515 supplier companies providing goods and services to life sciences industry companies.

The number of in-state supplier companies tracked by NCBIotech has increased by 206 companies, or 9%, since 2018, indicating that the growth of the life sciences industry is supporting substantial growth in other sectors of the North Carolina economy. The majority of the identified supplier companies are located in the Research Triangle Park region – 61%; still, the supply chain for the sector is distributed across the state (Figure 12). Of the supplier companies serving the state industry, the largest number (1,188) are in IT, professional, scientific, and technical services and provide a wide range of services from software to consulting to research to legal services. Other key supply chain sectors include manufacturing with 399 firms, wholesale trade, transportation and warehousing with 201 firms, and administrative, support and waste management and remediation services, with 190 firms (Figure 13).

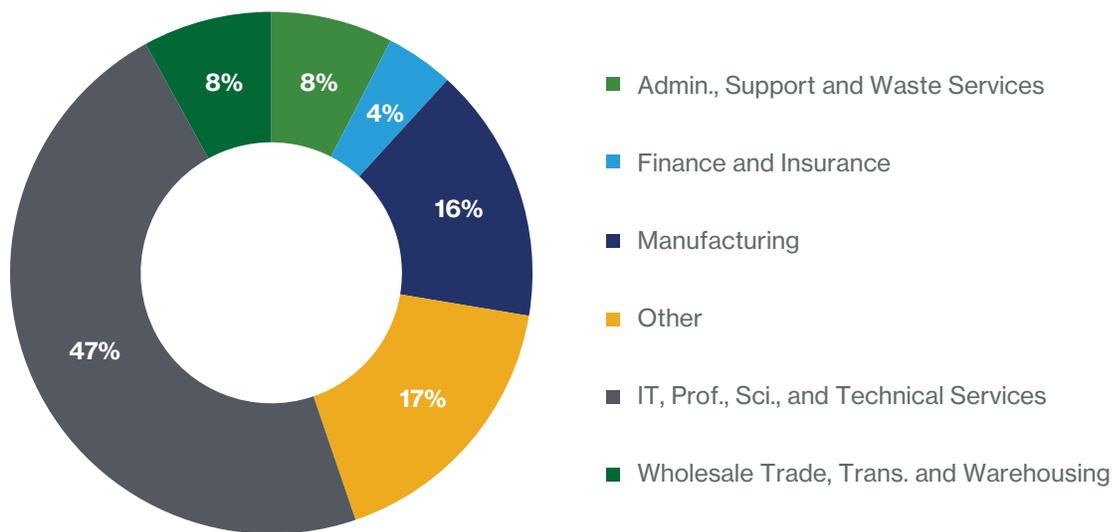
The number of in-state supplier companies tracked by NCBIotech totals more than 2,500 and has increased by 206, or 9%, since 2018, indicating that the growth of the life sciences industry is supporting substantial growth in other sectors of the North Carolina economy.

**FIGURE 12:** NORTH CAROLINA LIFE SCIENCE SUPPLIER COMPANIES, BY REGION



Source: NCBIotech’s BioAssets database.

**FIGURE 13:** NORTH CAROLINA LIFE SCIENCE SUPPLIER COMPANIES, BY INDUSTRY



Source: NCBiotech's BioAssets database.

The North Carolina life sciences industry's purchases from this statewide network of suppliers generates considerable economic activity in the state. The IMPLAN model used in this analysis estimates the level of local purchase made in the form of indirect impacts. As described above, the North Carolina life science sector generates \$18.3 billion in economic activity and 79,477 jobs through indirect impacts, or the purchases of goods and services from local suppliers. The top 20 supplier industries impacted by the North Carolina life science industry in terms of both output (purchases) and total jobs supported are presented in Table 7. For example, the Wholesale - Drugs and Druggists' Sundries industry, which includes companies engaged in the distribution of biological and medical products; botanical drugs and herbs; and pharmaceutical products and is, therefore, engaged in both the wholesale trade of intermediary supplies for the industry as well as of final products, experiences the largest impact in terms of output/revenues at \$3.6 billion and the fourth-largest employment impact at 4,689 jobs.

**TABLE 7: TOP 20 SUPPLIER INDUSTRIES TO THE NORTH CAROLINA LIFE SCIENCE INDUSTRY IN TERMS OF OUTPUT AND JOBS, 2022**

Top 20 Indirect Impact Industries	\$ in Millions	Top 20 Indirect Impact Industries	Jobs
Wholesale - Drugs and druggists sundries	\$3,618.2	Management of companies and enterprises	8,110
Management of companies and enterprises	\$2,068.5	Other real estate	7,120
Other real estate	\$1,358.9	Employment services	5,733
Management consulting services	\$526.6	Wholesale - Drugs and druggists sundries	4,689
Wholesale - Other nondurable goods merchant wholesalers	\$515.3	Management consulting services	3,611
Employment services	\$498.6	Truck transportation	2,561
Scientific research and development services	\$489.3	Services to buildings	2,091
Electric power transmission and distribution	\$412.6	Advertising, public relations, and related services	2,067
Monetary authorities and depository credit intermediation	\$408.3	Legal services	1,913
Truck transportation	\$393.9	Scientific research and development services	1,875
Advertising, public relations, and related services	\$348.0	Wholesale - Other nondurable goods merchant wholesalers	1,695
Legal services	\$347.2	Business support services	1,647
Wholesale - Professional and commercial equipment and supplies	\$284.1	Couriers and messengers	1,566
Insurance carriers, except direct life	\$254.1	Warehousing and storage	1,464
Insurance agencies, brokerages, and related activities	\$244.3	Architectural, engineering, and related services	1,256
Architectural, engineering, and related services	\$209.3	Full-service restaurants	1,237
Radio and television broadcasting	\$202.0	Office administrative services	1,018
Data processing, hosting, and related services	\$189.3	Postal service	975
Cable and other subscription programming	\$184.0	Computer systems design services	967
Services to buildings	\$161.1	Accounting, tax preparation, bookkeeping, and payroll services	959

Source: TEconomy Partners' analysis of NCBiotech data using IMPLAN.



III.

## NCBiotech Delivers Impactful Programs and Initiatives Targeting Ecosystem Needs and Gaps, Catalyzing Life Sciences Development

The list of achievements for North Carolina's life sciences industry are exciting and lengthy – strong and steady long-term job growth, a varied and diverse combination of strengths, a leading position among U.S. states, and outsized economic impacts that have grown by orders of magnitude over time – and reflect, in part, a dedicated and sustained focus on enhancing the statewide ecosystem for life sciences development by NCBiotech, its partners and other industry stakeholders.

For nearly four decades, NCBiotech has effectively designed and implemented programs and initiatives that span the broad set of unique development requirements for the life sciences and provide a competitive advantage for North Carolina. The Center has established itself as a trusted partner, working to ensure life sciences companies of all sizes and stages of development are able to access and effectively leverage the research, technology, talent, and capital resources across North Carolina and beyond.

Since its founding 39 years ago, NCBiotech has distributed 3,206 grants totaling \$160 million.

A key characteristic contributing both to the industry's growth and expanding impacts and the relevancy of NCBiotech as a growth catalyst is the Center's flexibility and steady evolution to address the changing needs of the industry tailored to North Carolina. NCBiotech is a dedicated entity designed to ensure a team of talented individuals wake up every day thinking about how to continue to grow this high-value industry sector.

Today, NCBiotech plays this role and delivers its extensive programming through five primary domain areas:

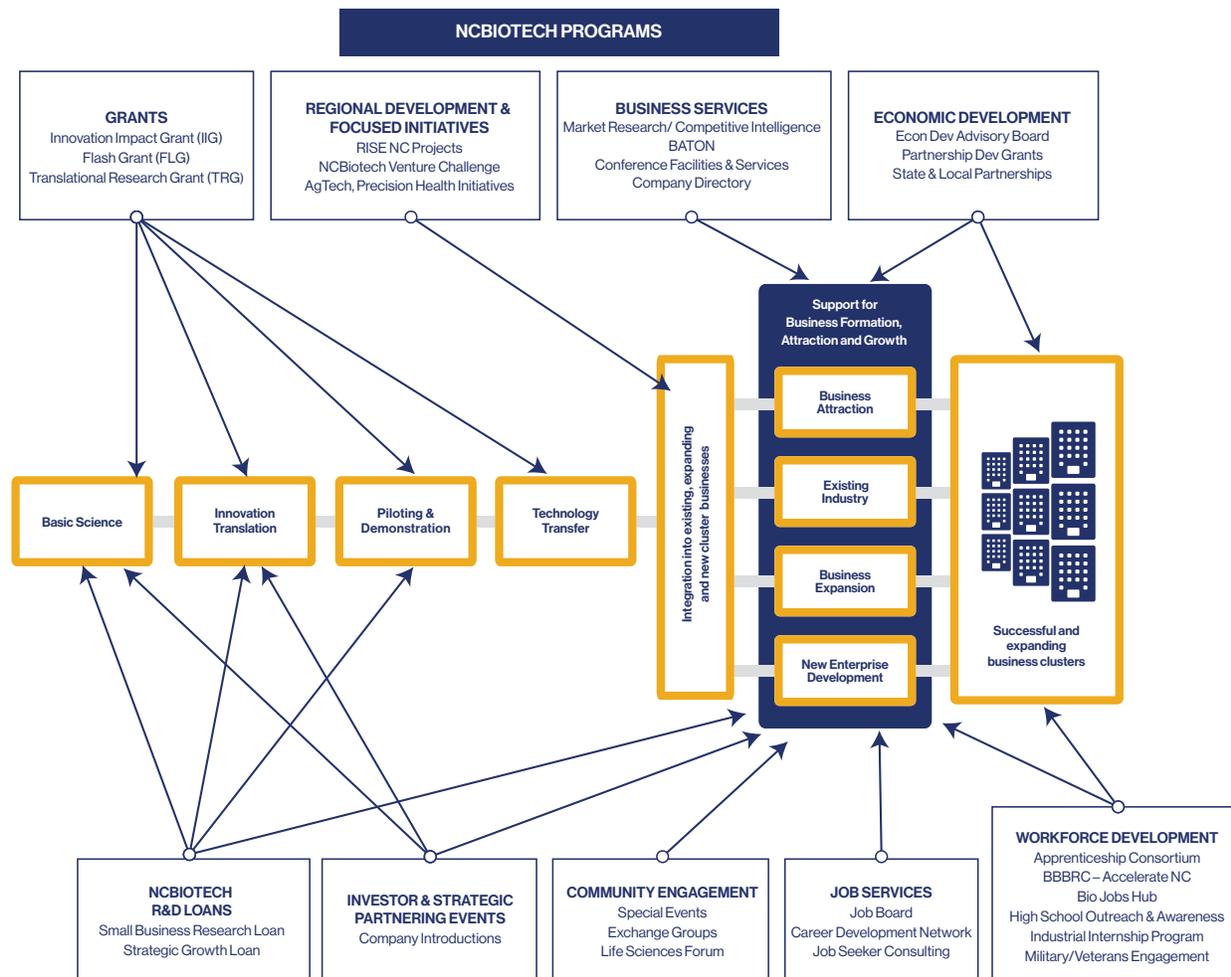
- Funds for commercializing university research and boosting early-stage company development;
- Talent development initiatives and career networking;

- Investor and industry connections to fill gaps;
- Unique spaces to accelerate company growth; and
- Access to high-value information resources.

These domain areas and their corresponding programs are highly intentional, designed by NCBiotech to target critical elements of a high-functioning technology-based or innovation-driven development ecosystem. To illustrate, the specific programs of the Center can be assigned along the chain of activities and phases of technology commercialization and cluster development that are necessary in this context – aligned to NCBiotech with program examples in Figure 14.

The comprehensive and strategic nature of the programming to address every key element of the TBED chain is impressive and especially notable. NCBiotech is engaged and involved in supporting aspects of each development phase or element extending out from basic and applied scientific research innovation to translation and transfer, to addressing the ecosystem for investment capital and workforce, and on through to support for business formation, attraction, retention, and expansion.

**FIGURE 14: TECHNOLOGY-BASED ECONOMIC DEVELOPMENT (TBED) CHAIN AND NCBIOTECH PROGRAMS AND INITIATIVES\***



\*Note: for program descriptions and links to further information on each, see the Appendix to this report.

Source: TEconomy Partners, LLC and NCBiotech.

In addition to direct programming, NCBiotech plays a key role as the connective tissue between the linkages shown in the development chain graphic as well as between the players – connecting university and research institute leadership and faculty with industry, connecting industry leaders with investors and talented individuals from diverse backgrounds and experiences, connecting public sector leaders and citizens with the industry, and on and on. This role was perhaps never more apparent than during the COVID-19 pandemic, as documented in the prior *Evidence & Opportunity* report. And this year, the Center led a statewide coalition to secure a major win from the federal Economic Development Administration’s (EDA) Build Back Better Regional Challenge to fund a set of projects advancing the life sciences ecosystem in North Carolina (see box on the following page). The ability to come together in strong coalitions was one of EDA’s priority criteria, and NCBiotech was able to bring the diverse partners to the table to win for North Carolina.

## NCBiotech-Led Coalition Wins Build Back Better Regional Challenge Award, Secures Nearly \$25 Million for Life Sciences Ecosystem Development Projects

The Economic Development Administration (EDA) recently awarded \$1 billion in funding for regional investments aimed at transforming local economies, promoting inclusive and equitable development, and creating good-paying jobs in “industries of the future such as clean energy, next-generation manufacturing, and biotechnology.”\*

North Carolina, and the coalition led by NCBiotech (the Accelerate NC – Life Sciences Manufacturing Coalition), was one of just 21 winning states/regions nationally and will receive nearly \$25 million to further strengthen the state’s life sciences manufacturing cluster by “expanding, connecting, and promoting training and career opportunities to underserved and distressed communities, including historically excluded populations.”\*\* The specific projects that will be funded include:

- **Workforce Diversification** – Led by North Carolina Central University’s Biomanufacturing Research Institute and Technology Enterprise (BRITE), this project will establish six training hubs at North Carolina’s Historically Black Colleges and Universities and at the University of North Carolina at Pembroke, the state’s sole Historically American Indian University. The training hubs will deliver hands-on short courses on manufacturing biopharmaceuticals to an inclusive and diverse population.
- **Expand Training Access and Faculty Recruitment** – Led by the North Carolina Community College System, the NC BioBetter project will bolster the number of trained life sciences manufacturing workers by enrolling citizens from across the state in BioWork and other life sciences training programs expanded through this funding. Ten community colleges and the North Carolina Community College System BioNetwork will develop and deliver training. Recruitment will focus on historically excluded, rural and distressed populations.
- **Community Engagement** – Led by NCBiotech, this project will launch ambassador and apprenticeship programs to increase awareness of, and access to, life sciences manufacturing training and job opportunities. The project will also connect high school seniors in Pitt County and participants in Made in Durham’s BULLS program with free life sciences manufacturing training. NCBiotech will forge connections among coalition members, community leaders, training partners and industry, removing barriers to training and job opportunities for underserved individuals in both urban and rural communities.

Coalition partners include Novo Nordisk, Amgen, Biogen, FUJIFILM Diosynth Biotechnologies, Pfizer, and others contributing matching funds; with additional partners including Thermo Fisher Scientific, state universities, and other organizations from throughout North Carolina. This type of ecosystem collaboration and coordination in partnering to win a major federal grant is just the role NCBiotech is well positioned to play as the “connective tissue” across the state’s life sciences ecosystem.

\* EDA press release, see: <https://eda.gov/news/press-releases/2022/09/02/build-back-better-regional-challenge-awardees-announced.htm>.

\*\*NCBiotech press release, see: <https://www.ncbiotech.org/news/ncbiotech-led-coalition-wins-phase-2-build-back-better-regional-challenge-award>.

## Measuring the Economic Impact of NCBiotech on the Development of the North Carolina Life Science Industry

In addition to NCBiotech's broad strategic impact on the industry through its role as connector and facilitator, the Center has directly supported the growth and development of the life science industry in North Carolina in two principal areas:

1. NCBiotech directly supports the growth and development of the industry through its Emerging Company Development program, through which the Center invests in promising, emerging life science companies across the state; and
2. NCBiotech also supports industry growth and development via retention, expansion, and recruitment activities, largely by providing its specialized life sciences capabilities, knowledge, and relationships to the North Carolina Department of Commerce, regional economic development organizations, and city and county economic development departments.

This report has estimated the economic contribution of the companies supported by NCBiotech's business loan programs since its first assessment of the economic impact of the Center in 2008 and by the companies NCBiotech has helped to recruit to or expand in the state since the 2012 report. Though these are just two of the many NCBiotech programs, their impact on the state is significant.

### NCBiotech's Business Loan Programs

Targeted, early-stage loans to life science businesses help create and support business activity in the companies receiving loans, which has a long-term impact on the state's economy. As a result, NCBiotech's loan programs create a "portfolio" of businesses assisted by the Center, and the operations of these businesses created or assisted represent the economic development impacts associated with NCBiotech. This analysis focuses on the impact of the total portfolio of all of the companies who have received funding since 1989 and are still in operation today.

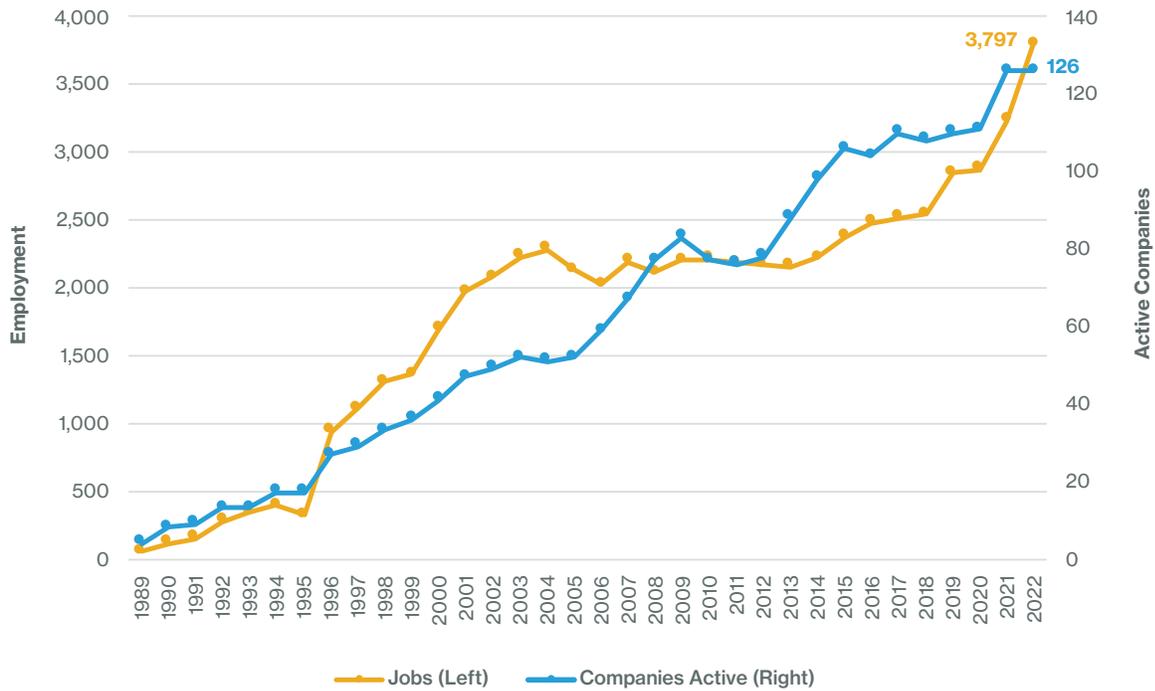
Since 1989, NCBiotech has made business loans to 246 companies. Of the 246 companies that have received loans, 126 are currently active in some form and these companies employ 3,797 workers. NCBiotech's business loan programs have invested in an expanding portfolio of companies that account for a growing share of life science employment in the state. The growth in employment in the portfolio of companies supported by the NCBiotech business loan programs is presented in Figure 15.

TEconomy has estimated the economic impacts of these 126 active loan-recipient companies. As presented in Table 8, these 126 companies had total employment of 3,797 and estimated revenues of \$3.4 billion and have the following impacts:

- Generate \$5.1 billion in economic activity in the state;
- Create or support 12,484 jobs earning \$959 million in labor income; and
- Generate an estimated \$124.1 million in state and local tax revenues.

The economic impacts associated with the portfolio of life science companies assisted by NCBiotech’s business loan programs have grown rapidly over time, increasing from 64 companies generating \$1.1 billion in economic activity and supporting 4,700 jobs as documented in the 2008 *Evidence & Opportunity* report, to 126 companies supporting \$5.1 billion in economic activity and 12,484 jobs today.

**FIGURE 15:** NUMBER OF ACTIVE COMPANIES THAT RECEIVED NCBIOTECH BUSINESS LOANS AND ASSOCIATED EMPLOYMENT



Source: NCBiotech data.

**TABLE 8: THE ECONOMIC CONTRIBUTION TO THE NORTH CAROLINA ECONOMY OF THE 126 CURRENTLY ACTIVE COMPANIES THAT RECEIVED NCBIOTECH BUSINESS LOANS**

	Output (Mil. \$s)	Labor Income (Mil. \$s)	Employment	State/Local Tax Revenue (Mil. \$s)
<b>Total Life Science Industry</b>				
Direct Effect	\$58,643	\$8,408.0	73,775	\$1,111.4
Indirect Impacts	\$18,293	\$5,661.2	79,477	\$663.6
Induced Impacts	\$11,351	\$3,483.2	71,955	\$605.8
<b>Total Impact</b>	<b>\$88,286</b>	<b>\$17,552.4</b>	<b>225,206</b>	<b>\$2,380.8</b>
<b>Impact of the 126 Currently Active Companies that Received Economic Development Loans</b>				
Direct Effect	\$3,355.7	\$447.5	3,797	\$53.4
Indirect Impacts	\$1,092.9	\$322.7	4,795	\$37.9
Induced Impacts	\$615.9	\$188.8	3,893	\$32.8
<b>Total Impact</b>	<b>\$5,064.4</b>	<b>\$959.0</b>	<b>12,484</b>	<b>\$124.1</b>
<b>Share of Total Industry Impact</b>				
Direct Effect	5.7%	5.3%	5.1%	4.8%
Indirect Impacts	6.0%	5.7%	6.0%	5.7%
Induced Impacts	5.4%	5.4%	5.4%	5.4%
<b>Total Impact</b>	<b>5.7%</b>	<b>5.5%</b>	<b>5.5%</b>	<b>5.2%</b>

Source: TEconomy analysis of NCBiotech data using IMPLAN.

**North Carolina receives a strong return on its investment in NCBiotech.** TEconomy estimated the state government revenue portion of the estimated \$124.1 million in combined state and local government revenues generated by the active loan recipient companies (through direct, indirect, and induced impacts), using the IMPLAN model. **This analysis yields an estimated \$77.0 million in state government revenues generated by these companies, an amount almost five times greater than the state's FY2022 appropriation to NCBiotech of \$17.1 million for the current fiscal year.** Companies that have received business loans from the Center now account for almost 6% of the economic activity associated with the entire life science industry.

## NCBiotech Loan Portfolio Highlights

Since 1989, NCBiotech's Emerging Company Development team has strategically deployed close to \$51 million in loan funding to 246 start-up therapeutic, diagnostic, medical device, and other life sciences companies. **For every \$1 in loans, NCBiotech loan portfolio companies have subsequently raised an additional \$148 in other sources of funding.** Examples of these successful companies are profiled below.

- **AskBio** is a leading, clinical-stage gene therapy company dedicated to developing Adeno-Associated Virus (AAV) gene therapies for genetic and complex disorders such as Pompe Disease, Parkinson's Disease, Huntington's Disease, and Congenital Heart Disease. AskBio was acquired by Bayer in 2020.
- **Baebies** is delivering pediatric early disease detection and comprehensive diagnostics through screening and testing platforms powered by digital microfluidics. Their Seeker® and Finder® platforms are used to test thousands of babies each day around the world.
- **BioMason** is developing biologically-produced construction materials using a non-pathogenic soil bacterium. Their first product is Biolith®, a commercially available Biocement® that uses less energy, can be deployed on-site, and can utilize non-potable water.
- **G1 Therapeutics** is advancing the next generation of cancer therapies and has launched its first product, Cosela™, to decrease the incident of chemotherapy-induced myelosuppression in patients with small cell lung cancer.
- **Humacyte** has bioengineered and manufactured human acellular vessels in varying sizes to address the significant unmet needs across multiple potential indications including vascular trauma, AV access for hemodialysis, and peripheral arterial disease.
- **Locus Biosciences** is developing novel precision therapies using CRISPR-based phage technology to treat infectious diseases. The company is currently focused on urinary tract, respiratory, and bloodstream infections through partnership with the Biomedical Advanced Research and Development Authority (BARDA), CARB-X and Janssen.
- **Piedmont Animal Health** developed novel and differentiated products for the companion animal market and was acquired by Dechra Pharmaceuticals in 2022.
- **T3D Therapeutics** is developing a disease-modifying medicine for the treatment of Alzheimer's disease patients with mild to moderate disease severity, and potentially for patients with mild cognitive impairment. The potential exists for therapeutic benefit in other CNS disorders.

Source: NCBiotech.

## Projected Impact of Life Sciences Expansion and Relocation Growth Announcements

In addition to its role in directly supporting commercialization and business growth through its Emerging Company Development program, NCBiotech supports the broader business recruitment and expansion efforts of the Economic Development Partnership of North Carolina and other state, regional, and local economic development organizations. With offices across the state, NCBiotech's team provides expert knowledge of the industry to support state and regional life science business attraction, expansion, and retention efforts.

NCBiotech has tracked an impressive 63 expansion and relocation growth announcement during the last two fiscal years with the potential to create a total of 9,115 new jobs in North Carolina.

North Carolina's life sciences sector is expanding, from the growth of locally formed startups, the expansion of existing firms, and the attraction of new companies to North Carolina's significant biotechnology and life sciences ecosystem. Since 2012, TEconomy has been tracking the potential economic contribution of announced major expansion and relocation announcements of life sciences companies assisted by NCBiotech.

**This analysis focuses on the economic impact of 63 expansion and relocation announcements made by life sciences companies in Fiscal Years 2021 and 2022.**<sup>6</sup> These 63 announcements have the potential to create a total of 9,115 jobs once they reach their projected employment level, and once they attain this full projected level of employment, they will generate \$10.8 billion in total economic activity and support 26,544 jobs earning \$2.1 billion in labor income and generate \$284 million in combined state and local government revenues (Table 9).

In coordination with its economic development partners, the Center supported 32 of the announcements included in this analysis. Once the companies involved in these 32 projects attain their full projected level of employment, they are expected to generate an estimated \$7.2 billion in economic activity and support 18,395 jobs earning \$1.5 billion in labor income and generate \$188.8 million in combined state and local government revenues.

**Since 2008, NCBiotech has assisted in the efforts to attract or retain 139 major life science employers, including those accounted for during the latest two fiscal years,** playing a critical role in supporting our economic development partners in attracting, growing and retaining North Carolina's life sciences sector.

Highlights from the recruitment and expansion announcements are included in the callout below.

<sup>6</sup> This analysis does not include projects that were formally cancelled after being announced, as they will not contribute to job creation or economic activity. The 63 announcements include some instances of multiple announcements made by the same company.

**TABLE 9: PROJECTED ECONOMIC CONTRIBUTIONS OF THE 63 ANNOUNCED LIFE SCIENCE INDUSTRY EXPANSION AND RELOCATION GROWTH ANNOUNCEMENTS IN FY 2021 AND 2022 TO THE NORTH CAROLINA ECONOMY**

	Output (Mil. \$s)	Labor Income (Mil. \$s)	Employment	State/Local Tax Revenue (Mil. \$s)
Projected Economic Impacts				
Direct Effect	\$7,261.1	\$1,081.9	9,115	\$133.8
Indirect Impacts	\$2,144.1	\$641.8	8,685	\$76.5
Induced Impacts	\$1,383.6	\$424.1	8,744	\$73.7
Total Impact	\$10,788.7	\$2,147.9	26,544	\$284.0
Share of Total Industry Impact of the 32 Life Science Companies with Expansion or Relocation Announcements Assisted by NCBiotech				
Direct Effect	67.7%	76.6%	72.5%	65.9%
Indirect Impacts	64.0%	63.6%	63.4%	62.3%
Induced Impacts	71.8%	71.8%	71.8%	71.8%
Total Impact	67.5%	71.7%	69.3%	66.5%

Source: TEconomy analysis of NCBiotech data using IMPLAN

## North Carolina Life Sciences Recruitment and Expansion Highlights from FY 2021-22

### Life Science companies with strong North Carolina ties continue to expand their footprint in the state:

- **BioAgilytix**, a home-grown contract bioanalytical testing company, will create 878 new jobs and invest another \$61.5 million at its global headquarters in Durham, where the company was founded in 2008.
- **Eli Lilly & Company** doubled down on its 2020 investment in North Carolina with plans to invest \$1 billion and create nearly 600 new jobs at a new injectable product manufacturing site in Concord.
- **FUJIFILM Diosynth Biotechnologies**, a world leading contract development and manufacturing organization (CDMO), announced plans to invest \$2 billion and create 725 jobs to build North America's largest end-to-end biopharmaceutical manufacturing facility in Holly Springs. The company also announced plans to double their existing laboratory footprint in North Carolina, adding an additional 145 jobs at their Research Triangle Park location.
- **Thermo Fisher Scientific** continues to grow its major operations in the state with four announcements including two Greenville expansions totaling 790 new jobs and \$654 million investment, an expansion in Asheville that will create 200 new jobs, and a new manufacturing facility in Mebane that will create an additional 200 new jobs.

### Other established life sciences companies are investing in North Carolina for the first time:

- **Amgen**, a world-class biopharmaceutical company that pioneered the use of recombinant DNA technology, is building a \$550 million manufacturing facility in Holly Springs that will employ 355 people.
- **Invitae** is establishing a medical genetics testing facility in Morrisville, investing \$114.6 million and creating 374 new jobs. The company's test portfolio is one of the broadest in the industry, and they have already provided medical genetics information to more than one million people.

### Additionally, North Carolina's cell- and gene-based therapy cluster continues to grow through both expansions and companies establishing new sites in the state:

- **Beam Therapeutics**, a gene editing company, committed \$83 million to build a manufacturing facility in Research Triangle Park and create more than 200 jobs.
- **CARSGen Therapeutics** is building a \$157 million biomanufacturing facility in Durham to make chimeric antigen receptor (CAR) T cell therapies for cancer, creating approximately 200 jobs.
- **Jaguar Gene Therapy**, an Illinois-based gene therapy company, is investing \$125 million to create a new GMP facility in Durham that will employ 200 people.
- **StrideBio**, an adeno-associated viruses (AAV)-based gene therapy company spun out of UNC Chapel Hill in 2015, shared plans to create 100 new jobs to fill a newly expanded facility that includes office, lab, and manufacturing space in Research Triangle Park.
- **Taysha Gene Therapies** announced plans for a new \$75 million manufacturing facility in Research Triangle Park that will employ more than 200 people to produce AAV gene therapies.

Source: NCBiotech.



## Conclusion

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North Carolina's continued life sciences industry growth and significant impacts should be celebrated, as the industry has helped lead the state through challenging economic times. This represents a dividend, of sorts, for North Carolinians' steady and long-term support for the industry and its ecosystem through public funding for NCBiotech.

This biennial assessment finds the industry in a strong position, with growth accelerating in recent years, and keeping pace nationally with leading peer states. Strong hiring and high-quality jobs are generating extensive impacts, including an expanding supply chain impact across North Carolina. But these gains are hard-earned, and economic headwinds have emerged with respect to inflation, slower economic growth, continued supply chain challenges, and a competition for talent that is especially fierce. The life sciences industry will continue to lead from both an economic and public health perspective, but its supportive ecosystem requires continued investment and connectivity, and NCBiotech must continue to lead in this capacity.



## Appendix: Data and Methodology

### Defining the Life Science Industry

The following presents the industry definition utilized in Section I of this report based on the detailed North American Industry Classification System (NAICS) codes that make up the five major subsectors of the life science industry.

**TABLE A-1: NAICS-BASED DEFINITION OF THE LIFE SCIENCE INDUSTRY**

Life Sciences Subsector	NAICS Code	NAICS Description
Agricultural Feedstock & Industrial Biosciences	311221	Wet Corn Milling
	311224	Soybean and Other Oilseed Processing
	325193	Ethyl Alcohol Manufacturing
	325311	Nitrogenous Fertilizer Manufacturing
	325312	Phosphatic Fertilizer Manufacturing
	325314	Fertilizer (Mixing Only) Manufacturing
	325320	Pesticide and Other Agricultural Chemical Manufacturing
Bioscience-related Distribution	423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
	424210*	Drugs and Druggists' Sundries Merchant Wholesalers
	424910*	Farm Supplies Merchant Wholesalers
Drugs & Pharmaceuticals	325411	Medicinal and Botanical Manufacturing
	325412	Pharmaceutical Preparation Manufacturing
	325413	In-Vitro Diagnostic Substance Manufacturing
	325414	Biological Product (except Diagnostic) Manufacturing
Medical Devices & Equipment	334510	Electromedical and Electrotherapeutic 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, & Medical Laboratories	541380*	Testing Laboratories
	541713*	Research and Development in Nanotechnology
	541714	Research and Development in Biotechnology (except Nanobiotechnology)
	541715*	Research and Development in the Physical, Engineering, and Life Sciences (except Nanotechnology and Biotechnology)
	621511	Medical Laboratories

\*Includes only the portion of these industries engaged in relevant life science activities.

## Economic Impact Approach and Methodology

Using the information on the size and composition of the North Carolina life science industry provided by NCBio-tech, TEconomy prepared an analysis of the economic impact of the industry on the State of North Carolina's economy using the IMPLAN input/output model. IMPLAN, one of the most widely used models in the nation, can be used to analyze the impacts of companies, projects, or entire industries. An input/output (I-O) analysis examines the relationships among businesses and among businesses and final consumers. I-O analysis is based on the use of multipliers, which describe the response of an economy to a change in demand or production. Multipliers measure the effects on an economy from a source of economic activity, in this case, the jobs and activities of companies in the life science industry in North Carolina.

The economic activity generated in a state is greater than the simple total of spending associated with the event or activity being studied. As money is earned, it is, in turn, spent, earned, and re-spent by other businesses and workers in the regional economy through successive cycles of spending, earning, and spending. However, the spending in each successive cycle is less than in the preceding cycle because a certain portion of spending "leaks" out of the economy in each round of spending. Leakages occur through purchases of goods or services from outside of the region and federal taxation. The IMPLAN multipliers used in this analysis capture the effects of these multiple rounds of spending.

This report measures the economic impact of the life science industry by focusing on four measures of economic impact:

- **Employment.** The total number of full- and part-time jobs in all industries.
- **Output.** The total value of production or sales in all industries.
- **Labor Income.** Total labor income including wages and salaries, benefits, and self-reported income earned by the workers holding the jobs created; and
- **State and Local Government Revenues.** The fiscal benefits accruing to both state and local governments in North Carolina as a result of the direct and multiplier impacts associated with the North Carolina life science sector, academic life science R&D spending, and the portfolio of companies assisted by NCBio-tech.

Four measures of the economic activity and impact of the jobs supported by the life science industry are included as follows:

- **Direct effects.** The change in economic activity being analyzed – in this case, the business activities of the life science industry, including life science companies, life science research, and the Center's portfolio of assisted businesses. For this analysis, TEconomy used the employment data from the NCBio-tech Company Database and the IMPLAN model to estimate business activity based on these activities.
- **Indirect effects.** The changes in inter-industry purchases, for example, the purchase of raw materials by a life science manufacturer, in response to the change in demand from the directly affected industries.
- **Induced effects.** The changes in spending from households as income and population increase due to changes in production; and
- **Total effects.** The combined total of direct, indirect, and induced effects.

## NCBiotech Program Descriptions and Overviews

Brief overviews and descriptions of the programs and initiatives of NCBiotech that are assigned to focus areas along the “TBED” chain graphic in Figure 14 are provided here in Table A-2 below.

**TABLE A-2:** DESCRIPTIONS AND OVERVIEWS OF NCBIOTECH PROGRAMS AND INITIATIVES

Program	Description	Website
Apprenticeship Consortium	The Apprenticeship Consortium is developing apprenticeships in the life sciences to strengthen workforce preparedness.	<a href="http://www.ncbiotech.org/news/life-sciences-apprenticeships-planned-north-carolina">www.ncbiotech.org/news/life-sciences-apprenticeships-planned-north-carolina</a>
BATON Referral Network	The BATON Referral Network is a community of life science professionals committed to the growth of North Carolina-based companies.	<a href="http://www.ncbiotech.org/resources/baton-services">www.ncbiotech.org/resources/baton-services</a>
Bio Jobs Hub	Bio Jobs Hub provides information and resources on training programs and job opportunities in biomanufacturing, contract research, and diagnostic testing	<a href="https://biojobshub.wraltechwire.com/">https://biojobshub.wraltechwire.com/</a>
Career Development Network	The Career Development Network offers free monthly networking events for life sciences professionals in North Carolina.	<a href="http://www.ncbiotech.org/networking/exchange-groups/Career-Development-Network">www.ncbiotech.org/networking/exchange-groups/Career-Development-Network</a>
Flash Grant (FLG)	The Flash Grant program identifies and energizes creative ideas that exhibit early indications of exceptional commercial potential. Like a flash of inspiration, flash grants infuse a quick jolt of funding at a critical early point when a small, targeted influx of funds is crucial to shaping innovative research ideas into high-potential life sciences technologies.	<a href="http://www.ncbiotech.org/flash">www.ncbiotech.org/flash</a>
Intellectual Exchange Groups (IEG)	Intellectual Exchange Groups are scientific and other seminar groups assisted or managed by NCBiotech.	<a href="http://www.ncbiotech.org/transforming-life-sciences/exchange-groups">www.ncbiotech.org/transforming-life-sciences/exchange-groups</a>
Innovation Impact Grant (IIG)	The Innovation Impact Grant (IIG) program supports the purchase of research equipment for core facilities at academic or nonprofit institutions fostering innovation within North Carolina's life sciences ecosystem.	<a href="http://www.ncbiotech.org/iig">www.ncbiotech.org/iig</a>
Industrial Internship Program (IIP)	The Industrial Internship Program is an NCBiotech grant program that started in 2012. The program provides internship opportunities for undergraduates, graduate students and recent graduates in business administration or the life sciences.	<a href="http://www.ncbiotech.org/talent-careers/industrial-internship-program">www.ncbiotech.org/talent-careers/industrial-internship-program</a>
Job Board	The NCBiotech Job Board contains life science-related job postings in North Carolina.	<a href="http://careers.ncbiotech.org">careers.ncbiotech.org</a>

Program	Description	Website
Military Outreach & Veterans Engagement (MOVE)	NCBiotech's Military Outreach & Veterans Engagement (MOVE) initiative helps raise awareness of career opportunities and delivers training programs that enhance skills developed during military service.	<a href="http://www.ncbiotech.org/military-programs">www.ncbiotech.org/military-programs</a>
Partnership Development Grant (PDG)	The Partnership Development Grant is a performance-based grant centered on net new job growth as part of a defined company expansion or relocation project. These grants are awarded to local units of government to support economic growth.	<a href="http://www.ncbiotech.org/transforming-life-science/transforming-north-carolina">www.ncbiotech.org/transforming-life-science/transforming-north-carolina</a>
Regional Impact of Statewide Engagement (RISE NC)	Regional Impact of Statewide Engagement, North Carolina is a combination of projects involving the NCBiotech statewide offices.	
Strategic Growth Loan (SGL)	The Strategic Growth Loan (SGL) program is designed to help North Carolina life science product companies reach specific and meaningful milestones that will enable them to obtain further funding from investors and/or commercialize their products. For most applicants, SGL awards of up to \$250,000 will be matched by an equal or greater investment from one or more organized angel groups or venture capital firms.	<a href="http://www.ncbiotech.org/sgl/">www.ncbiotech.org/sgl/</a>
Small Business Research Loan (SRL)	The Small Business Research Loan program provides investments of \$100,000 to \$250,000 into innovative early-stage life science companies in North Carolina.	<a href="http://www.ncbiotech.org/funding/company-funding/small-business-research-loan">www.ncbiotech.org/funding/company-funding/small-business-research-loan</a>
Translational Research Grant (TRG)	The Translational Research Grant (TRG) program funds projects that explore commercial applications or initiate the early commercial development of university-held life sciences inventions. The technology must have the potential to solve a real-world problem as a commercial product in the life sciences sector.	<a href="http://www.ncbiotech.org/trg">www.ncbiotech.org/trg</a>
Venture Challenge	The NCBiotech Venture Challenge competition is a life-sciences-based, innovation-focused venture challenge to support life sciences startup commercialization, innovators, entrepreneurs, and companies in each of the Biotech Center's five regions outside the Research Triangle area.	





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