



Overview and Summary of Recent Initiatives

In November 2005, Maine voters passed a bond issue of \$20 million for jobs and economic growth. Among the components of the **\$20 million economic stimulus bond** were the following:

- \$12 million to the Department of Economic and Community Development to be divided between two funds: \$8 million for the **Maine Biomedical Research Fund** to support capital infrastructure and equipment and \$4 million to the **Marine Infrastructure and Technology Fund** to match federal and private funding for capital infrastructure grants to nonprofit marine research laboratories, institutions, and state governmental and quasi-governmental agencies
- \$5 million to the University of Maine system for the **laboratory for surface science technology** at the University of Maine, the **graduate school for biomedical sciences** at the UM Bangor campus, and the **Educational Change Center** within the UM system
- \$1 million to the Small Enterprise Growth Board to provide funding for the **Small Enterprise Growth Fund** to make equity investments in small Maine companies with the potential for high growth.

These funding initiatives build upon the infrastructure previously established in Maine. In 2003, Governor John Baldacci created by Executive Order the **Maine Science and Technology Advisory Council** to coordinate the state's R&D activities and to foster collaboration among its higher educational and nonprofit research institutions and business community. In 2005, Maine's first **Science Advisor** was announced to lead the newly formed Office of Innovation within the Maine Department of Economic and Community Development (DECD). In the spring of 2004, Governor Baldacci also released an Economic Development Strategy that identified the biotech and biomedical research cluster as an emerging area of opportunity on which to focus.

The **Office of Innovation** recently released "*A Science and Technology Action Plan for Maine, 2005*" wherein it reinforced the state's commitment to the bioscience sector by its recommendation to "Support and advocate for focused state R&D investments at levels that keep Maine competitive, nationally and internationally, in Maine's targeted technology areas:

- Biotechnology
- Composite
- Environmental

- Marine and Aquaculture
- Information
- Precision Manufacturing
- Agriculture and Forestry.”

The plan calls for Maine’s annual investment in research and development, including both private and public funding, to reach \$1 billion, or approximately 3 percent of the state’s GSP, by 2010.

The **Maine Technology Institute (MTI)** promotes and supports R&D leading to the commercialization of new products and services in the state’s seven targeted technology sectors, including biotechnology. It was established by the Maine State Legislature in 1999 as a private, nonprofit organization and is funded through an appropriation to the DECD. The President of MTI is appointed by the Governor and reports to the Science and Technology Advisor. MTI supports the development of early-stage R&D activities for which other forms of capital are difficult to secure. MTI accomplishes its purpose by cost-sharing R&D and cluster enhancement projects with private companies through several competitive award programs and by helping firms access federal funds for their R&D projects. MTI’s budget was approximately \$5.5 million per year in 2004, 2005, and 2006.

Building Bioscience R&D Capacity

Recent state investments in facilities

The **Maine Biomedical Research Fund (MBRF)** was created in 2001 and provides state funding through both General Revenue Funds as well as bond financing for bioscience R&D facilities. Of the \$20 million bond issue approved in 2005, \$8 million will go to the MBRF to support capital infrastructure, bringing the total investment in the MBRF to \$50 million since 2001. The MBRF is administrated by the Maine Biomedical Research Board through MTI.

Since 2001, approximately \$42 million has been invested in the following facilities:

- The **Jackson Laboratory** has received approximately \$17 million for the design, construction, and fit-out of the Functional Genomics Building, East Research Building, renovations to support the Institute for Molecular Biophysics, renovations of the Computational Sciences floor, and renovations of the wet-lab research space.
- The **Mount Desert Island Biological Laboratory** has received approximately \$2.3 million for the establishment of the Center for Marine Functional Genomic Studies, including recruitment of full-time research scientists, purchase of equipment, renovation of laboratory space, and construction of a new research building.
- The **Maine Medical Center** has received approximately \$2.3 million for the recruitment of peer-reviewed researchers and for construction and equipment associated with expansion of the Scarborough facility, including a new Animal Facility with small-animal magnetic resonance imaging facility.

- The **Foundation for Blood Research** has received approximately \$1.1 million for the development of the Maine Center for Clinical Epidemiology, including construction, equipment purchase, and recruitment of researchers.
- The **University of New England** has received approximately \$687,000 for the construction of a new biomedical research facility.

The **University of Southern Maine (USM)** established the **Biosciences Research Institute** where it has developed increased capacity focused on environmental toxicology, among other topics, that has allowed it to (1) attract external funding for R&D in the biosciences through small group collaborations as well as individual research and by assembling inter-institutional teams of researchers for large-scale projects and (2) facilitate the participation of USM and affiliated faculty in delivering the University of Maine's collaborative Ph.D. program with emphasis in carcinogenesis and environmental toxicology. The State of Maine has provided approximately \$5 million in bond funding for a facility that is under construction to house the institute.

The **Marine Research Fund (MRF)** (formerly known as the Marine Infrastructure and Technology Fund) also is administered by MTI. In 2002 and 2003, the State of Maine approved \$1 million bonds to support marine research. These were followed by an additional \$4 million of the \$20 million bond issue of 2005. The MRF provides funding for capital infrastructure and equipment that enable competitive marine research and enhance research capacity and productivity. Recipients include the **Downeast Institute for Applied Marine Research and Education, Bates College, Maine Geological Survey (Maine Department of Conservation), Mount Desert Island Biological Laboratory, University of New England, Bigelow Laboratory for Ocean Sciences, Wells National Estuarine Research Reserve, Maine Department of Marine Resources, Gulf of Maine Ocean Observing System, and Maine Aquaculture Innovation Center.**

Encouraging Academic/Industrial Interaction

The **Institute for Molecular Biophysics (IMB)** was created to develop an interdisciplinary center for biomedical imaging. The program brings together expertise in biophysics and engineering at the University of Maine, cell biology at the Maine Medical Center Research Institute, and genetics and genomics at The Jackson Laboratory. IMB was established through a \$6 million NSF grant matched by university and state funds. The equipment of IMB will be augmented by an additional NSF and Keck Foundation award that allowed the purchase of a 4Pi laser scanning confocal microscope, the first in the United States, in addition to other equipment, that resides at The Jackson Laboratory.

Moving Technology into the Marketplace

Supporting bioscience entrepreneurs and emerging companies

MTI's **Commercialization Assistance Program (CAP)**, helping companies' efforts to advance their products toward the market, includes the following:

- A technical assistance and information program to increase the amount of funding that Maine companies receive from the federal SBIR and the related STTR award programs. In addition, MTI is the SBA's FAST designee.

- Tech Tracker workshops and mentoring to guide commercialization activity.

In addition to CAP, MTI manages three other commercialization financing programs, which are described in the section on capital, below.

Making Capital Available

Pre-seed and seed capital

Phase 0 Awards for SBIR preparation are available from MTI. Twelve awards for more than \$50,000 were approved in FY 2005, matched by more than \$80,000 in investment by the companies themselves. One project for \$5,000 was in the biotechnology sector.

Seed Grants are awarded on a competitive basis to support very early activities for product development, business planning, or development leading to commercialization. Grants of up to \$10,000 per project help fund small, specific R&D projects leading to commercialization, or technical or consulting assistance for proposal preparation, market analysis, intellectual property filing, or other activity leading to commercialization. Through 2005, MTI has approved funding for more than 500 Seed Grants totaling more than \$4.5 million, matched by more than \$7.5 million in investments by the grant recipients.

Development Awards are granted on a competitive basis to provide R&D funding to companies and nonprofit research organizations within the state's seven identified technology clusters to support commercialization of new technology-related products and services that will create and support sustainable, high-quality jobs. The funding supports proof-of-concept work, prototype development, alpha or beta testing, product development, and designs for manufacturing. Grants range from \$10,000 to \$500,000 per project. Repayment of up to two times the amount of the award is required when the new product or service is commercialized. Through 2005, 107 projects have been funded for more than \$18 million, matched by more than \$24 million in commitments from recipients.

The **Accelerated Commercialization Fund (ACF)** provides capital to bridge the financing gap between R&D and sales. This program helps MTI-funded companies move toward the market by providing additional capital to match other investors' capital. The MTI investment will replicate other investors' terms, generally in the form of equity, and either convert existing MTI debt and/or provide additional capital to help advance the company's new products toward the market. MTI has reserved \$1 million to seed this fund. Investment decisions are made on a case-by-case basis and include consideration of funding available and reserve requirements. It is expected that MTI will make two to three investments from this fund each year. In FY 2005, MTI made its first ACF investment of \$100,000, matched 1.5:1 from additional outside investment to the company.

Cluster Enhancement Awards are made on a competitive basis to seed collaborative efforts that will stimulate and support the formation and growth of technology businesses and increase Maine's capacity for R&D leading to commercialization in its technology-intensive sectors. While up to \$500,000 per project may be awarded for projects that support and develop technology-based industry clusters, most awards are in the range of \$50,000 to \$300,000. Through 2005, 31 Cluster Enhancement Awards have been made, totaling \$3.3 million and matched by more than \$8 million. Since program initiation in 2000, the biotechnology cluster has captured approximately \$5.4 million of the funding.

The **Small Enterprise Growth Fund (SEGF)**, an independent body corporate and politic and an instrumentality of the State of Maine, invests equity capital directly in companies that demonstrate a

potential for high growth and public benefit. It was capitalized by \$8 million from both bond proceeds and direct appropriation. SEGF will receive another \$1 million of capital from the proceeds of the 2005 economic development bond. In order to qualify for funding, small businesses must be engaged in or involved in at least one of the following:

- Marine sciences
- Biotechnology
- Manufacturing
- Software development
- Out-of-state exporters
- Environmental services
- Financial/insurance services
- Natural resources.

Through 2005, SEGF has invested \$8.4 million in 27 companies. Four of those are within the biotechnology sector.

Venture capital

The **Maine Economic Development Venture Capital Revolving Investment Program** enables the state to invest as an equal partner with others in eligible, private venture capital funds to support emerging and early-growth businesses. It is intended to utilize experienced, professional fund managers to increase the probability of successful investments and the success of recipient companies. A typical investment in any one fund does not exceed \$1 million. It is administered by the Finance Authority of Main (FAME). This program currently has investments in five private venture-capital firms that are actively seeking and have made investments in Maine.

FAME administers the **Maine Seed Capital Tax Credit Program**, which is designed to encourage equity investment in young business ventures, directly and through private venture-capital funds. FAME authorizes state income tax credits to investors for up to 60 percent of the cash equity they provide to eligible Maine businesses. Investments may be used for fixed assets, research, or working capital. Through 2005, approximately \$12.2 million in state tax credits have been provided to more than 911 investments in Maine totaling nearly \$34.7 million.

Providing Space for Bioscience Companies

Incubators

Each of Maine's seven targeted technology sectors has its own incubator; these are known as the **Technology Centers**, a state-supported network of self-managed incubators. These centers provide critical early-stage technical, business, administrative, and financial resources and training for participating firms. The **Thomas M. Teague Technology Center in Fairfield** is specifically geared to biotechnology and related industries.

Addressing Talent Needs

Specialized postsecondary programs

Kennebec Valley Technical College Bioscience Training Program, which operates in collaboration with The Jackson Laboratory, offers curriculum designed to provide students with a sound theoretical base in the life sciences and to include the skills necessary for a variety of employment opportunities. National biotechnology skill standards are incorporated into the coursework.

In 2005, the Governor announced the creation of a **Graduate School of Biomedical Sciences**, and the University of Maine Board of Trustees approved the program in 2006. The University of Maine, in collaboration with The Jackson Laboratory, Mount Desert Island Biological Laboratory, University of Southern Maine, and The Maine Medical Research Institute, will offer a Ph.D. in Biomedical Sciences. The program is expected to accept students beginning in fall 2006.

Contacts

Janet Yancey-Wrona, Ph.D.
 Director
 Office of Innovation
 Maine Department of Economic and Community Development
 59 State House Station
 Augusta, ME 4333
 (207) 624-7499
janet.yancey-wrona@maine.gov

The Biotechnology Association of Maine (BAM) is a trade association that promotes the growth of the industry in the state, represents the industry to government, and influences public policy accordingly. In addition, BAM provides a forum for companies to exchange ideas and information, collects and prepares information relevant to the industry, and provides this information to its members.

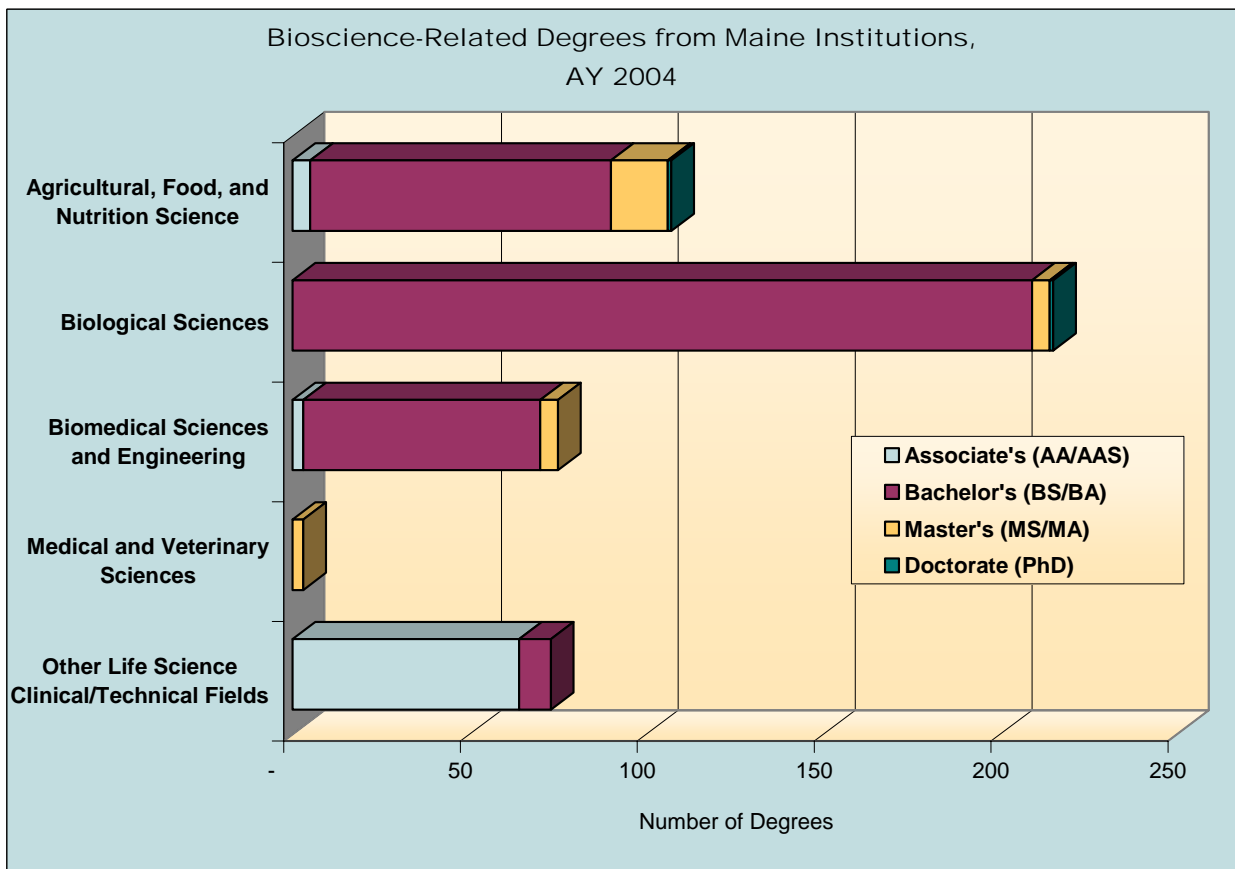
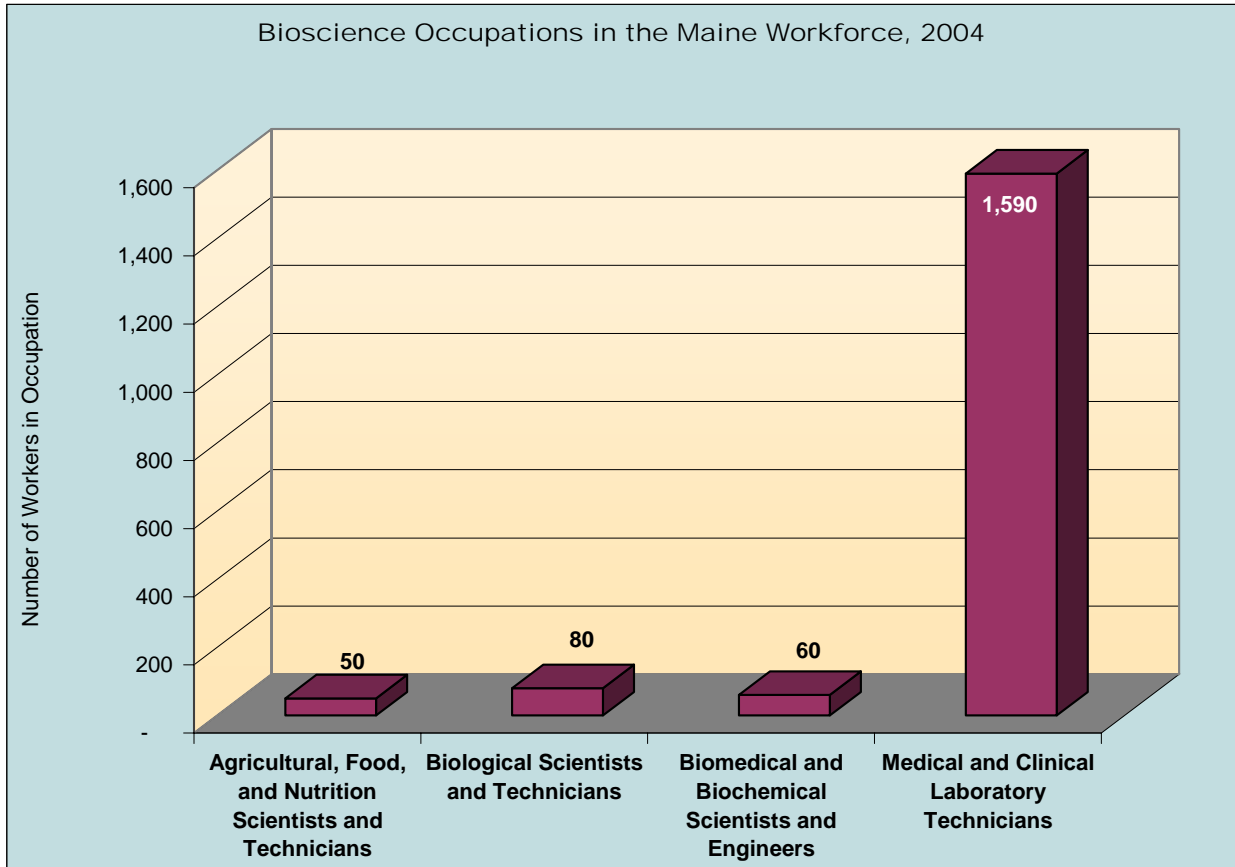
The Center for Innovation in Biotechnology (CIB) is an industry-driven, nonprofit corporation established to catalyze the growth of Maine's biotechnology and biomedical sector by promoting the interaction of scientific excellence, commercial innovation, and business development. To fulfill their similar missions, BAM and CIB, collectively known as Maine Biotech, work collaboratively to achieve their common goals.

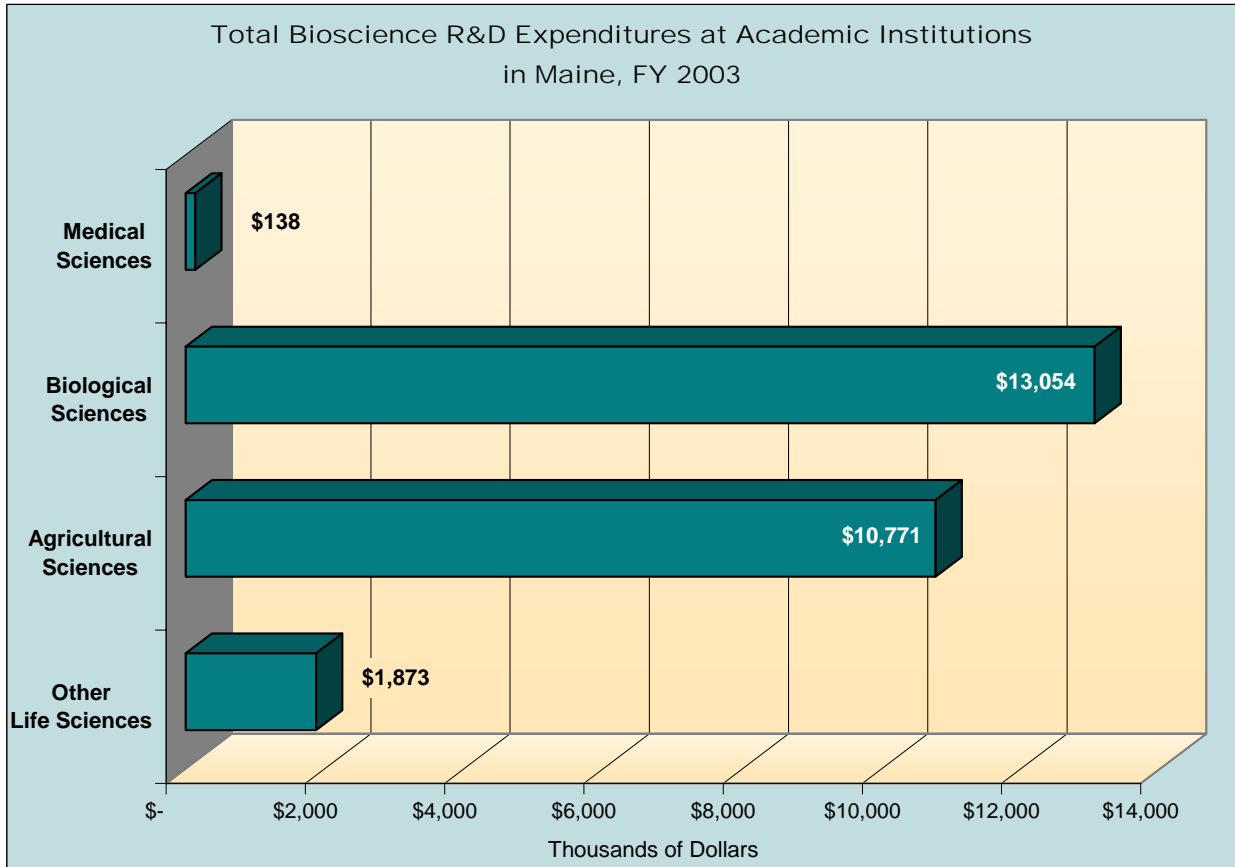
Ms. Cheryl Timberlake
 Executive Director
 Biotechnology Association of Maine
 P.O. Box 615
 150 Capitol Street
 Augusta, ME 04332-0615
 (207) 623-3790
ctimberlake@capitolinsights.com

Industry Subsector	Maine	United States
Agricultural Feedstock & Chemicals		
Establishments 2004	12	2,111
2001-2004 Establishment % Change	15.0%	0.4%
Employment 2004	195	104,893
2001-2004 Employment % Change	11.9%	-6.9%
Share of U.S. Employment	0.2%	100.0%
Location Quotient	0.41	n.a.
Average Annual Wage 2004	\$39,423	\$63,383
Direct-Effect Employment Multiplier	3.43	10.91
Total Employment Impact	671	1,212,094
Drugs & Pharmaceuticals		
Establishments 2004	20	2,589
2001-2004 Establishment % Change	-9.1%	-0.6%
Employment 2004	968	313,207
2001-2004 Employment % Change	3.4%	2.7%
Share of U.S. Employment	0.3%	100.0%
Location Quotient	0.68	n.a.
Average Annual Wage 2004	\$64,273	\$79,303
Direct-Effect Employment Multiplier	5.63	9.51
Total Employment Impact	5,453	2,731,321
Medical Devices & Equipment		
Establishments 2004	53	15,190
2001-2004 Establishment % Change	23.7%	0.2%
Employment 2004	958	411,460
2001-2004 Employment % Change	-2.0%	-3.6%
Share of U.S. Employment	0.2%	100.0%
Location Quotient	0.51	n.a.
Average Annual Wage 2004	\$34,716	\$56,449
Direct-Effect Employment Multiplier	2.19	4.56
Total Employment Impact	2,096	1,817,705
Research, Testing, & Medical Laboratories		
Establishments 2004	103	20,565
2001-2004 Establishment % Change	15.8%	19.4%
Employment 2004	2,508	413,550
2001-2004 Employment % Change	10.3%	8.2%
Share of U.S. Employment	0.6%	100.0%
Location Quotient	1.33	n.a.
Average Annual Wage 2004	\$43,200	\$65,414
Direct-Effect Employment Multiplier	1.92	3.15
Total Employment Impact	4,802	1,272,936
TOTAL PRIVATE SECTOR		
Establishments 2004	46,380	8,156,137
2001-2004 Establishment % Change	7.3%	4.8%
Employment 2004	497,613	109,249,195
2001-2004 Employment % Change	0.2%	-0.7%
Share of U.S. Employment	0.5%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$31,402	\$39,003

Source: Battelle calculations -- based on Bureau of Labor Statistics QCEW data from the Minnesota Implan Group, RIMS II Employment Multipliers from the Bureau of Economic Analysis, and the Census Bureau's Economic Census.

Note: n.a. = metric is not applicable.





	Maine	United States	Rank
University R&D Expenditures, FY 2003			
Total (\$ thousands)	\$75,092	\$40,104,621	50
Life Science R&D (\$ thousands)	\$25,836	\$24,062,088	51
Percent of Total R&D	34.4%	60.0%	
Life Sciences Per Capita	\$19.79	\$82.74	
Change in Life Sciences FY 1999–2003	43.3%	52.7%	
NIH Support to Institutions, FY 2004			
Total (\$ thousands)	\$72,868	\$22,556,459	39
Per Capita Expenditures	\$55.81	\$77.56	
Change in Expenditures FY 2000–2004	62.5%	53.2%	
Higher Education Degrees in Bioscience Fields, AY 2004	473	111,329	44
Bioscience Occupations in the Workforce, 2004	1,780	616,140	45