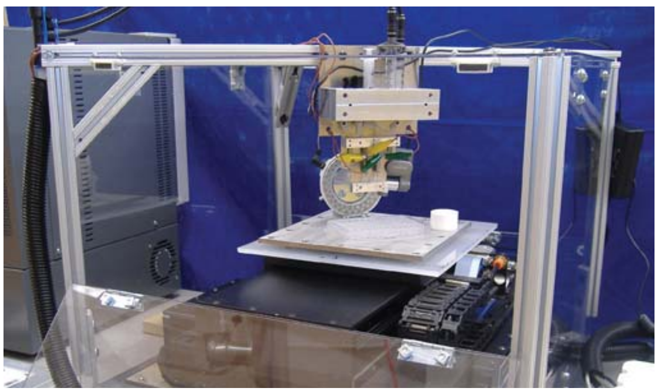
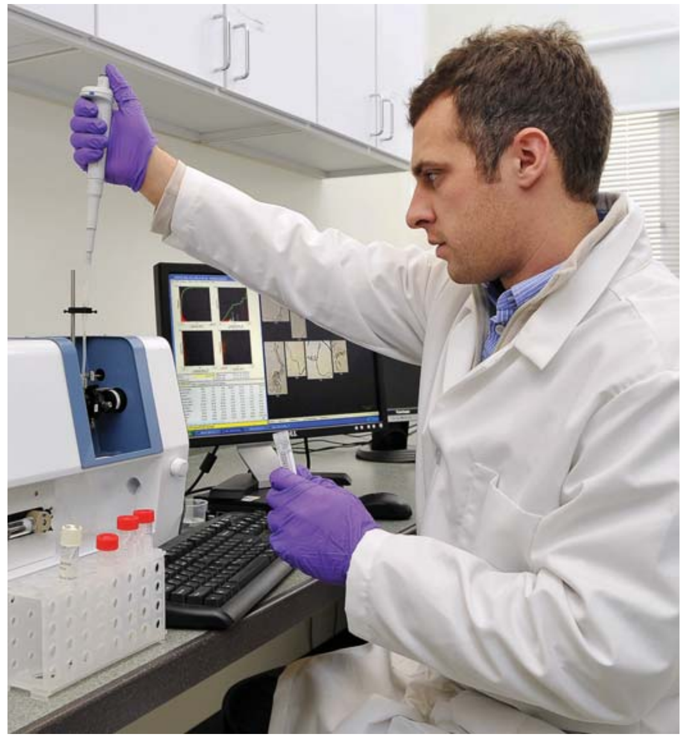
maine innovation index





A Report for the Maine Department of
Economic and Community Development

January 2012

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ECONOMIC DEVELOPMENT

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INTRODUCTION & SUMMARY

Maine's economy has expanded from its traditional bases of forestry, fishing, agriculture, tourism and manufacturing to include an increasing influence from business, financial and health services; information technologies; biomedical technologies; advanced materials; aquaculture; and advanced manufacturing. Furthermore, Maine's economy, like the global economy, is becoming increasingly driven by entities and individuals that operate at innovative crossroads of these sectors. Maine's future success in growing its economic base and increasing the standard of living of its people lies in the ability of its companies, workers, and citizens to foster this innovation.

The Council of Competitiveness, through its National Innovation Initiative, describes innovation as the "intersection of invention and insight, leading to the creation of social and economic value."[1] The Information Technology and Innovation Foundation suggests that innovation is "the creation and adoption of new products, services, production processes and business models."[2]

The importance of innovation in driving Maine's future economic growth cannot be overstated. According to the Council of Competitiveness, innovation is "the single most important factor in determining America's success through the 21st Century. It will drive productivity, standard of living, and leadership in the global economy,"[3] a thought that is echoed by the Information Technology and Innovation Foundation – "States face a new imperative to boost the competitiveness of their economies not just relative to each other, but to other nations."[4]

Maine's Innovation Index 2012 is a compilation of 24 indicators measuring Maine's economic capacity and progress toward competing in an innovation-driven economy. The indicators are organized into five categories representing key components of an innovation-based economy:

- **Research and Development Capacity**
- **Innovation Capacity**
- **Employment & Output Capacity**
- **Education Capacity**
- **Connectivity Capacity**

Research and Development Capacity - Research forms the basis for the successful development of new products, processes and services. The section on research and development (R&D) capacity provides measures of the dollar amount of R&D performance in the state as a percent of gross state product. The measures capture performance (as measured by spending) by the various types of entities engaged in R&D, including industry, academic institutions, and not-for-profit laboratories. Additionally, R&D contributions by the federal government and the state are considered within the R&D capacity section.

Innovation Capacity - Innovation is the continuous process of generating and applying new ideas that lead to commercialization of new products, processes and services. It is this commercialization process that leads to the creation of new jobs and ultimately increased wealth throughout the state. The innovation capacity section of this report assesses Maine's potential for generating innovation by measuring grants obtained through the Federal Small Business Innovation Research program, venture capital attracted, patents issued, and entrepreneurial activity.

Employment & Output Capacity - The depth and breadth of Maine's highly skilled workforce is perhaps the most important indicator of our ability to grow and sustain an innovation-driven economy. For Maine to remain competitive in today's marketplace we need to assure that technology and research-intensive businesses and institutions have a thick labor market of skilled and highly educated workers. With a skilled and knowledge driven labor market, Maine can improve its ultimate economic outcomes: gross state product and per capita income. This section includes the measures of employment within Maine's targeted technology sectors, science and engineering occupations and PhD's in the workforce, gross state product, and per capita income.

Education Capacity - Maine's economic future will depend heavily on the quality of today's education systems. Since knowledge is the raw material of innovation, our education systems must produce students capable of organizing and analyzing information, communicating effectively, and operating in both collaborative and independent settings. As a state, our success relies on our ability to increase access to a quality, life-long education system for all Maine residents. Over the long-term, it is our education capacity that will serve as the foundation for our employment capacity. Furthermore, technology and innovation based businesses rely on workers with solid foundations in math and science as well as advanced knowledge in science and engineering fields. The education capacity section includes the indicators of science and math skills of 8th grade students, the chance for college by age 19, science and engineering graduate enrollments and degrees awarded, and the percent of population 25 and older with bachelor's degree or more.

Connectivity Capacity - The development and deployment of information technology (IT) has profoundly impacted the way we access and use information, and is defining the way we learn, work, and communicate. The section on connectivity capacity measures Maine's ability to provide IT infrastructure to enable businesses, educators, students and citizens to easily access information. Connectivity capacity indicators include high-speed Internet access, household Internet connectivity, and K-12 students per Internet connected classroom computer.

Within each capacity area there are two types of indicators. The first measures the relative strength of the "raw materials" essential to the growth of Maine's innovation economy. Examples include: R&D spending, education attainment, venture capital investments, and Internet connectivity - all necessary inputs that serve as the foundation for innovation-based economic growth. The second type of indicator assesses the performance of Maine's innovation-driven economic growth by measuring key outputs and products. Examples include: patents issued, technology-business establishments, and technology employment. These indicators tell us how Maine's innovation economy is performing and the degree to which inputs are leading to desired outputs and outcomes. In addition to the 24 key indicators, related sub-indicators further describe Maine's performance in growing and sustaining the innovation economy.

In order to assess Maine's performance on the indicators relative to other states and regions, the data for Maine is compared with data for relevant comparison, or reference groups. The reference groups are the U.S. as a whole, the New England states, and the states that are included in the Experimental Program to Stimulate Competitive Research (EPSCoR). The comparison with the U.S. provides the benchmark most commonly used by similar studies that measure a state's performance. The comparison with the New England states allows for an assessment of how well Maine is doing relative to the state's geographic neighbors with whom Maine competes for innovation resources and industry. The comparison with EPSCoR states provides the most analytically sound benchmark because it compares Maine to states that are similar in terms of their historical performance on R&D indicators. Most of the EPSCoR states are rural and lack a high concentration of industry and related innovation resources.

Table 1 presents a summary of Maine's performance for the 24 primary innovation indicators. It is important to note that for some of the indicators, data for the reference group comparisons and five-year trends is not available. The indictors presented are not meant to be the sole-source, definitive assessment of whether Maine is succeeding in building and sustaining an innovation economy. Like all states, Maine has areas that represent strengths or assets that will serve as the building blocks for the future economy. It also has areas requiring improvement in order for the state to foster innovation, leading to commercialization and economic growth. In many of these areas Maine has made significant progress in the last five years. However, it is clear from several of the indicators that more needs to be done.

Existing areas of strength for Maine in building and sustaining an innovation-driven economy - The following are indicators for which Maine's performance ranks it within the top 20 states in the latest year for which data is available:

- Not-for-Profit Laboratory R&D Performance
- Math Skills of 8th Grade Students
- Science Skills of 8th Grade Students
- Higher Education Enrollment among Young People – Chance for College by Age 19
- Classroom Connectivity

Areas in which Maine showed improvement during the last five years in building and sustaining an innovation-driven economy - The following are indicators for which Maine experienced a trend of improvement during the last five years:

- Total R&D Performance
- Industry R&D Performance
- Academic R&D Performance
- Patents Issued
- Ph.D. Scientists and Engineers in the Labor Force
- Per Capita Income
- Math Skills of 8th Grade Students
- Higher Education Enrollment among Young People – Chance for College by Age 19
- Science and Engineering Graduate Enrollments
- Science and Engineering Degrees Awarded
- Classroom Connectivity

Areas in which Maine outperforms its EPSCoR peers - Success in economic development does not occur overnight. Maine, building from a position well behind other states, still has a way to go to successfully compete with the top tier states. However, in several indicators, Maine outperforms its peer states as defined by the EPSCoR program. The following are indicators for which Maine's performance exceeds the EPSCoR states as a whole in the latest year for which data is available:

- Not-for-Profit Laboratory R&D Performance
- SBIR/STTR Funding
- Patents Issued
- Ph.D. Scientists and Engineers in the Labor Force

- Math Skills of 8th Grade Students
- Science Skills of 8th Grade Students
- Higher Education Enrollment among Young People – Chance for College by Age 19
- Education Attainment - % of Population 25 and Older with Bachelor's Degree or More
- Household Connectivity
- High Speed Internet Access
- Classroom Connectivity

Existing areas requiring improvement for Maine in building and sustaining an innovation driven economy - The following are indicators for which Maine's performance ranks it within the bottom 20 states in the latest year for which data is available:

- Total R&D Performance
- Industry R&D Performance
- Academic R&D Performance
- Federal R&D Obligations
- Venture Capital Investments
- Patents Issued
- S&E Occupations in the Workforce
- Gross State Product - % Change
- Science and Engineering Graduate Enrollments
- Science and Engineering Degrees Awarded
- High Speed Internet Access

TABLE 1 - MAINE INNOVATION INDEX 2012 – INDICATOR PERFORMANCE SUMMARY				
INDICATOR	**Maine 1-Year Trend**	**Maine 5-Year Trend**	**Maine Compared to EPSCoR Most Current Year**	**Maine Latest Year National Rank 1-51 with 1=best; (year)**
RESEARCH & DEVELOPMENT CAPACITY				
Total R&D Performance	↑	↑	↓	**40** (2008)
Industry R&D Performance	↑	↑	↓	**35** (2008)
Academic R&D Performance	↔	↑	↓	**43** (2009)
Not-for-Profit Laboratory R&D Performance	↑	↓	↑	**4** (2007)
Federal R&D Obligations	↓	↓	↓	**35** (2008)
State R&D Investments	↓	↓	**N/A**	**N/A** (FY 2011-12)
INNOVATION CAPACITY				
SBIR/STTR Funding	↑	↓	↑	**25** (2010)
Venture Capital Investments	↓	↓	↓	**46** (2010)
Patents Issued	↑	↑	↑	**35** (2010)
Entrepreneurial Activity	↓	↓	↓	**30** (2010)
EMPLOYMENT & OUTPUT CAPACITY				
Targeted Technology Sector Employment - % Change	↑	↓	**N/A**	**N/A** (2011)
Science and Engineering Occupations in the Workforce	**N/A**	**N/A**	↔	**42** (2008)
Ph.D. Scientists and Engineers in the Labor Force	↑	↑	↑	**27** (2006)
Gross State Product Growth	↓	↓	↓	**37** (2010)
Per Capita Income	↑	↑	↔	**30** (2010)

TABLE 1 - MAINE INNOVATION INDEX 2012 – INDICATOR PERFORMANCE SUMMARY				
INDICATOR	**Maine 1-Year Trend**	**Maine 5-Year Trend**	**Maine Compared to EPSCoR Most Current Year**	**Maine Latest Year National Rank 1-51 with 1=best; (year)**
EDUCATION CAPACITY				
Math Skills of 8th Grade Students	N/A	↑	↑	**13** (2011)
Science Skills of 8th Grade Students	N/A	N/A	↑	**8** (2009)
Higher Education Enrollment among Young People – Chance for College by Age 19	N/A	↑	↑	**14** (2008)
Science and Engineering Graduate Enrollments	↓	↑	↓	**51** (2009)
Science and Engineering Degrees Awarded	↑	↑	↓	**38** (2009)
Education Attainment - % of Population 25 and Older with Bachelor's Degree or More	↔	↔	↑	**27** (2010)
CONNECTIVITY CAPACITY				
Household Connectivity[6]	N/A	N/A	↑	**21** (2010)
High Speed Internet Access	↑	N/A	↑	**33** (2010)
Classroom Connectivity	↔	↑	↑	**2** (2006)

Ranking is among all states plus District of Columbia, 1-51 with 1=best. Latest year is in parentheses.

Key: ↑ = Improving Trend or Higher
↓ = Decreasing or Lower
↔ = No Change or Equal
N/A = Not Applicable or Data Not Available

Endnotes

[1] *Innovate America,* Council of Competitiveness, 2004

[2] *The 2008 State New Economy Index,* The Information Technology and Innovation Foundation, 2008

[3] see endnote 1

[4] See endnote 2

[5] EPSCoR focuses on those states that have historically received lesser amounts of federal R&D funding and have demonstrated a commitment to develop their research bases and to improve the quality of science and engineering research conducted at their universities and colleges. The program currently operates in 23 states: Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Carolina, South Dakota, Tennessee, Vermont, West Virginia, and Wyoming, as well as the Commonwealth of Puerto Rico and the U.S. Virgin Islands. For the purposes of this report, Puerto Rico and the Virgin Islands are not included in EPSCoR data calculations. This description is from the EPSCoR Web site at: http://www.ehr.nsf.gov/epscor/start.cfm.

[6] Data is from a different source than previous years and therefore is not compatible for comparison with data presented in previous years of the Maine Innovation Index.

indicators:
– Total R&D Performance
– Industry R&D Performance
– Academic R&D Performance
– Not-for-Profit Laboratory R&D Performance
– Federal R&D Obligations
– State R&D Investments

RESEARCH & DEVELOPMENT CAPACITY OVERVIEW

Research and development (R&D) is a driving force in economic growth. It fuels innovation that leads to new products, processes, technologies, and services. These innovations spawn new industries, new jobs, and ultimately, an improved quality of life. R&D activity also attracts and supports a highly educated and skilled workforce which in turn continues to build a cycle of innovation.

In the last ten years, Maine has made progress on building R&D capacity and performance. In 1999 Maine ranked 45th among all states in total R&D as a percent of gross state product (GSP). In 2008, the latest year for which comparable data is available, Maine improved its ranking to 35th.

Maine's improvement in R&D capacity is by design. In the early 1990's, Maine invested very little in R&D with annual funding levels below $3 million. Since 2000, Maine has maintained annual state R&D investment levels in excess of $20 million with peaks occurring in 2003-04, 2007-08, and 2008-09, due in part to the passage of major bonds for R&D.

Most of the R&D performance indicators in this section are expressed as a percentage of GSP. This provides a measure of both the intensity of R&D in the state (How much is occurring?) and the importance of R&D to the economy (What is its impact?). GSP is also the most accurate way of comparing R&D investments in Maine to other states and the nation. In order to assess Maine's performance relative to other geographic areas, the R&D indicators in this section are presented in comparison to three reference groups. They are the U.S. as a whole, New England, and states that are part of The Experimental Program to Stimulate Competitive Research (EPSCoR).

These indicators attempt to present the most complete picture of R&D funding in Maine, but they are limited by the availability of data. For example, nationwide data on state investments in R&D are not available; likewise, figures for R&D spending by not-for-profit laboratories reflect only their federal sources of funding.

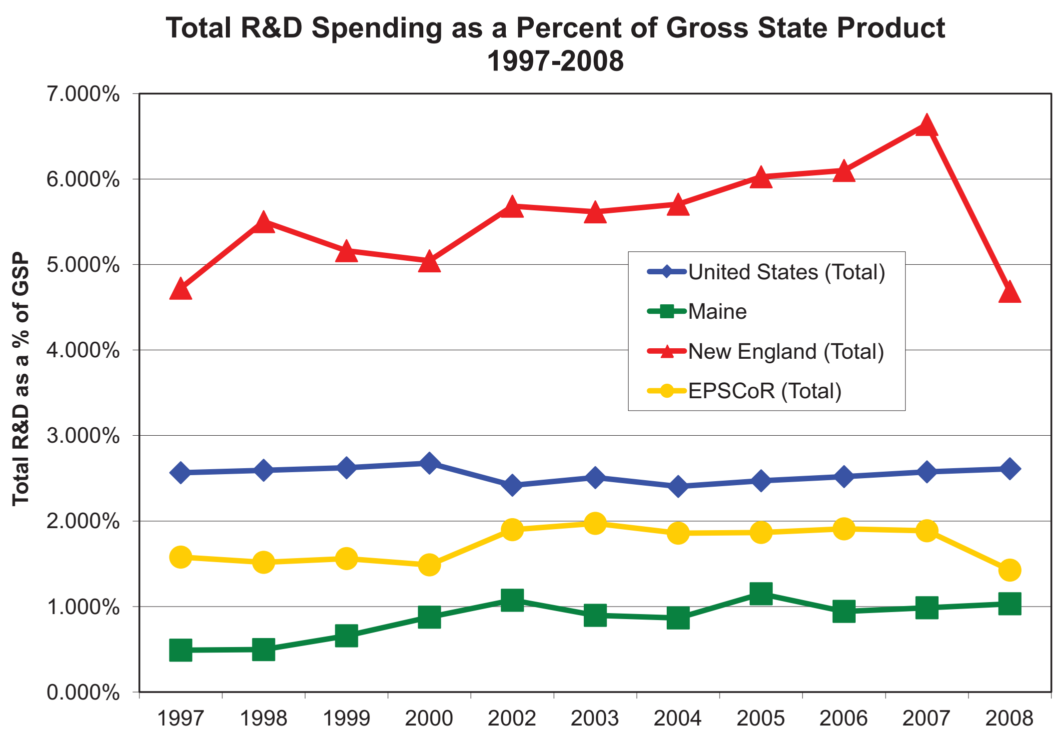
Total R&D Performance

— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	**40**

Summary

In 2008, total R&D performance in Maine represented 1.03 percent of GSP compared to 2.61 percent for the U.S., 4.69 percent for New England, and 1.43 percent for the EPSCoR states. Maine lags the reference groups on this indicator but has made progress. **In 1999 Maine ranked 45th among all states in total R&D as a percent of gross state product (GSP). In 2008, the latest year for which comparable data is available, Maine improved its ranking to 40th.**



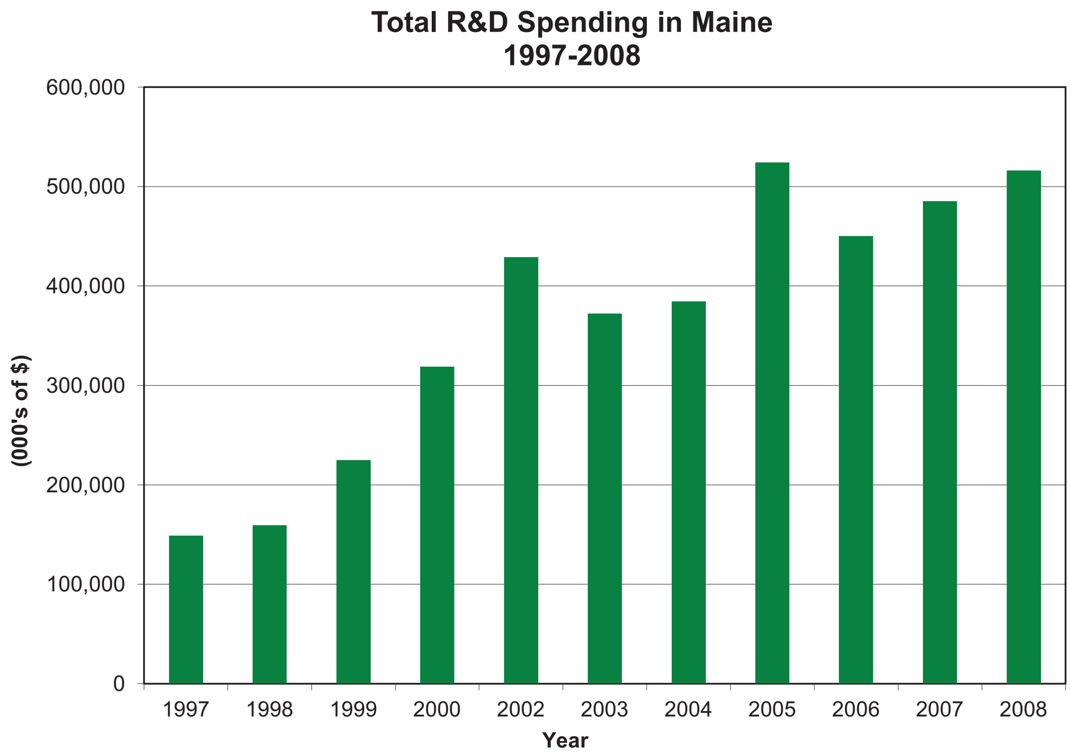
Note: From 1997-2000 & 2002-2007 chart portrays one-year increments; all other years are in two-year increments.

Why This Is Significant

An innovation economy requires investments in research and development to generate the knowledge and discoveries that lead to new commercial products and services. Such research is conducted by industry, academia, not-for-profit laboratories, and government. This indicator is the most comprehensive measure of R&D capacity in Maine and captures all available sources of comparable state data. Expressing R&D expenditures as a percent of gross state product measures both the impact of R&D on the economy and the intensity of R&D that is occurring.

Related

In 2008, total R&D performed in Maine equaled $516 million. This represented an increase of 6.4 percent from the 2007 level. In the same two years, total R&D increased 3.6 percent in the U.S, 11.3 percent among the EPSCoR states, but dropped 7.3 percent in the New England region.



Note: From 1997-2000 & 2002-2007 chart portrays one-year increments; all other years are in two-year increments.

Sources:

Total R&D spending[1] is from National Science Foundation/Division of Science Resources Statistics. National Patterns of R&D Resources (annual series) and 2012 Science and Engineering Indicators; derived from four NSF surveys: Survey of Industrial R&D; Survey of R&D Expenditures at Universities and Colleges, Survey of Federal Funds for R&D, and Survey of R&D Funding and Performance by Nonprofit Organizations; http://www.nsf.gov/statistics.

Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

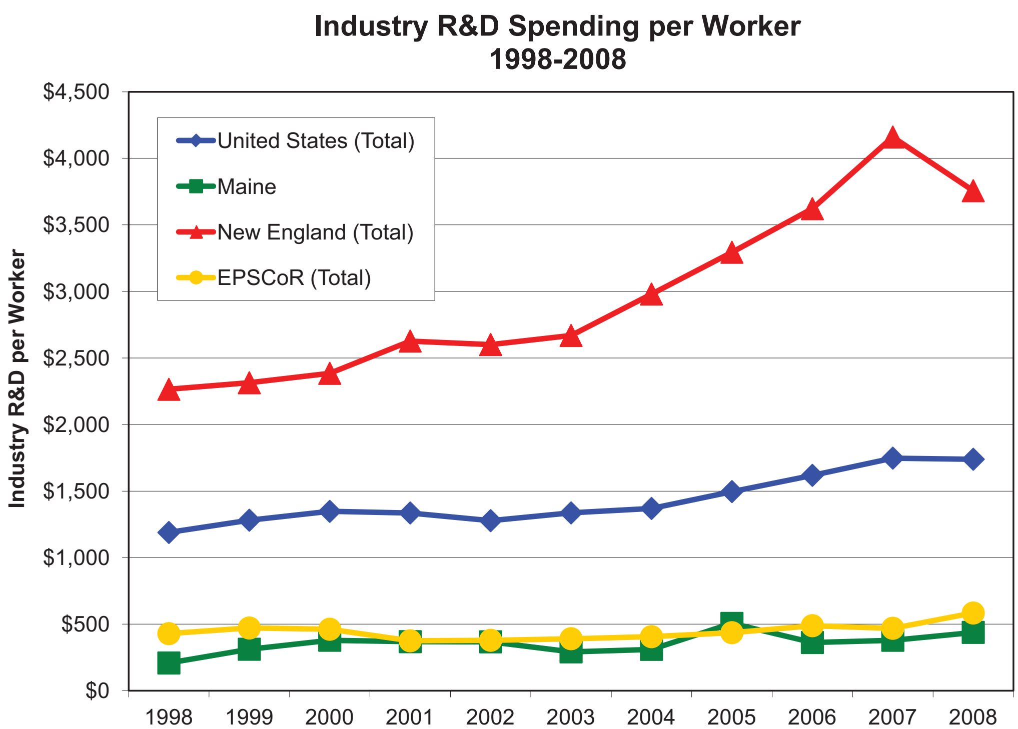
Industry R&D Performance

— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	**35**

Summary

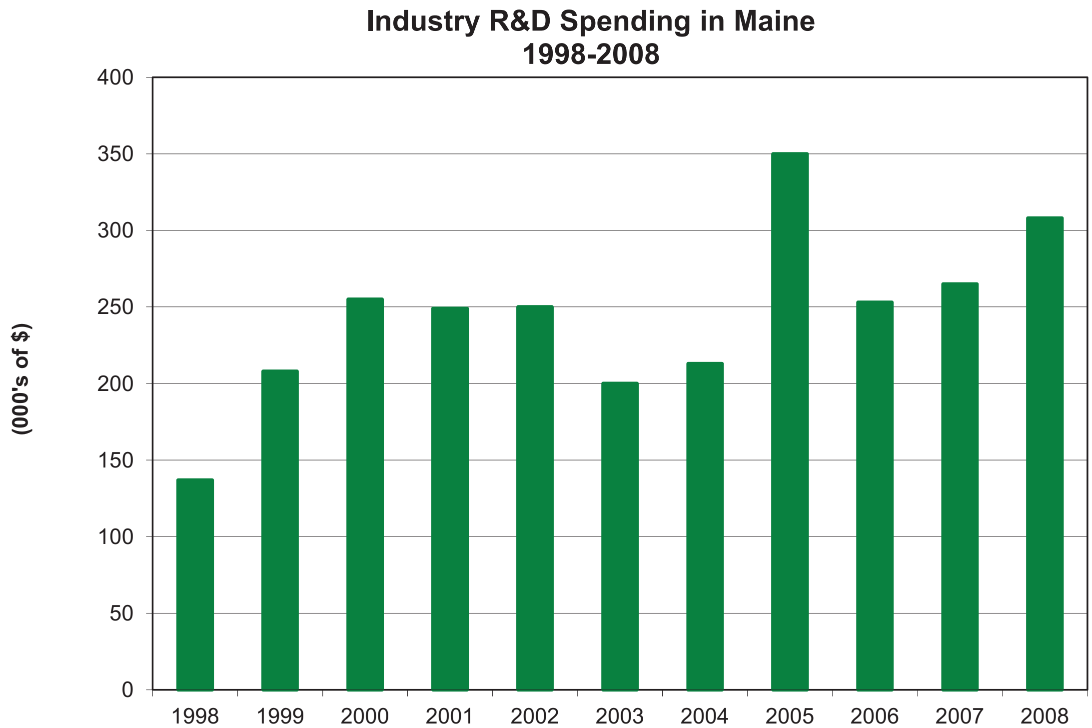
In 2008, industry R&D in Maine represented 0.62 percent of gross state product (GSP). This was slightly lower than the EPSCoR level of 0.69 percent and significantly lower than the U.S. at 1.87 percent and New England at 3.75 percent. In 2008 Maine ranked 35th on this indicator, an improvement from the 2007 level of 38th.



Why This Is Significant

This indicator measures Maine's private sector investments in innovation. Industry R&D comprises the vast majority of the nation's total R&D investments, and is considered to be an indicator of where industry is willing to reinvest its knowledge base and build a competitive advantage. Industry R&D drives state economic growth by creating high paying jobs for the performance of R&D, increasing productivity, and generating new products and services. Industry R&D is particularly important for transforming and growing Maine's economy, which has been historically reliant on traditional, natural resource-based industries. R&D can both strengthen these industries as well as create opportunities for new industries in the state.

INDUSTRY R&D PERFORMANCE



Related

In 2008, industry R&D in Maine equaled $308 million. This represented a 16.2 percent increase from the 2007 level of $265 million. With one exception in 2006[2] Maine has experienced annual growth in industry R&D since 2003.

Sources

Industry R&D performance is from National Science Foundation/Division of Science Resources Statistics, Survey of Industrial Research and Development (various years) and Business R&D and Innovation Survey; http://www.nsf.gov/statistics

Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

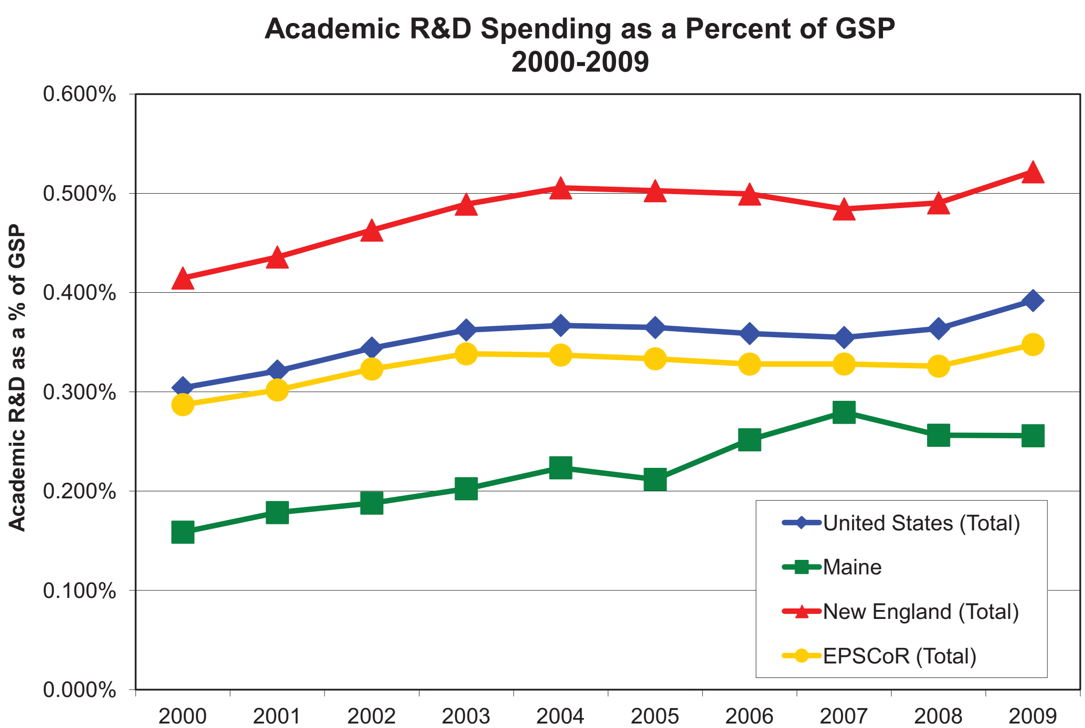
Academic R&D Performance

— performance summary —

Maine 1-Year Trend	⇔
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	43

Summary

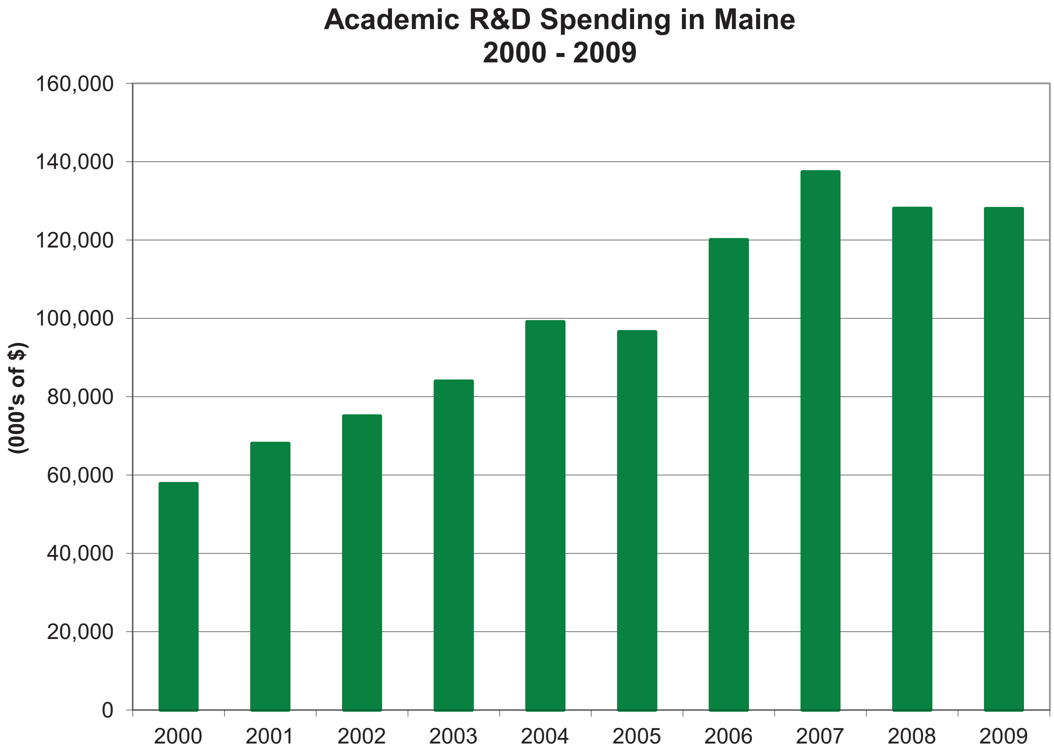
In 2009, R&D performed at academic institutions in Maine equaled $128 million, which was the same as the 2008 level. Maine still lags the benchmark groups including the EPSCoR states, and stayed level in the last year while all other groups saw an increase. In 2009, R&D performed at Maine academic institutions represented 0.25 percent of GSP compared to 0.39 percent in the U.S. as a whole, 0.52 percent among New England states, and 0.35 percent for all EPSCoR states combined. In 2009 Maine ranked 43rd in the nation on this indicator. Between 2005 and 2009 growth in academic R&D in Maine equaled 32.6 percent outpacing the growth experienced on average in the U.S (19.9 percent) and New England (13.6 percent), and the EPSCoR states (20.5 percent).



Why This Is Significant

Universities and colleges are a major source of knowledge and research. In this knowledge-based economy, businesses increasingly seek to develop partnerships with research-oriented universities and colleges to develop and test innovative products and services. A healthy economy also benefits from knowledge workers that begin their advanced learning and research experiences at universities and colleges. This requires investments in R&D at universities and colleges. This indicator reflects the capacity of Maine universities and colleges to conduct R&D and contribute to knowledge-based economic development.

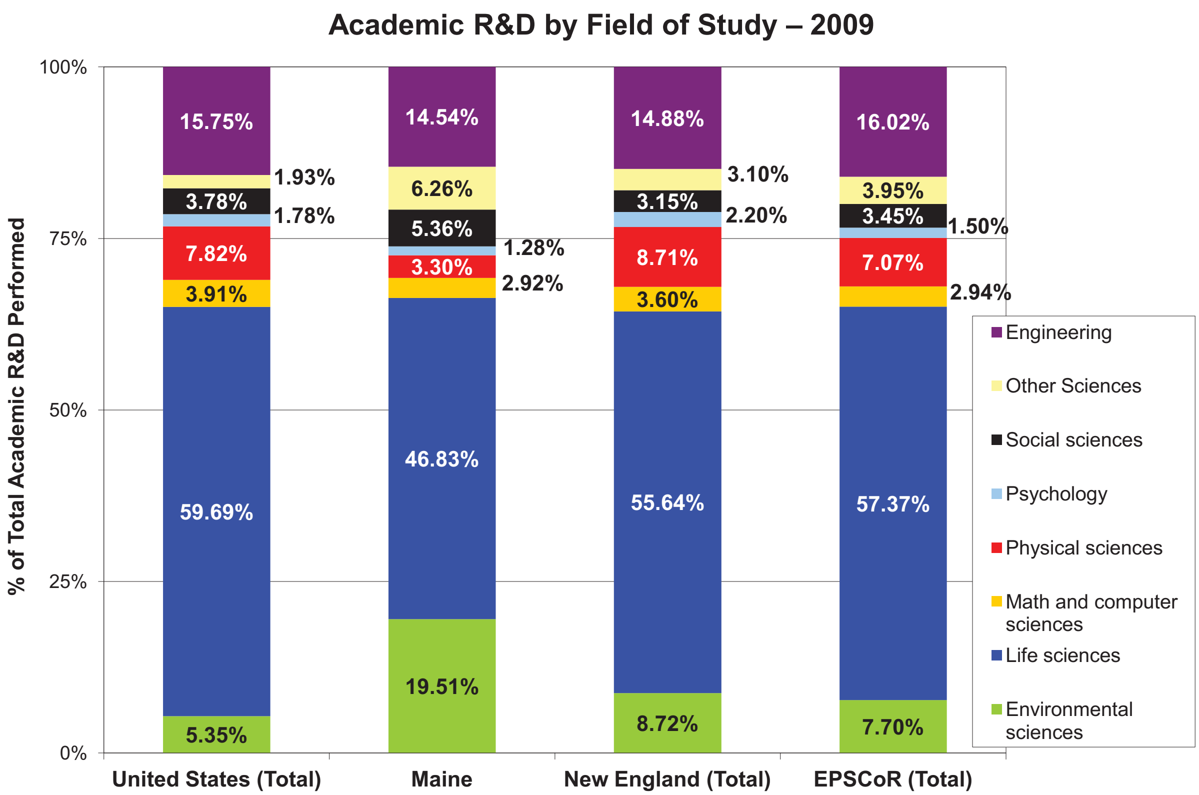
ACADEMIC R&D PERFORMANCE



Related

In 2009, 46.8 percent of all R&D performed by academic institutions in Maine was within the life sciences field.[3] This was the largest field of study for academic-performed R&D in Maine. Life sciences include the fields of agricultural, biological, and medical sciences. Environmental sciences (the fields of atmospheric sciences, earth sciences, and oceanography) followed at 19.5 percent and then engineering at 14.5 percent. These three areas accounted for 80 percent of academic-performed R&D in Maine in 2009.

In comparison to the reference group, in 2009 Maine had a greater concentration of academic performed R&D in the fields of environmental and social sciences and a lower concentration in the field of life sciences.



Sources

Academic R&D performance data[4] is from National Science Foundation/Division of Science Resources Statistics; Survey of R&D Expenditures at Universities and Colleges 2009; http://www.nsf.gov/statistics.

Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

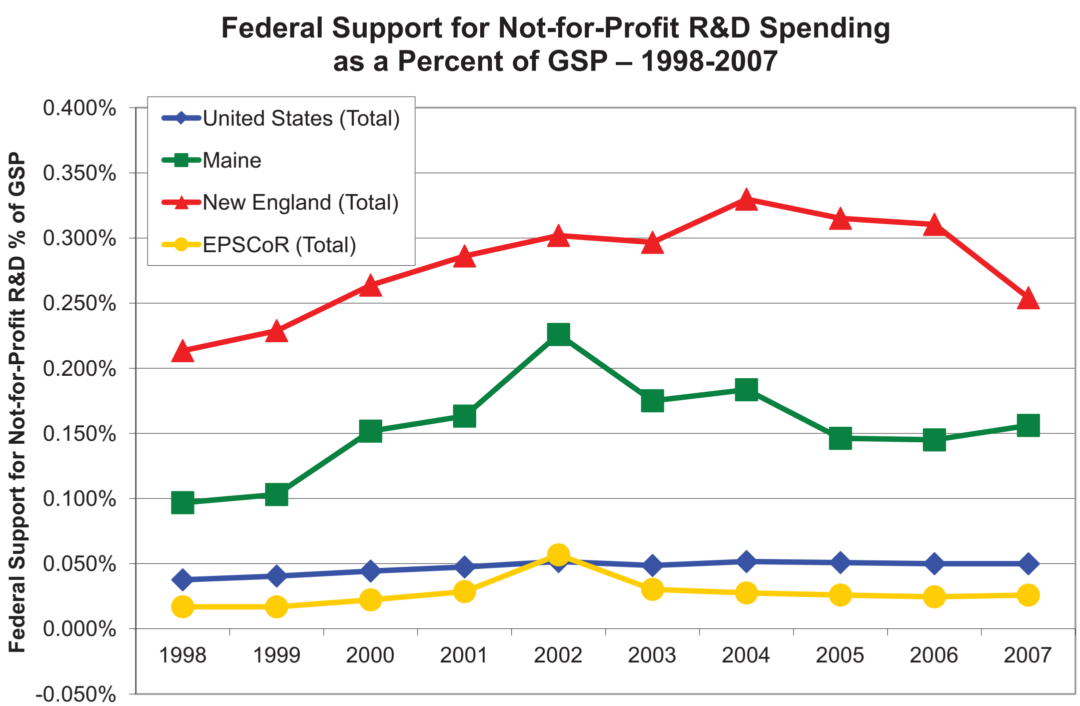
Not-for-Profit Laboratory R&D Performance[5]

— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↑
Maine's National Ranking	4

Summary

Maine continues to be a national leader in R&D performed by not-for-profit research laboratories; however the trend indicates the state's competitive advantage has declined. From 1998 to 2002, R&D performed at Maine's not-for-profit research labs from federal sources of funding grew dramatically, from 0.097 percent of GSP in 1998 to 0.226 percent of GSP in 2002. In 2003, Maine's level dropped to 0.175 percent and increased slightly to 0.184 percent in 2004 but then dropped to 0.146 for 2005. It has since increased to 0.156 in 2007 and has remained significantly above the level of the nation as a whole at 0.050 percent and the EPSCoR states combined at 0.026 percent of GSP. The New England level in 2007 was 0.254 percent, remaining above the Maine level. In 2007, Maine ranked 4th nationally on this indicator.

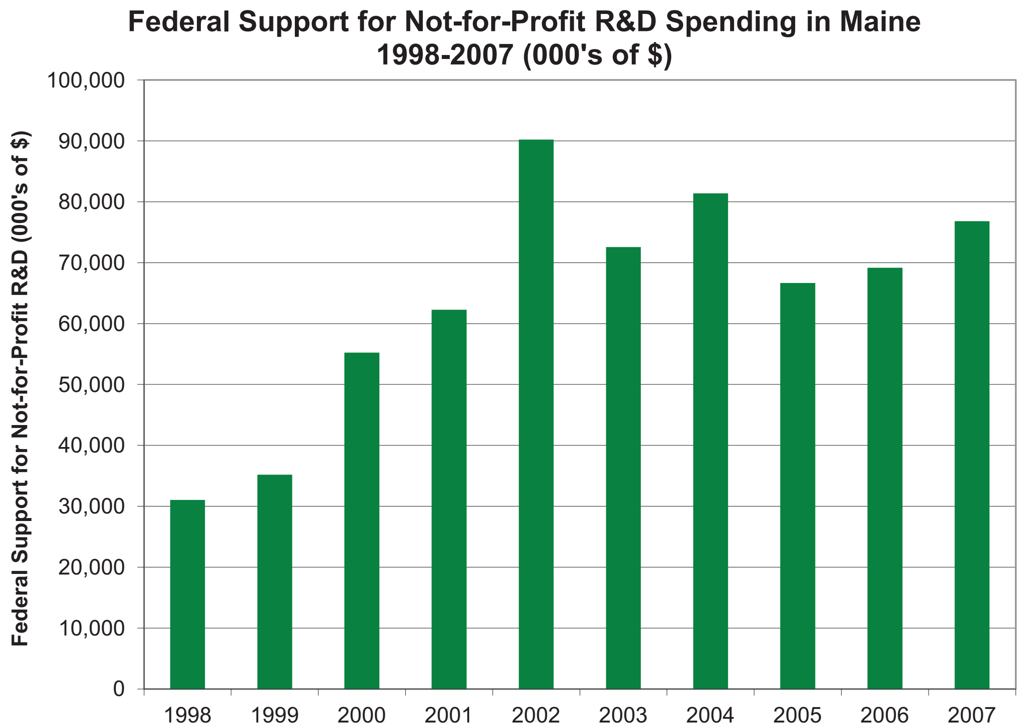


Why This Is Significant

Maine has a robust and economically important not-for-profit research sector. In Maine this sector includes the institutions of Bigelow Laboratory for Ocean Sciences, Foundation for Blood Research, Gulf of Maine Research Aquarium, Jackson Laboratory, Maine Medical Center Research Institute, Mount Desert Island Biological Laboratory, and the Maine Institute for Human Genetics and Health. This is significant because Maine has historically lacked private academic institutions, such as a medical school, that focus on R&D. The not-for-profit institutions are involved in various partnerships with the University of Maine which helps increase Maine's overall R&D capacity. Taken together, Maine's not-for-profit research labs and academic institutions contribute significantly to both R&D performance and the development of students and talent.

Related

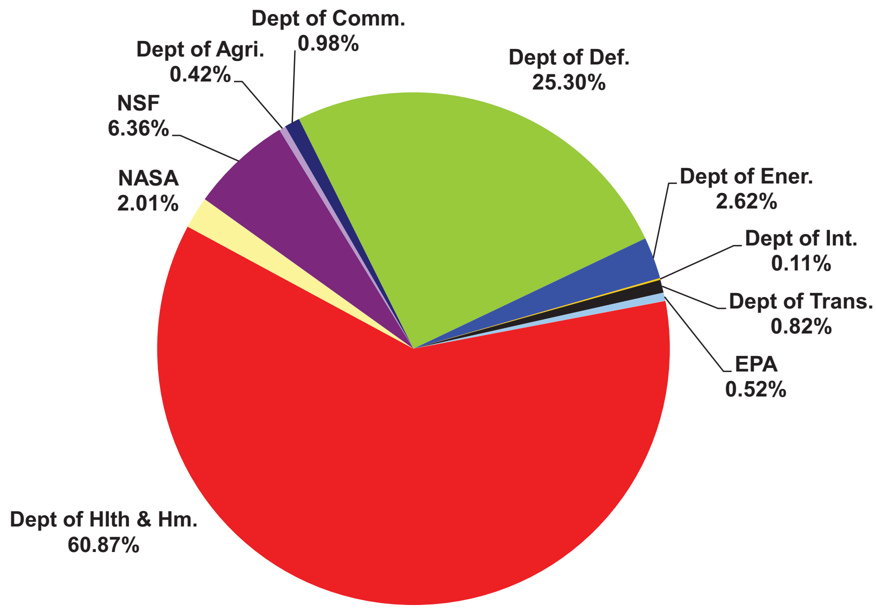
In terms of absolute dollars, federal funding for not-for-profit R&D performance in Maine increased from $31 million in 1998 to more than $81 million in 2004, before falling off to a little less than $67 million in 2005. It has since rebounded slightly and increased to $76.8 million in 2007, a change slightly above (5.8 percent) where it was 5 years previous in 2003.



In terms of what agency the funding is coming from for not-for-profit R&D, Maine relies very heavily on the Department of Health and Human Services, receiving almost 93% of funding from that agency. By comparison, the U.S. as a whole receives 60.9% of its funding from DHHS. Maine also receives some (just under 7%) of its funding from the National Science Foundation, placing it slightly above the U.S. which receives just under 6.5% from the NSF.

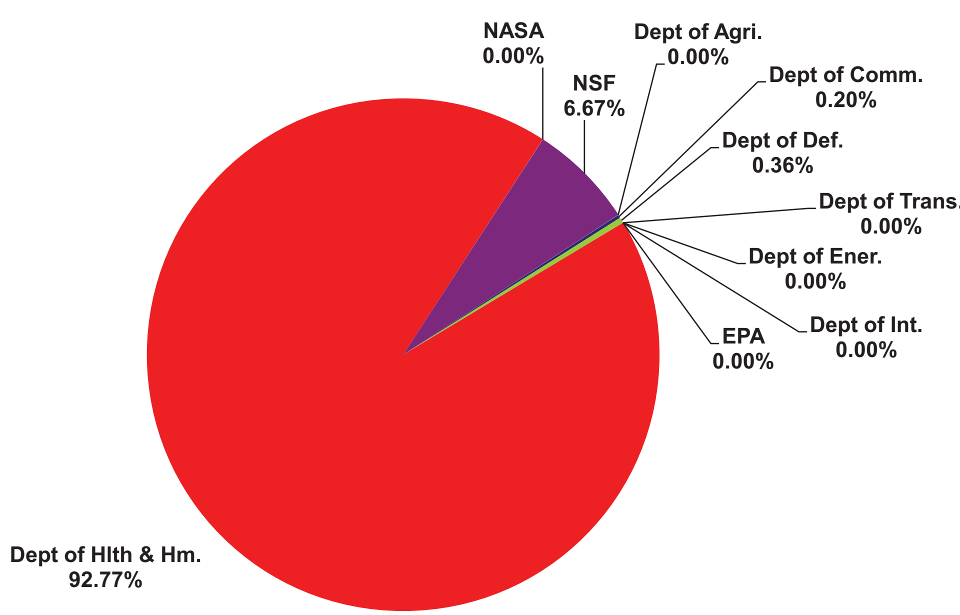
NOT-FOR-PROFIT LABORATORY R&D PERFORMANCE

NonProfit R&D Obligations by Funding Agency – U.S. - 2007



Total Federal R&D Obligations: $6,820,405,000

NonProfit R&D Obligations by Funding Agency – Maine - 2007



Total Federal R&D Obligations: $74,636,000

NOT-FOR-PROFIT LABORATORY R&D PERFORMANCE

Sources

1987-2001 not for profit R&D performed is from National Science Foundation/Division of Science Resources Statistics; National Patterns of R&D Resources 2002 Data Update, derived from Survey of R&D Funding and Performance by Nonprofit Organizations; 2002-2007 is from National Science Foundation/Division of Science Resources Statistics, Survey of Federal Funds for Research and Development: Fiscal Years 2002, 2003, 2004, 2005, 2006 and 2007; http://www.nsf.gov/statistics.

Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

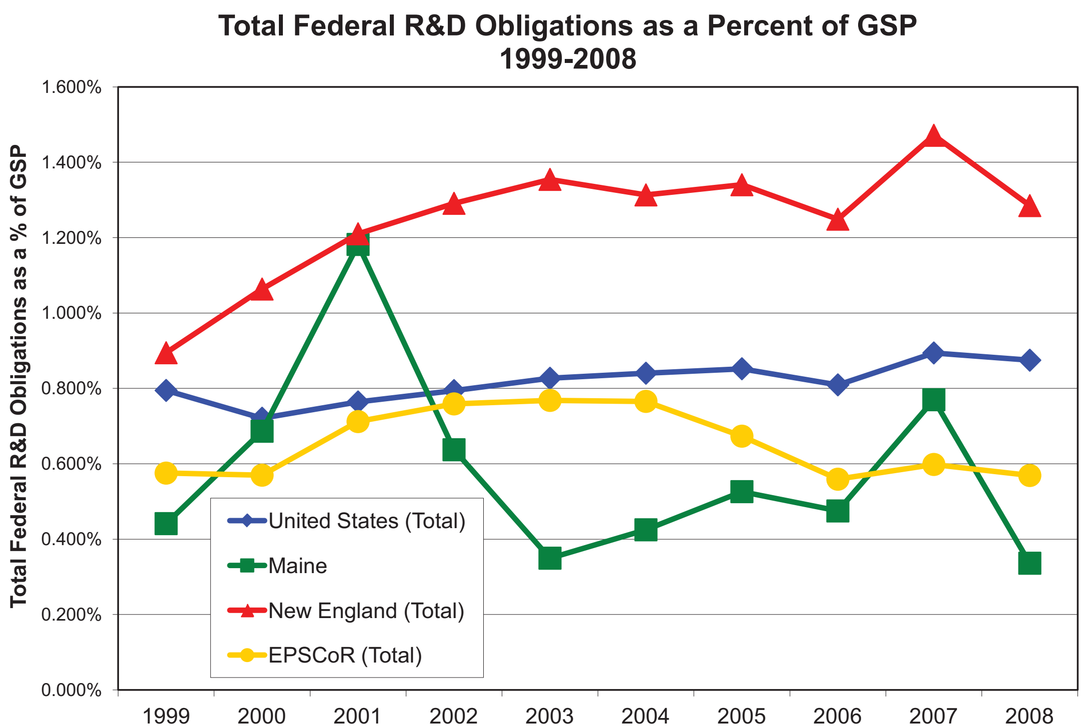
Federal R&D Obligations

— performance summary —

Maine 1-Year Trend	↓
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↓
Maine's National Ranking	35

Summary

Between 1999 and 2001, Maine experienced significant increases in federal funding for R&D to a point where the state caught up with the reference groups on this indicator.[6] During this period, federal funding for R&D in Maine increased from 0.44 percent of gross state product (GSP) to 1.18 percent. However from 2001 to 2003, Maine experienced a drop on this indicator to a level of 0.35 percent of GSP to near 1998 levels. Since then, Maine has seen some recovery up to 2005 where it had the level of 0.53 percent and then it dropped slightly in 2006 to 0.48 percent. In 2007 Maine experienced a jump past the EPSCoR states and approached the U.S. as a whole but well behind the New England level (1.34%)[7]. However Maine has seen a decrease in the last year to below all the reference groups and was at 0.34 percent of GSP.

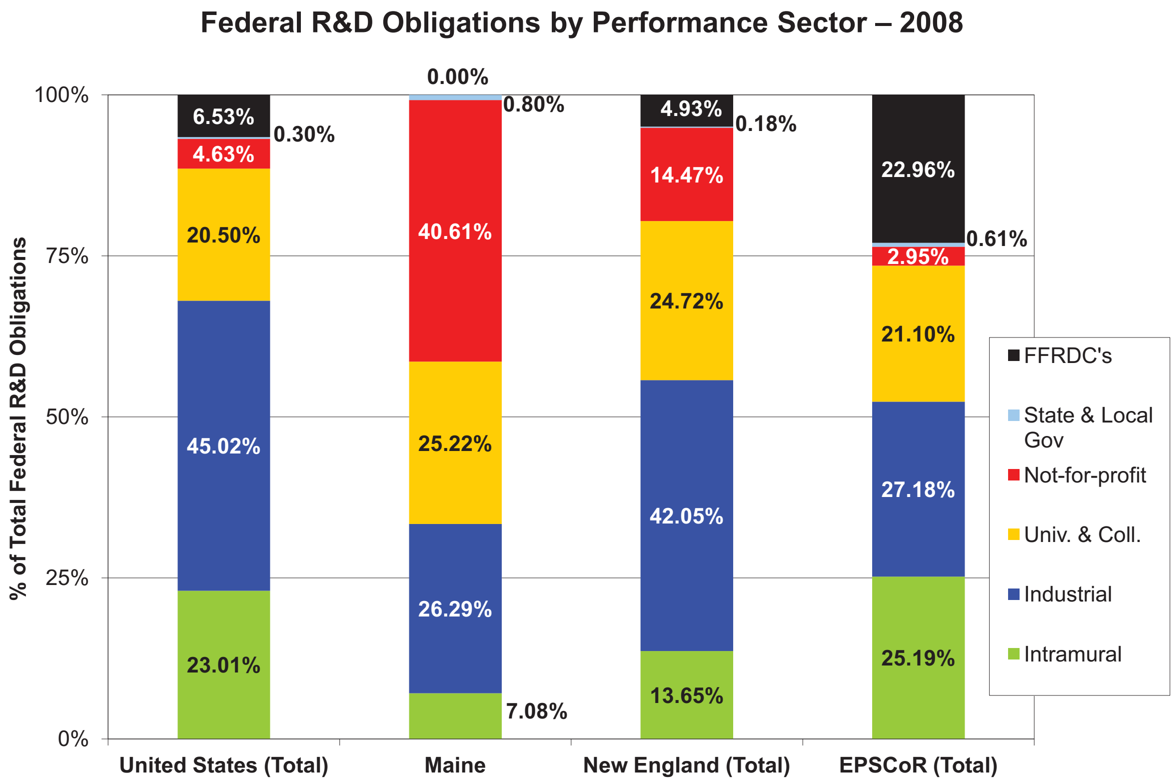


Why This Is Significant

Federal funding is an important source of financial support for R&D, contributing approximately 22 percent of total R&D funding in the U.S. This indicator measures Maine's capacity to access federal funds to support its R&D enterprise. State investments in R&D infrastructure build on the capacity of research entities to access federal R&D grants.

Related

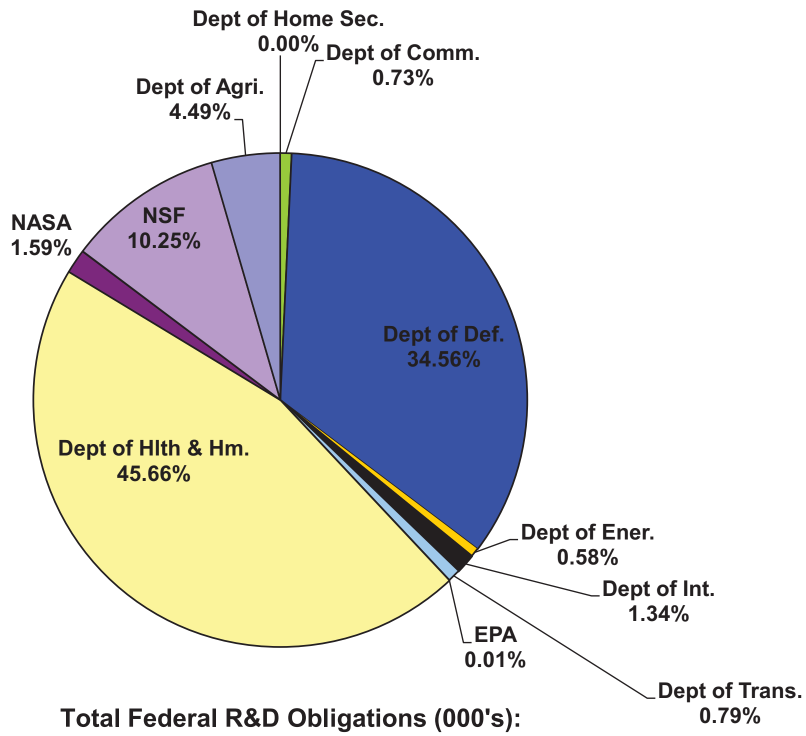
In 2008, the not-for-profit research sector was the largest recipient of federally funded R&D in Maine, accounting for 40.6 percent of the state's federal R&D obligations. Following this was the industrial research sector at 26.3 percent.[8] In comparison to the reference groups – the U.S. as a whole, New England, and the EPSCoR states – Maine's federal obligations for R&D were more highly concentrated in the not-for-profit sector.



In terms of the sources of Federal funds, in 2008, 61 percent of Maine's federal obligations for R&D came from the Department of Defense followed by 14 percent from the National Science Foundation and 12 percent from the Department of Defense. In comparison to the U.S. as a whole in 2008, Maine is similar to the U.S. with funding from the Department of Health and Human Services. However, there appears to be a mismatch between Maine's targeted industry sectors of energy and environmental sciences and the amount of federal funding received from agencies that typically support these industries (Department of Energy and the EPA).

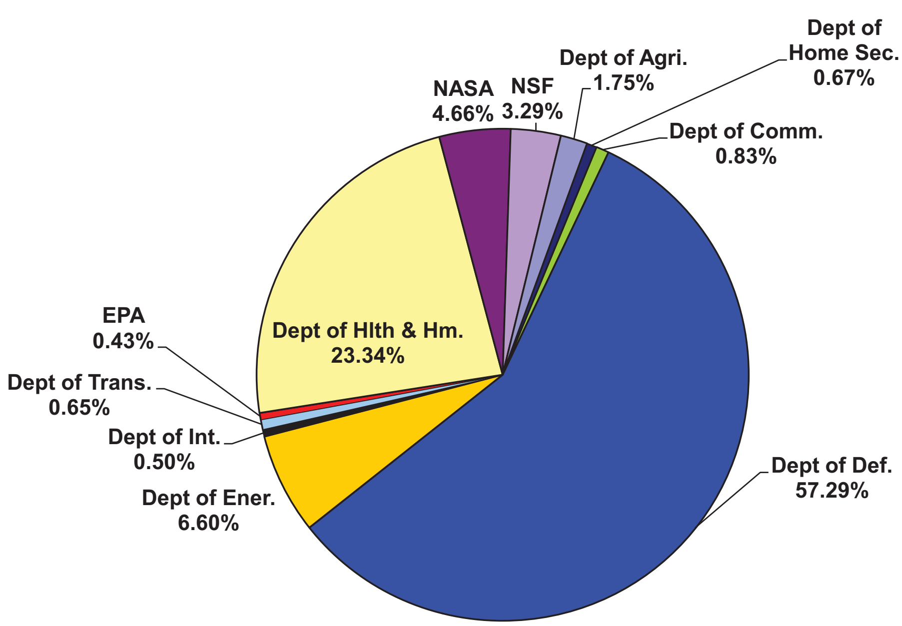
FEDERAL R&D OBLIGATIONS

Federal R&D Obligations by Funding Agency – Maine - 2008



Total Federal R&D Obligations (000's): $168,009

Federal R&D Obligations by Funding Agency – U.S. - 2008



Total Federal R&D Obligations (000's): $124,844,682

Sources

Federal R&D obligations[9] are from National Science Foundation/Division of Science Resources Statistics; Survey of Federal Funds for Research and Development: Fiscal Years 2003-08; http://www.nsf.gov/statistics.

Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

— performance summary —

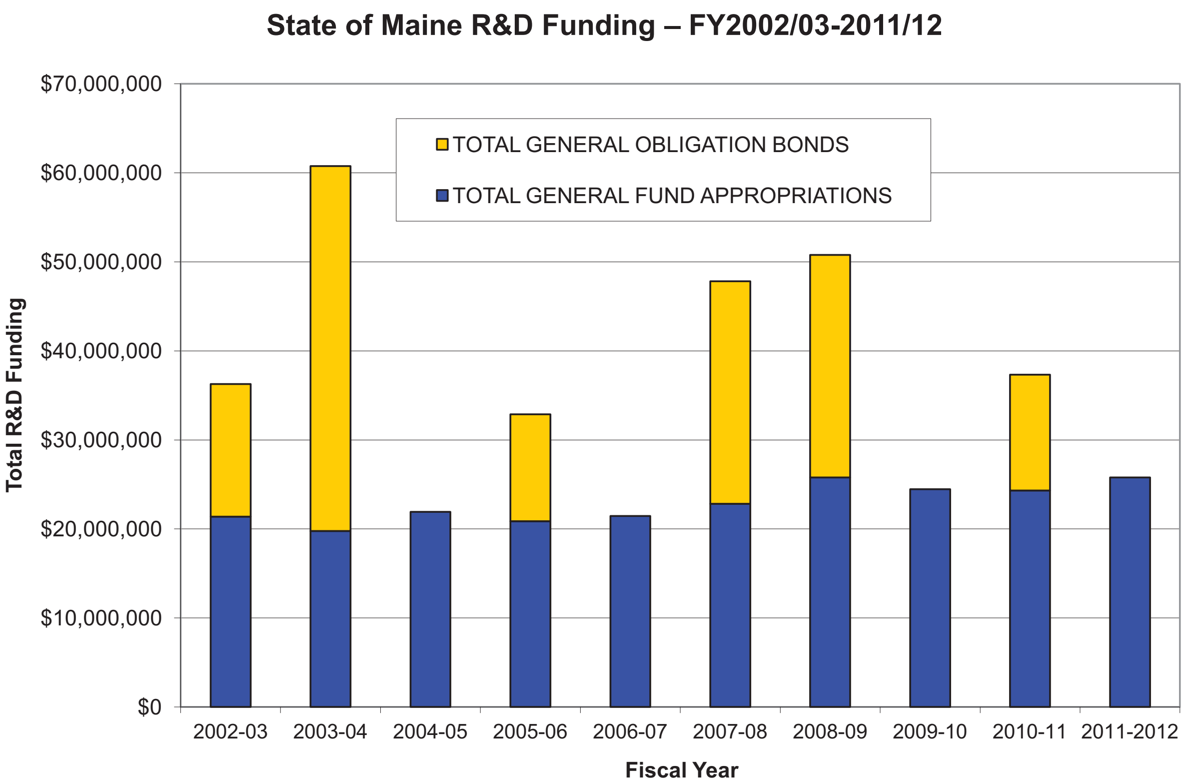
Maine 1-Year Trend ↓

Maine 5-Year Trend ↓

State R&D Investments

Summary

Over the last ten years Maine has seen fluctuations in state-sponsored investments in research and development. In FY 2002-03, Maine had an annual investment level in R&D of just over $36 million. By 2003-04, Maine's annual investment exceeded $60.7 million. Since 2004-05, Maine has maintained an annual state investment level of general fund appropriations between $20 million and $26 million annually. In FY 2011-12, Maine had an annual investment level of $25.8 million.[10]



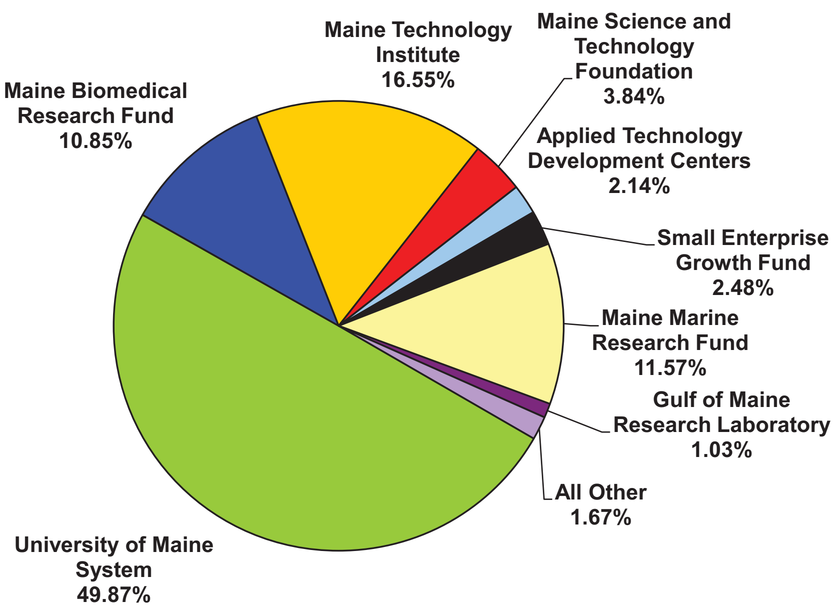
Why This Is Significant

Maine's state-sponsored investments in research and development are used to build infrastructure and leverage federal and industry research funding. Federal R&D expenditures rarely fund research equipment and facilities. Thus, state investments are essential to build physical R&D capacity and to stimulate successful private/public research partnerships. Maine state funds, in particular those provided through the Maine Technology Institute, are also used to fund R&D in small and medium sized business. These businesses don't always have access in the near term to federal R&D funding.

Related

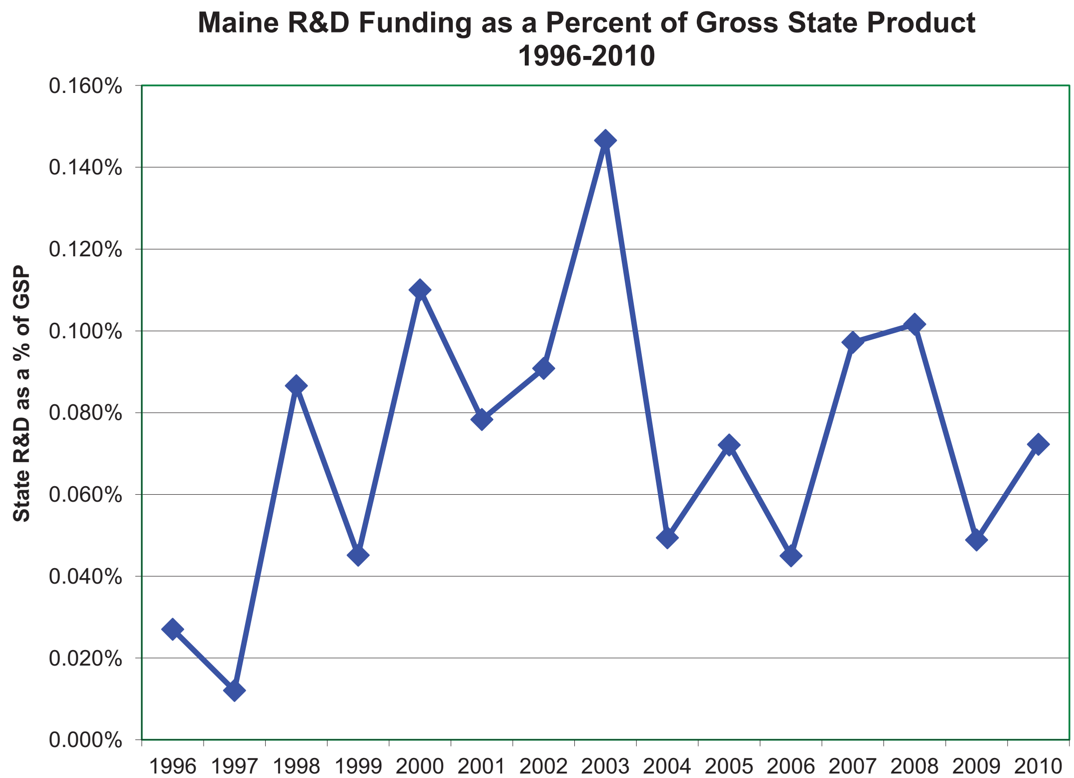
From fiscal year 1996/97 to fiscal year 2011/12, Maine has invested a total of almost $484 million in state funds for R&D. Of this amount, 49.87 percent has supported programs and infrastructure of the University of Maine System[11], 10.85 percent has supported the Maine Biomedical Research Fund, and 16.55 percent has supported numerous businesses through the Maine Technology Institute.

Maine State Funding for R&D by Program
FY1996/97-FY2011/12



Cumulative State Funding for R&D = $483,924,654

As a percent of Gross State Product, Maine's R&D Funding has seen some significant increases from 1996 to 2010. In 1997, Maine's R&D funding was at a low of 0.012% of gross state product. In 2008, however, the percent had increased to 0.100% before dropping back down to 0.048% in 2009 and back up to 0.072% in 2010. The larger increases, such as in 2003, are reflecting the general obligations bonds that were passed in the state those years.



Source

State R&D investment was compiled by Camoin Associates from data provided by the Maine Legislature, Office of Fiscal & Program Review.[12]

Gross State Product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

Endnotes

[1] Total R&D includes R&D for all performance sectors including industry, universities and colleges, non-profit in-stitutions, federal government, and federally funded research development centers from all sources of funding. Not-for-profit performed R&D as reported by NSF includes only that which is funded by the federal government. Therefore, this data understates the intensity of not-for-profit performed R&D.

[2] This drop in industry R&D from 2005 to 2006 was driven largely by a $68 million drop in the publishing sector and a $58 million drop in the pharmaceuticals and medicines sector; a total drop of $126 million in two sectors alone.

[3] Academic Fields of Study are defined as: Engineering (aeronautical and astronautical, bioengineering and biomedical, chemical, civil, electrical, mechanical, metallurgical and materials); Physical Sciences (astronomy, chemistry, physics); Environmental Sciences (atmospheric, earth sciences, oceanography); Mathematical Sciences; Computer Sciences; Life Sciences (agricultural, biological, medical); Psychology; Social Sciences (economics, political science, sociology); unclassified.

[4] Academic R&D performance excludes federally funded research and development centers administered by academic institutions, of which Maine has none.

[5] Excludes nonprofit federally funded research and development centers administered by academic institutions for which there are none in Maine but that do exist nationally. Also, the not-for-profit data only includes research expenditures funded by the federal government because data from other funding sources is not available on a state basis.

[6] The federal R&D data in this section represent obligations as opposed to outlays. According to NSF, obligations represent the amounts for orders placed, contracts awarded, services received, and similar transactions during a given period, regardless of when the funds were appropriated and when future payment of money is required.

[7] The increase in 2007 federal funding was driven largely by an increase in Department of Defense funding to Maine industry.

[8] This includes federally funded research and development centers (FFRDC's). These are R&D-performing organizations that are exclusively or substantially financed by the Federal Government and are supported by the Federal Government either to meet a particular R&D objective or, in some instances, to provide major facilities at universities for research and associated training purposes. Each center is administered either by an industrial firm, a university, or another nonprofit institution. Maine has no FFRDC's. Intramural performers are the agencies of the Federal Government. Their work is carried on directly by federal agency personnel.

[9] Includes the obligations of the 10 or 11 major R&D supporting agencies that were requested to report this information; together they represent 96 percent or more of the total R&D obligations.

[10] Includes general fund appropriations as well as bonds approved as of November 5, 2010, but doesn't reflect curtailments and budget adjustments for FY2010-11.

[11] Includes Maine Economic Improvement Fund, State Res. Lib. for Business, Science & Technology, Strategic Technology Initiative Program Funding, Debt Service for previous R&D Bonds, and Bonds for the Advanced Engi-

neered Wood Composites Center, USM Bioscience Wing, and Maine Agricultural Research Farms. Includes all campuses within UMaine System

[12] State R&D investments in Maine include portions of funding within the following program areas:

- University of Maine System
- Maine Technology Institute
- Maine Marine Research Fund
- Maine Biomedical Research Fund
- Maine Applied Technology Development Center System
- Centers for Innovation
- MERITS
- ScienceWorks
- Governor's Marine Studies Fellowship
- Small Enterprise Growth Fund
- EPSCoR
- Maine Science and Technology Foundation (now defunct)
- Maine Patent Program
- Gulf of Maine Research Laboratory
- NASA Partnership
- Downeast Institute for Applied Marine Research
- Schoodic Education and Research Center

This does NOT include funding for the Office of Innovation, the R&D evaluation or the Innovation Index

indicators:
- SBIR/STTR Funding
- Venture Capital Investments
- Patents Issued
- Entrepreneurial Activity

INNOVATION CAPACITY OVERVIEW

Financial investment, knowledge, skill, and creativity form a package of ingredients that foster an innovative business environment. This environment allows people to take risks, create new products and services, and grow their business ventures.

In terms of growing small innovative businesses, Maine regressed during the last year for which data is available on some of the four indicators measured. Maine has dropped from being a leader in 2006 in the area of entrepreneurial activity to falling behind all reference groups. Maine remains below the U.S. and New England average levels of SBIR/STTR funding as a percent of GSP but is ahead of all EPSCoR states combined.

Maine needs to improve its efforts in terms of attracting venture capital, producing patents, and starting new companies. In the latest years for which data is available, Maine lags New England and the U.S., as a whole, in generating patents. Maine and the EPSCoR states also continue to lag the nation and New England in attracting venture capital. However, since venture capital is so highly concentrated in just a few states, using U.S. averages can distort Maine's relative performance in this area.

The findings in this index are consistent with the findings in Maine's Comprehensive Evaluation of State Investments in R&D that Maine needs to continue to improve its ability to transfer knowledge and technology to commercial applications and ventures and focus it efforts on innovative growth-oriented companies.

SBIR/STTR Funding

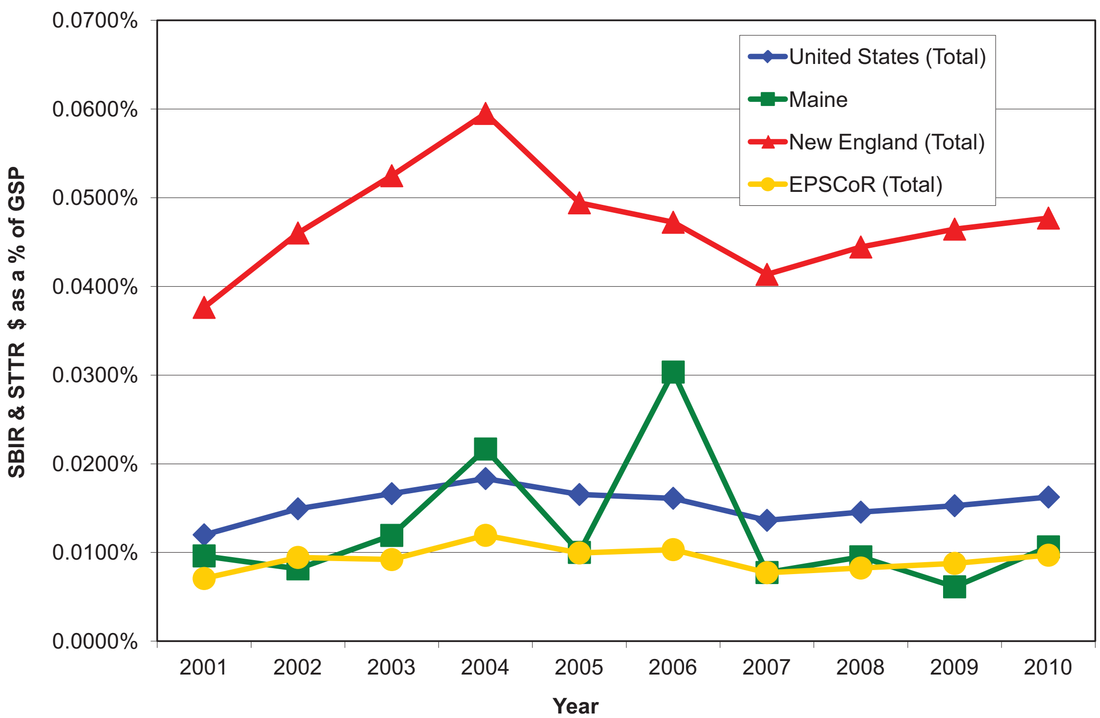
— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↑
Maine's National Ranking	25

Summary

Between 2001 and 2010, funding for the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs as a percent of gross state product (GSP) spiked in 2004 and 2006. In 2001, SBIR/STTR funding in Maine represented 0.0096 percent of GSP; in 2009 it represented 0.106 percent, an increase from 0.0061 percent in 2009. In 2010, Maine increased and was above the EPSCoR states (0.0097 percent) but below the level for the U.S. (0.0163 percent) and New England (0.0477 percent). Maine's national ranking among the states also increased from 36th in 2009 to 25th in 2010.

Total SBIR & STTR $ as a Percent of Gross State Product 2001-2010



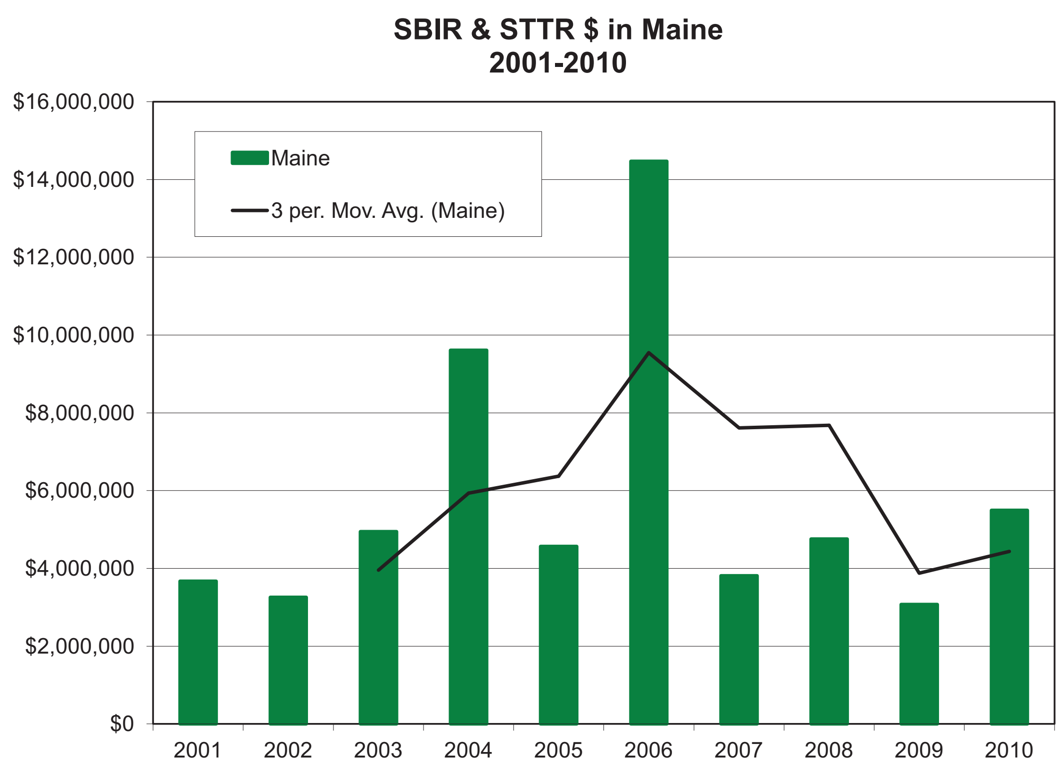
Why This Is Significant

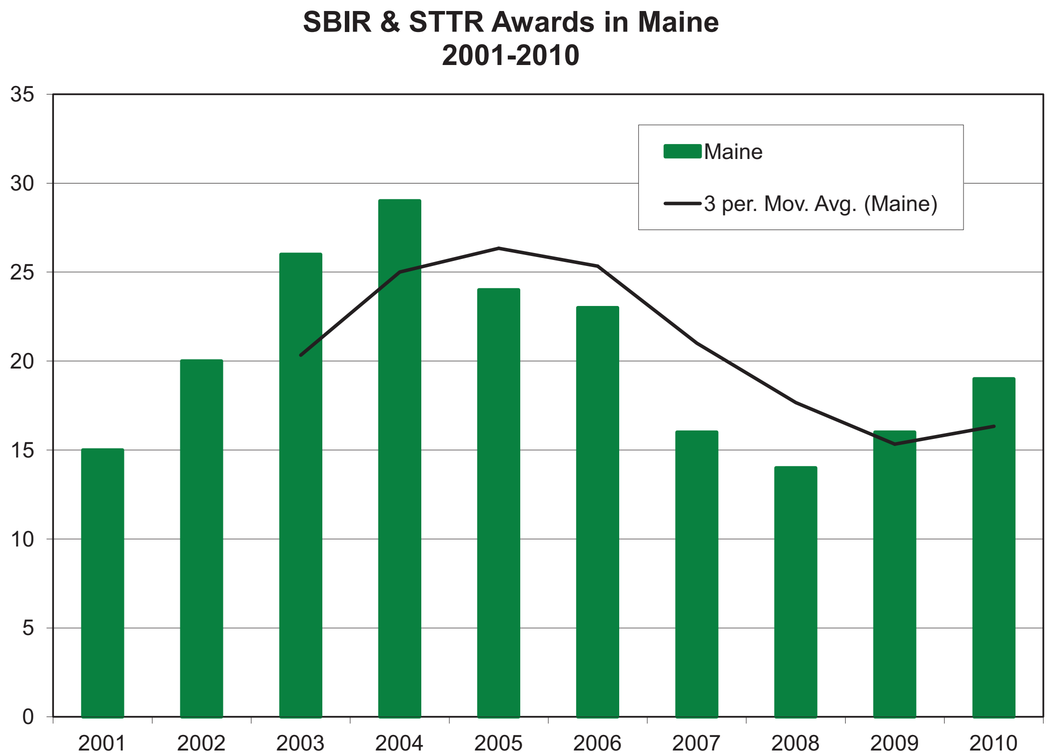
The Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs are important sources of early stage capital for technology-based entrepreneurs. The U.S. Congress established the SBIR program with the purpose of increasing opportunities for small businesses to participate in federal research and development and to stimulate technological innovation. The program funds high-risk R&D that may have commercial potential. It offers a way for small firms to obtain seed money to do the advanced R&D often necessary to enter into new projects. Similarly, Congress created the STTR program to encourage commercialization of university and federal laboratory R&D by small businesses and to foster the development of partnerships between universities and small firms. This type of funding and support is rarely available in the private marketplace, so the programs serve as a critical lifeline for research-intensive small businesses.

These programs are valuable in that they help small businesses build scientific and technical leadership in their industries. In an increasingly competitive marketplace, such leadership is key to innovation and the subsequent sales that innovation brings to small firms. Success in winning SBIR awards also is often helpful in attracting outside capital investments. Finally, success in the SBIR/STTR programs serves as a proxy indicator for Maine's ability to grow new generations of high-potential entrepreneurs.

Related

In 2010, the SBIR/STTR programs provided more than $2.36 billion nationwide in federally sponsored, early stage capital for entrepreneurial technology-based businesses. In 2010, Maine companies received a total of $5.49 million in SBIR/STTR awards. This represented an increase of 78.9 percent from 2009. In terms of number of awards, in 2010, Maine received 19 awards, up from 16 in 2009. This indicates that the average award amount was greater in 2010 than 2009.





Sources

SBIR/STTR data is from the U.S. Small Business Administration, http://web.sba.gov/tech-net/public/dsp_search.cfm

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/

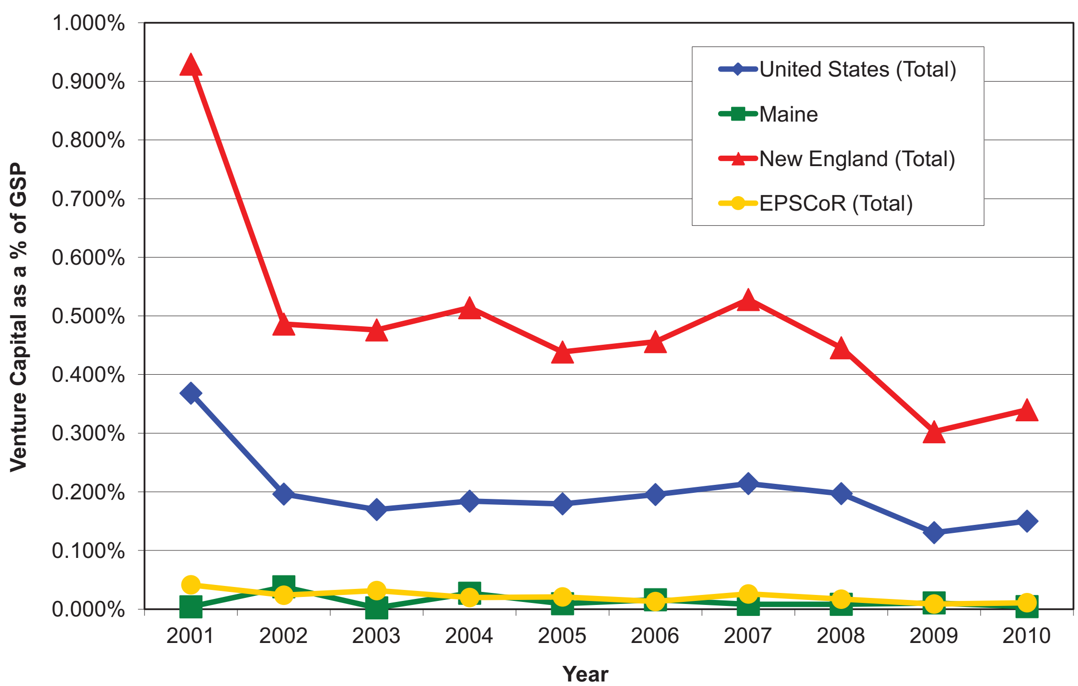
Venture Capital Investments

— Performance Summary —	
Maine 1-Year Trend	↓
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↓
Maine's National Ranking	**46**

Summary

In 2010, venture capital investments in Maine were 0.004 percent of gross state product (GSP). This was significantly lower than the New England level of 0.370 percent and the total U.S. level of 0.150 percent for the same year, and below the level for all EPSCoR states combined at 0.011 percent. New England's high level is skewed by the performance of Massachusetts, which remains the second largest state recipient of venture capital investments (over 61% of all reported venture capital goes to California and Massachusetts). Maine's venture capital investments as a percentage of GSP have remained relatively low between 2001 and 2010. Maine's national ranking has dropped from 34th in 2009 to 46th in 2010.

Venture Capital Invested as a Percent of Gross State Product – 2001-2010

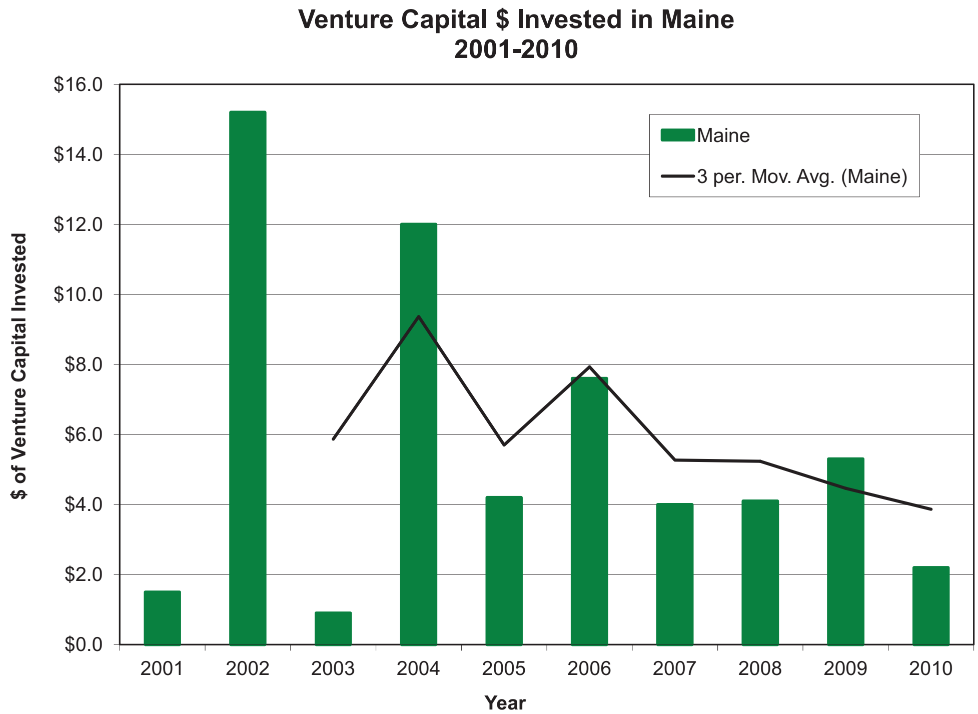


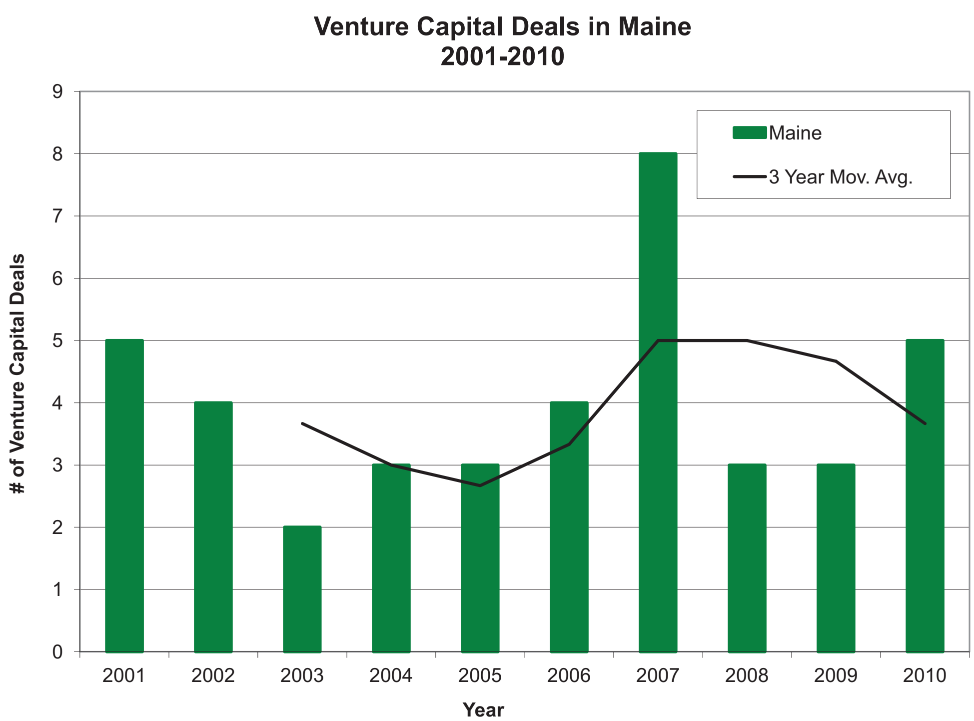
Why This Is Significant

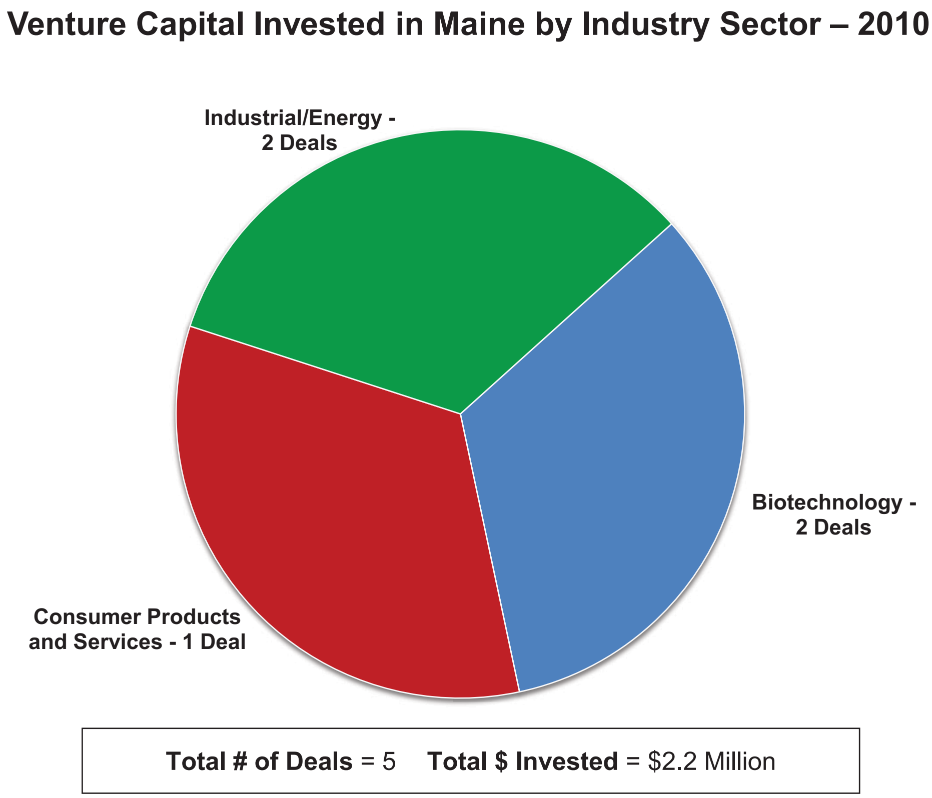
Venture capital, along with other equity and near equity capital, is a critical source of funding for technology-based startups and companies with high growth potential. States with access to venture capital tend to create technology-based companies at higher than average business formation rate. While the U.S. Federal Reserve reports that less than two percent of small business financing comes from venture capital, this form of capital is significant for companies with the highest growth potential, including technology-based companies. The venture capital industry is highly concentrated in a few states, such as California and Massachusetts. States outside of traditional venture capital centers often have limited access to these funds. As such, it is important for the State to develop ways of attracting interest from venture capitalists in nearby centers such as Boston. Maine's proximity to the Boston metro area represents a potential competitive advantage in this regard and one which Maine has yet to fully take advantage of.

Related

In 2010, Maine received $2.2 million in venture capital investments. This represented an increase of 58.5 percent from the Maine 2009 level of $5.3 million. Maine's $2.2 million in venture capital received in 2010 was part of five deals within the industry classes of biotechnology, consumer products and industrial/energy.







Sources

Venture capital investments data are from MoneyTree Venture Capital Profiles by State; based on PricewaterhouseCooper/Venture Economics/National Venture Capital Association Surveys; http://www.venturexpert.com/VxComponent/static/stats/2010q4/0MAINMENU.html; Data Current as of November 2011

Venture Capital Invested in Maine by Industry Sector is from http://www.pwcmoneytree.com/

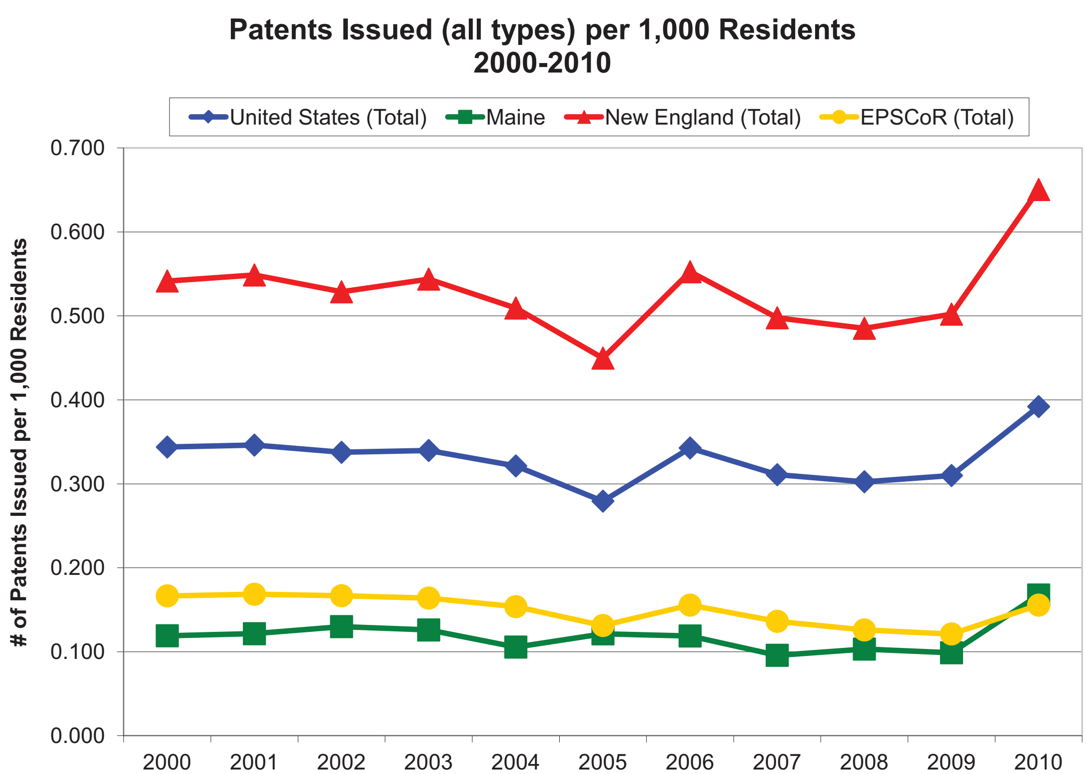
Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/

Patents Issued

— Performance Summary —	
Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	35

Summary

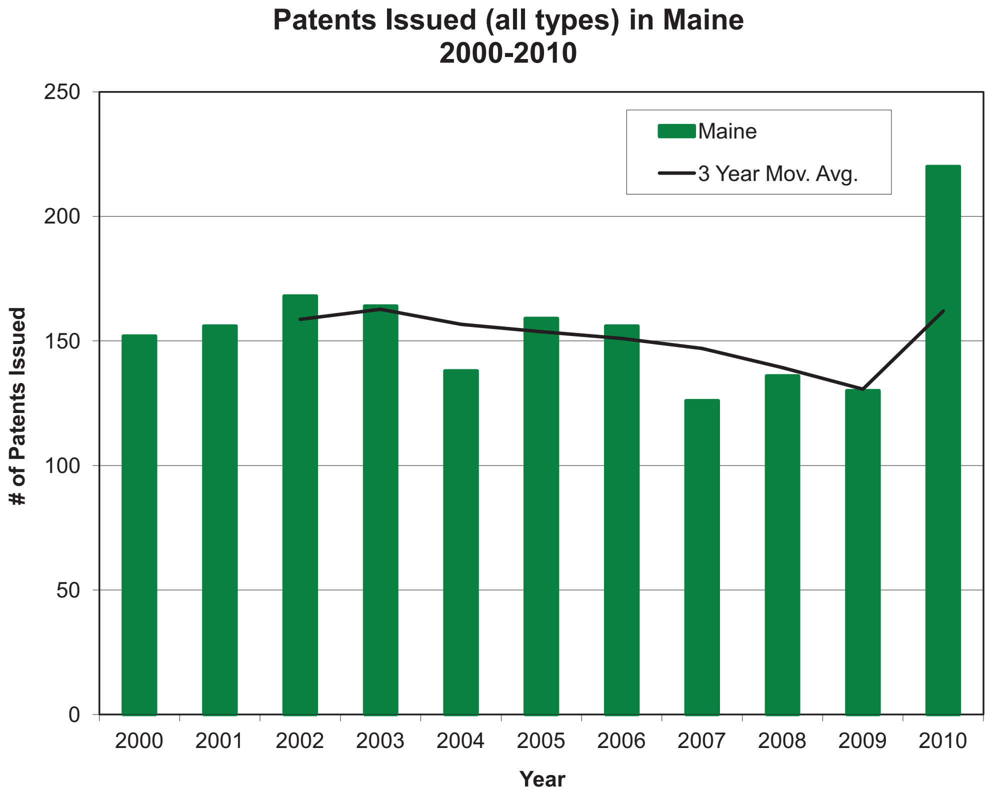
The number of patents issued per 1,000 residents of Maine has historically lagged behind the reference groups.[1] But, in 2010 Maine experienced an increase in patent activity that raised its level above the EPSCoR states. In 2010, all the reference groups saw an increase with Maine increasing slightly over the EPSCoR states. Maine's national ranking improved from 40th in 2006 to 35th in 2010.



Why This Is Significant

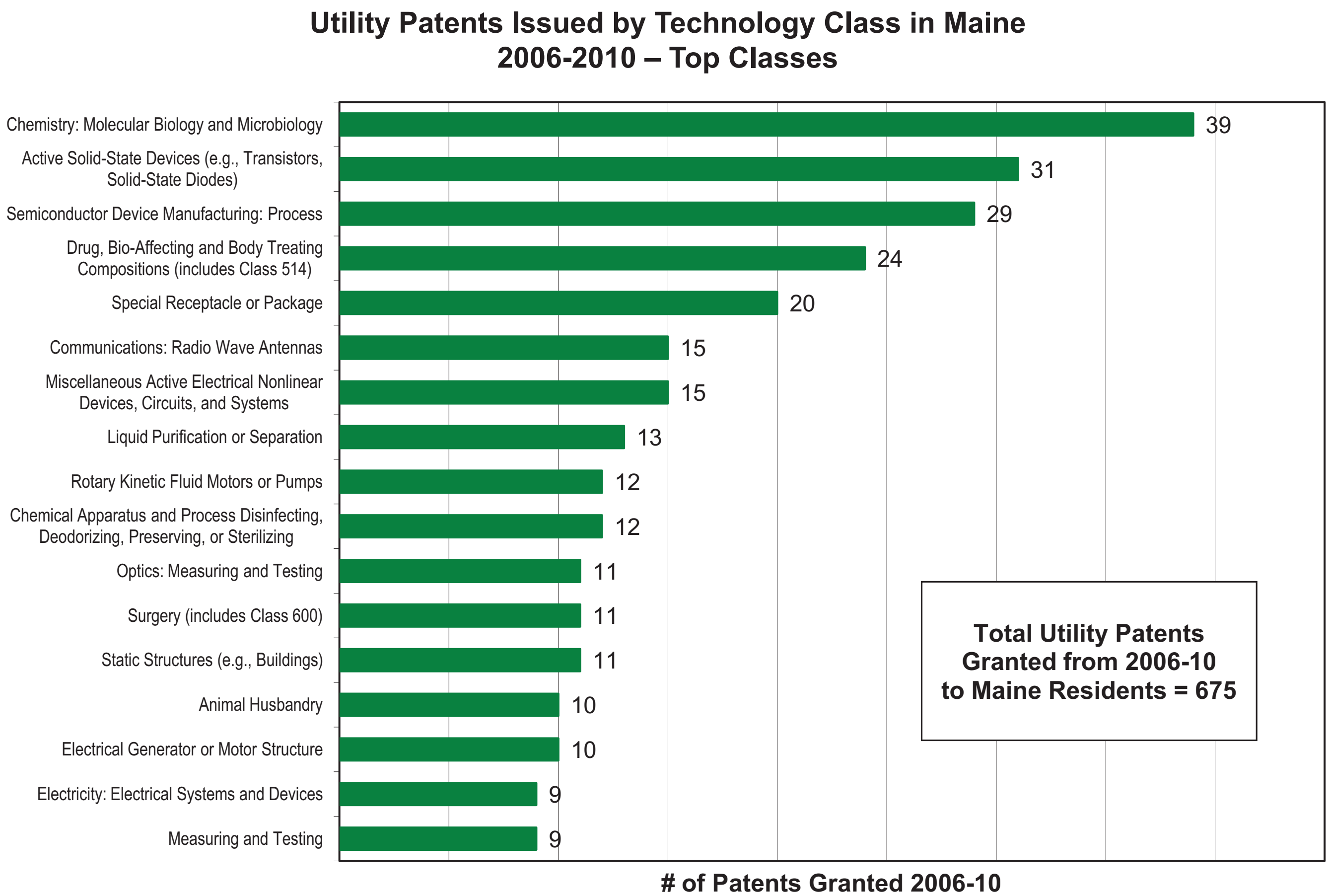
Patent activity indicates the level of innovative thinking and research that eventually may lead to commercialization of new products and services. Individuals and companies seek patent protection in anticipation of the commercial value and marketability of their new ideas. In 2000, Maine created the Maine Patent Program to provide patent assistance to businesses and individuals. This program has served over 750 business and individuals since its inception.

PATENTS ISSUED



Related

In 2010 there were a total of 220 patents issued in Maine, an increase of 69.2 percent from the 2009 level of 130. Between 2006 and 2010, there were a total of 675 utility patents[2] - that is, patents for inventions issued to Maine residents. The largest percent of these fell within the classification entitled "chemistry: molecular biology and microbiology". Other significant utility classes in Maine since 2006 include Active Solid-State Devices (e.g., Transistors, Solid-State Diodes); Semiconductor Device Manufacturing: Process; Drug, Bio-Affecting and Body Treating Compositions; Special Receptacle or Package; and Communications: Radio Wave Antennas.



Sources

Total patents issued was from "Patent Counts by Country/State and Year, All Patents, All Types", January 1, 1977-December 31, 2010; by Calendar Year; US Patent and Trade Mark Office; http://www.uspto.gov/

Utility patent data were from "Patenting by Geographic Region (State and Country), Breakout by Technology Class, 2006-2010 Utility Patent Grants by Calendar Year of Grant, U.S. Patent and Trademark Office; www.uspto.gov

Population is from 1990-1999 - Table CO-EST2001-12-00 - Time Series of Intercensal State Population Estimates: April 1, 2000 to July 1, 2010 (NST-EST2009-alldata), Population Division, U.S. Census Bureau; http://www.census.gov/popest/estimates.php

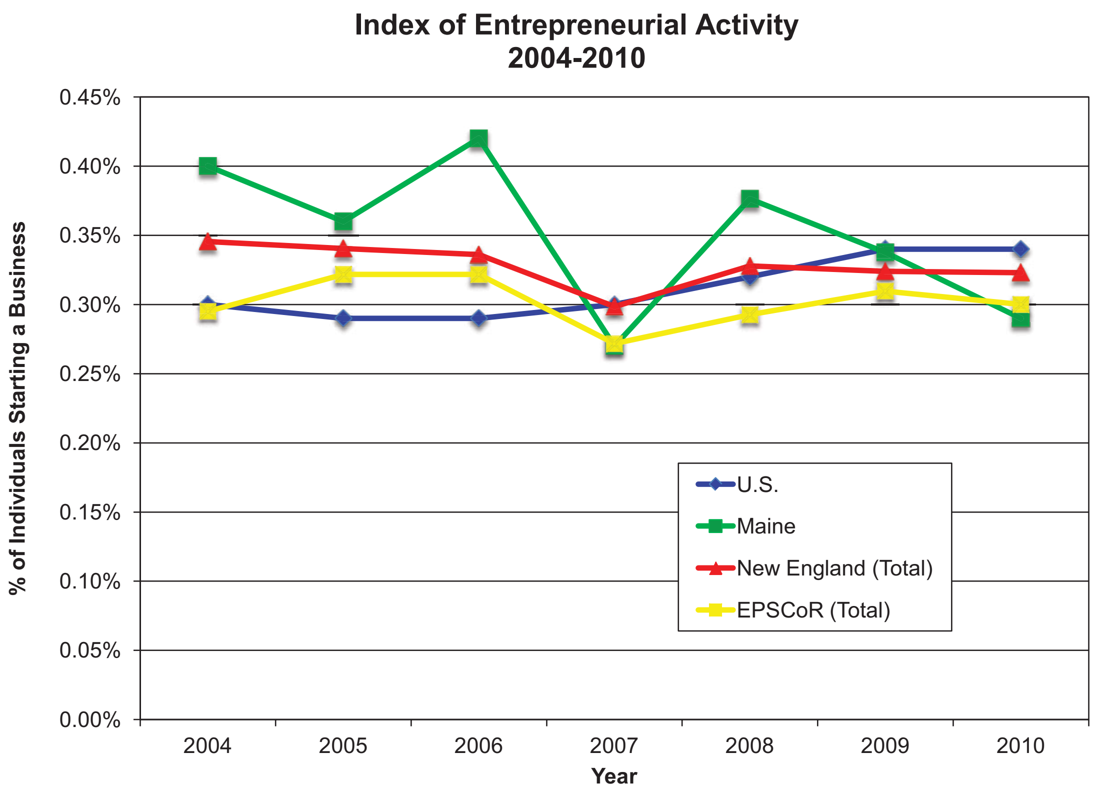
Entrepreneurial Activity

— Performance Summary —

Maine 1-Year Trend	↓
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↓
Maine's National Ranking	30

Summary

Based on the Kaufman Index of Entrepreneurial Activity (KIEA),[3] between 2004 and 2008, Maine had proven to be a strong competitor when compared to the other reference groups. In 2010, Maine has now fallen below the other reference groups on this indicator. This indicator measures the percent of persons within the general population who have recently started a business. As such, the KIEA data measures the number of non-business owners who started a business each month. In 2010, Maine index was 0.29 percent, and below that of U.S. (0.34 percent), New England (0.32 percent) and the EPSCoR states (0.30%). In 2010, ranked 30th in the nation on this indicator, down from 21st in 2009.



Why This Is Significant

Entrepreneurial activity measures the willingness of persons to take risks and grow a business. This measure helps assess the entrepreneurial propensities of Maine residents: do they have an interest and desire to start a business? Are resources and support networks readily available for those likely to take the entrepreneurial leap? A strong regional economy provides an environment that encourages this risk taking and supports the efforts to start and grow businesses. Maine has put in place a host of programs to encourage and support entrepreneurs in science and technology in the areas of financing, technical services, networking, marketing, and business development.

Sources

Estimates calculated by Robert W. Fairlie, University of California, Santa Cruz, using the Current Population Survey and reported in "Kauffman Index of Entrepreneurial Activity"; Ewing Marion Kauffman Foundation; www.kauffman.org/researchandpolicy/entrepreneurship-data.aspx

Endnotes

[1] The residence of the first-named inventor determines the origin of a patent.

[2] The utility patent data excludes design patents, plant patents, reissues, defensive publications, and statutory inventions registrations.

[3] Entrepreneurial activity is the percent of individuals (ages 20–64) who do not own a business in the first survey month that start a business in the following month with fifteen or more hours worked per week.

indicators:
- Targeted Technology Sector Employment Growth
- S&E Occupations in the Workforce
- Ph.D. Scientists and Engineers in the Labor Force
- Gross State Product Growth
- Per Capita Income

EMPLOYMENT & OUTPUT CAPACITY OVERVIEW

In some ways, it is difficult to speak of technology industries nowadays as nearly every industry sector has heavy reliance on technology. Maine has targeted specific technology related sectors for investment and growth. They include Advanced Technologies for Forestry and Agriculture, Aquaculture and Marine Technologies, Advanced Materials and Composites, Energy and Environment, Information Technologies, Precision Manufacturing, and Biotechnology.

Employment and business growth are primary economic outcome measures. In Maine, between 2010 and 2011, total employment in the state's targeted technology sectors increased by 0.7 percent. During this period all of Maine's targeted technology sectors experienced growth, except for information technology. A benefit to Maine's economy is that average wages in the technology sectors are higher than the average wages in Maine's economy as a whole.

Workforce data signifies a need for the state to strengthen its labor market in the areas of science and technology. In terms of occupations that are specifically related to science and engineering, in 2008, there were an estimated 17,000 science and engineering (S&E) occupations in Maine's workforce. On a per total worker basis, this ratio was lower than that of the New England states and the U.S. as a whole but on par with the EPSCoR states.

At the highest technical levels, Ph.D. recipients represent the underpinnings of an R&D based workforce. In 2006, there were an estimated 2,350 doctoral scientists and engineers in Maine's labor force. On a per total worker basis, Maine was slightly higher than the level in the EPSCoR states for the same year, but trailed New England and the nation as a whole.

Gross state product and per capita income are the end outcome indicators for investing in research and development and supporting technology intensive industries. Between 2009 and 2010, Maine's gross state product growth fell behind all of the reference groups. In 2010, Maine's per capita income was below that of all the New England states and the U.S. as a whole but on par with the EPSCoR states. Taken together these two indicators point out that Maine has yet to reap the full potential of a technology-intensive economy.

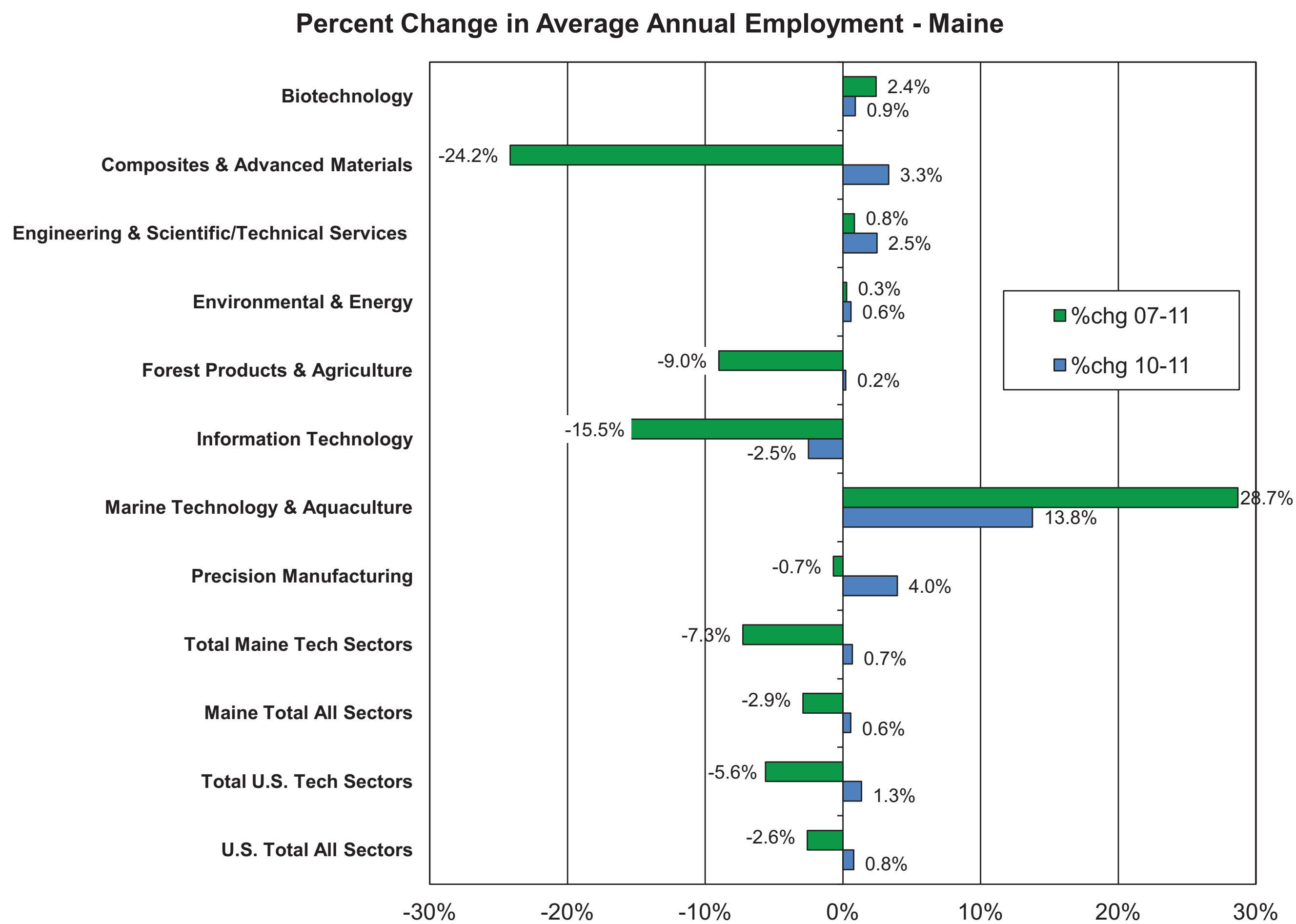
Targeted Technology Sector Employment Growth

— performance summary —

Maine 1-Year Trend	↑
ME compared to U.S. 1-Year	↓
Maine 5-Year Trend	↓
ME compared to U.S. 5-Year	↓

Summary

Between 2010 and 2011, total average employment in Maine's targeted technology sectors[1] increased slightly at 0.7 percent. This compared to an increase in the U.S. in the same targeted technology sectors of 1.3 percent. The total of all sectors (technology and non-technology) in Maine experienced an increase in employment of 0.6 percent and the U.S. an increase of 0.8 percent. During this period all of Maine's targeted technology sectors experienced growth except for information technology. In the five year period between 2007 and 2011, employment increases were experienced in biotechnology, engineering & scientific/technical services, environmental & energy, and marine technology & aquaculture sectors and all others experienced decreases.

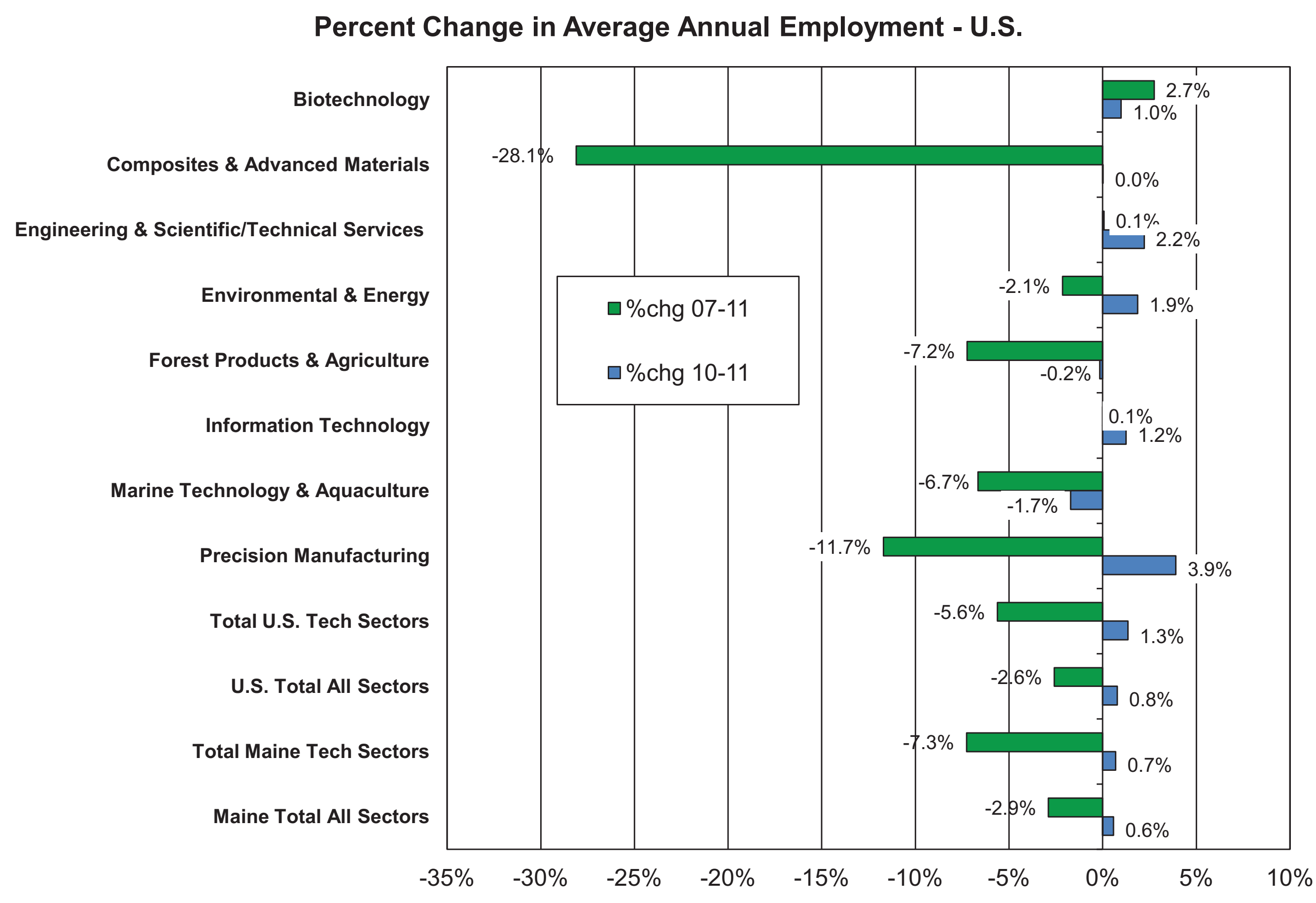


Why This Is Significant

Technology job growth is an outcome indicator of Maine's ability to build, recruit and retain an educated and technically skilled workforce. It measures the level of employment opportunity created by the Maine economy. Technology jobs typically pay higher wages than non-technology related jobs. Therefore, employment growth in technology-intensive businesses helps increase the standard of living among Maine residents. Maine has targeted these sectors for investment and growth and therefore over time they should be outperforming other sectors.

Related

From 2010 to 2011, of the targeted technology sectors identified by Maine, the U.S. experienced employment increases in biotechnology, engineering & scientific/technical services, environmental & energy, information technology, and precision manufacturing. In the five-year period from 2007-11 only biotechnology and engineering & scientific/technical services experienced growth at the U.S. level.



TARGETED TECHNOLOGY SECTOR EMPLOYMENT GROWTH

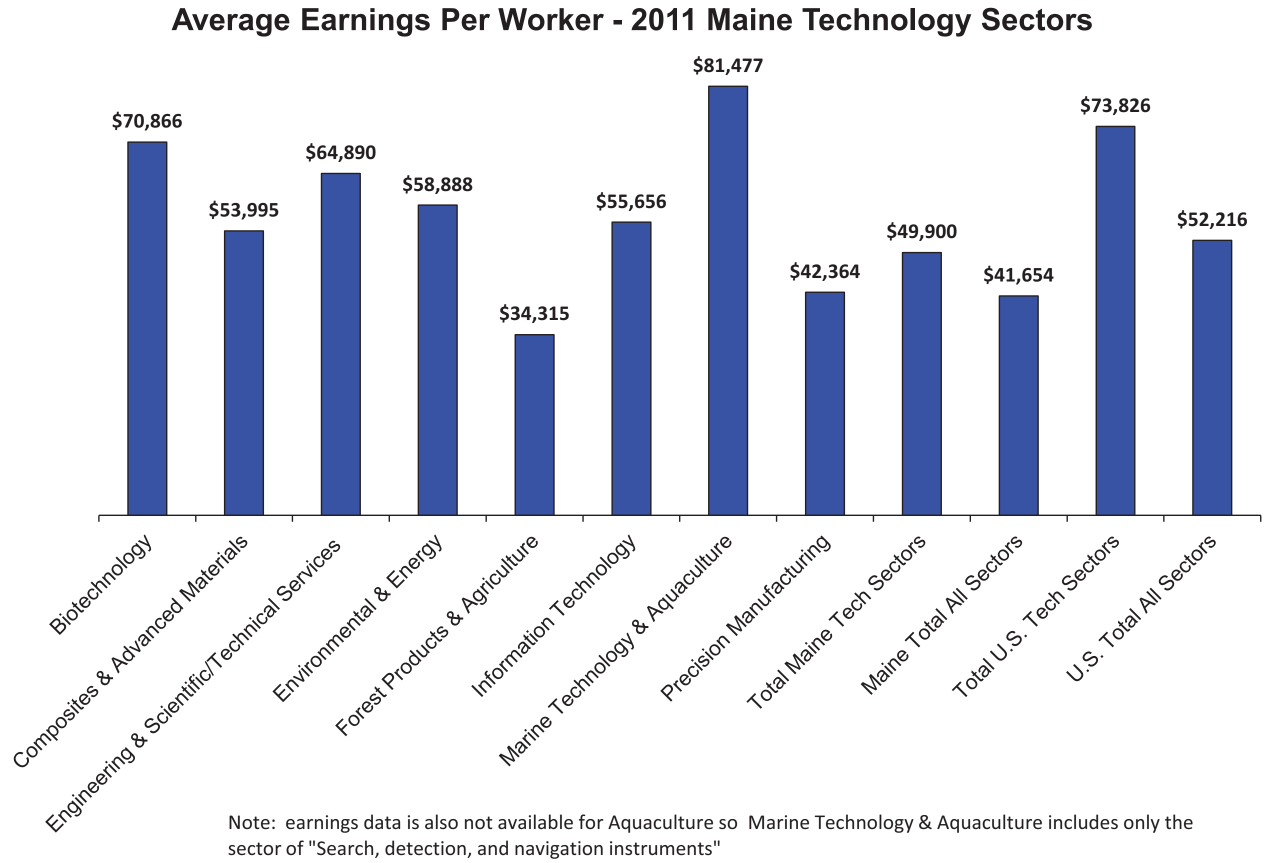
In terms of actual employment change between 2007 and 2011, Maine's targeted technology sectors had a net change of 5,456 jobs lost. Forest products and agriculture accounted for 64.3 percent percent of the job loss and information technology 27.5 percent. During this period 63.5 percent of the jobs gained in the biotechnology sector.

Cluster Summary - Employment Change 2006-10	2007	2008	2009	2010	2011	# Change 2007-2011	% of the 2007-2011 Tech Loss	% of 2007-2011 Tech Gains
Biotechnology	5,741	5,897	6,017	5,976	6,033	138		63.59%
Composites & Advanced Materials	1,602	1,592	1,162	1,176	1,215	-387	6.84%	
Engineering & Scientific/Technical Services	4,689	4,782	4,487	4,614	4,728	39		17.97%
Environmental & Energy	1,897	1,944	1,710	1,891	1,902	5		2.30%
Forest Products & Agriculture	40,368	39,894	36,936	36,655	36,732	-3,636	64.31%	
Information Technology	10,022	9,777	8,700	8,683	8,466	-1,556	27.52%	
Marine Technology & Aquaculture	122	126	134	138	157	35		16.13%
Precision Manufacturing	10,847	11,497	10,734	10,362	10,772	-75	1.33%	
Total Maine Tech Sectors	75,049	75,292	69,585	69,116	69,593	-5,456		
Sum of Tech Sectors Jobs Lost						-5,654		
Sum of Tech Sectors Jobs Gained						217		
Tech Sectors Jobs Net						-5,437		

*Total Maine Tech Sectors does not equal Total Tech Sectors Jobs Net and its components due to duplicate industries included in the individual industry sectors and not in Total Maine Tech Sectors

In terms of wage levels, the average wage per worker in 2011 varied considerably from sector to sector. The average wage of all of Maine's targeted technology sectors was $49,900 which was higher than Maine as a whole at $41,654. Technology sectors ranged from a low of $34,315 for forestry & agriculture to a high of $81,477 for marine technology.

TARGETED TECHNOLOGY SECTOR EMPLOYMENT GROWTH



Sources

Data from Economic Modeling Specialist Inc.; EMSI Complete Employment - 3rd Quarter 2011; http://economic-modeling.com/

Data for Animal Aquaculture (NAICS Code 1125) is from Bureau of Labor Statistics, Quarterly Census of Employment Wages; http://www.bls.gov/cew/

Science and Engineering Occupations in the Workforce

— performance summary —

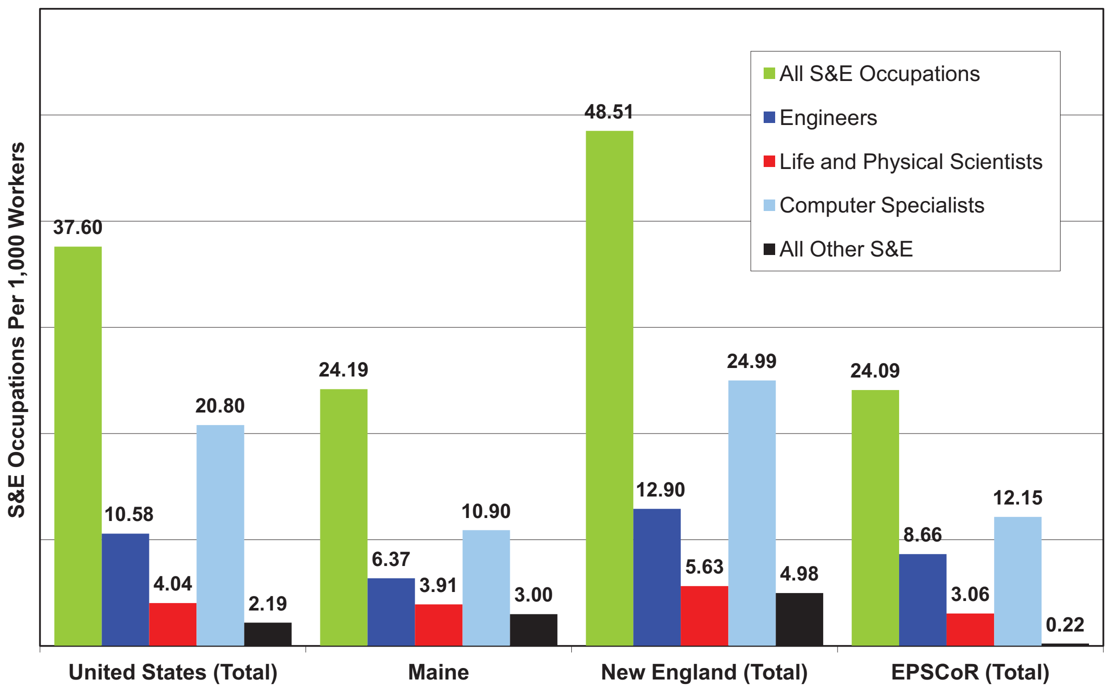
Maine Compared to EPSCoR ⇔

Maine's National Ranking 42

Summary

In 2008, there were an estimated 17,000 science and engineering (S&E) occupations in Maine's workforce[2]. This represented 24.19 S&E occupations for every 1,000 Maine workers, which lagged behind the U.S. as a whole (37.60) and New England (48.51), but was on par with the EPSCoR states (24.09). Maine ranked 42nd on this indicator in 2008.

S&E Occupations in the Workforce Per 1,000 Workers – 2008



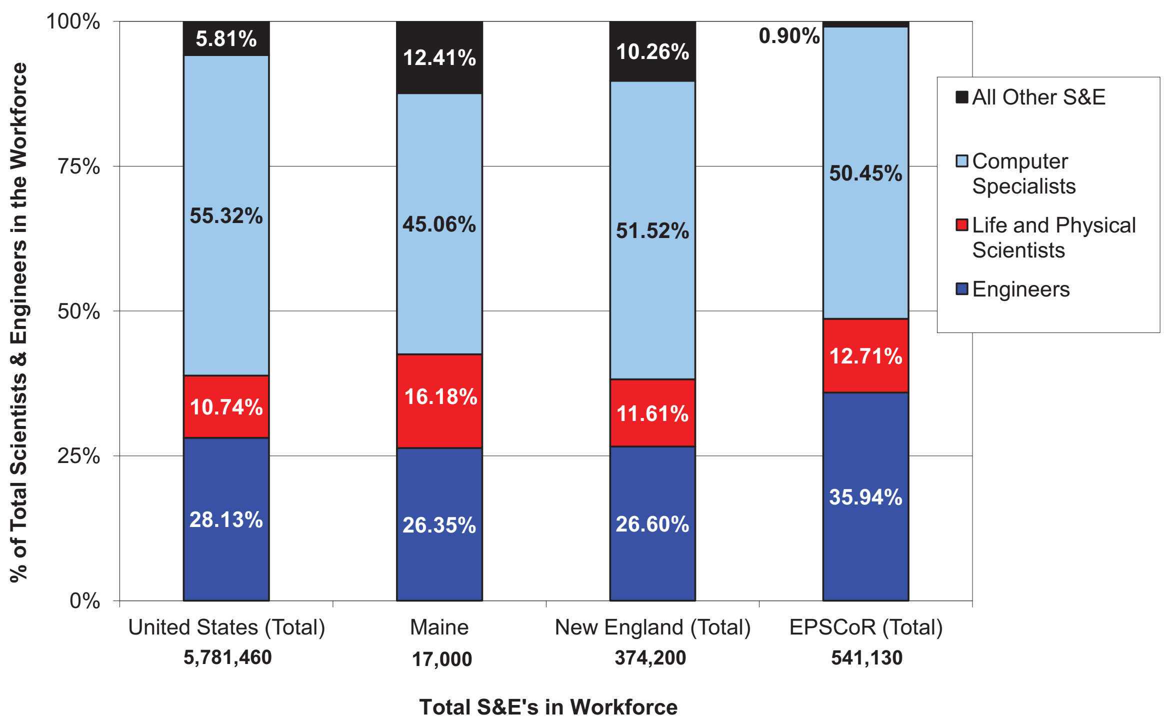
Why This Is Significant

A labor market of scientists and engineers is essential to creating a vibrant research, development and technology enterprise. There is a direct correlation between the percent of the labor force in science and engineering occupations and the growth and health of the innovation-based industries. This indicator is a measure of the state's ability to attract and retain highly skilled and highly educated workers who are critical to an innovation driven economy.

Related

In 2008, the largest percent (45.1 percent) of S&E occupations in the Maine workforce were computer specialist occupations. This was followed by engineers at 26.4 percent, and life and physical scientists at 16.2 percent. All other S&E occupations accounted for 12.4 percent. In relation to the reference groups, Maine had a higher concentration of occupations in life and physical sciences and all other S&E occupations and lower concentration in computer specialists.

Scientists & Engineers in the Workforce by Occupation – 2008



Sources

Science and engineering occupations is from National Science Foundation, Division of Science Resources Statistics, Science & Engineering Indicators 2010, http://www.nsf.gov/statistics/seind10/; based on data from U.S. Department of Labor, Bureau of Labor Statistics, Occupational Employment and Wage Estimates; and Local Area Unemployment Statistics.

Workforce is based on civilian labor force and is from U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - http://www.bls.gov/lau/home.htm.

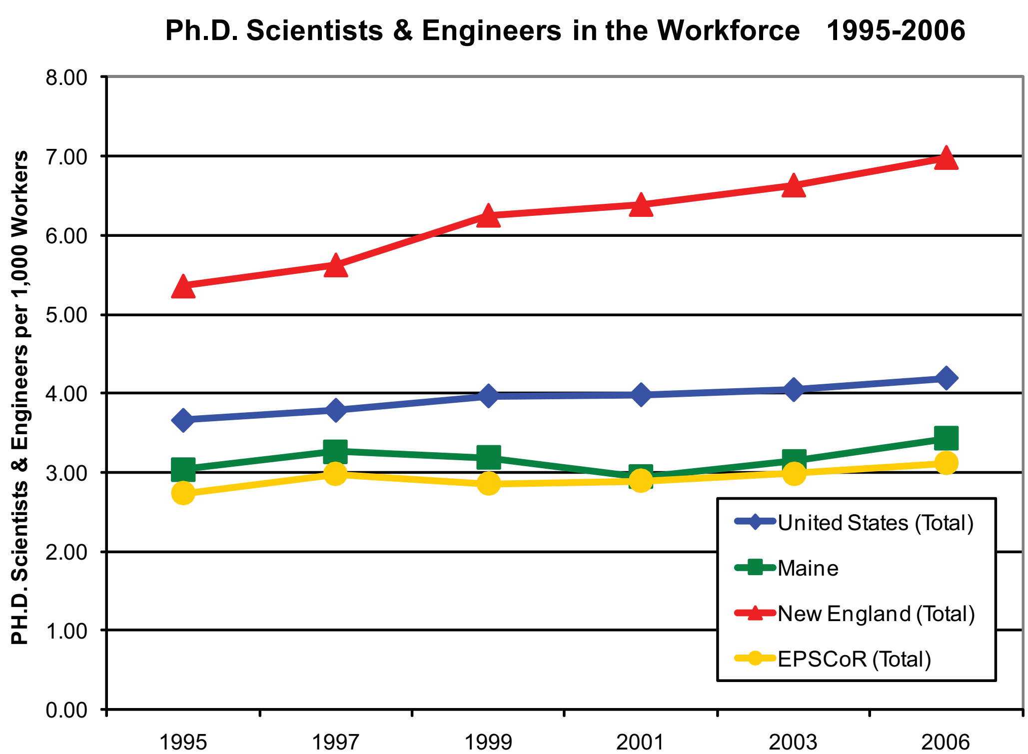
Ph.D. Scientists and Engineers in the Labor Force

— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	**27**

Summary

In 2006, there were an estimated 2,350 doctoral scientists and engineers in Maine's labor force. This represented 3.4 doctoral scientists and engineers for every 1,000 Maine workers and was slightly higher than the level in the EPSCoR states (3.1) for the same year. However, Maine lagged behind New England and the nation as a whole. In 2006 New England had 6.9 employed doctoral scientists and engineers per 1,000 workers and the U.S. had employed 4.1.



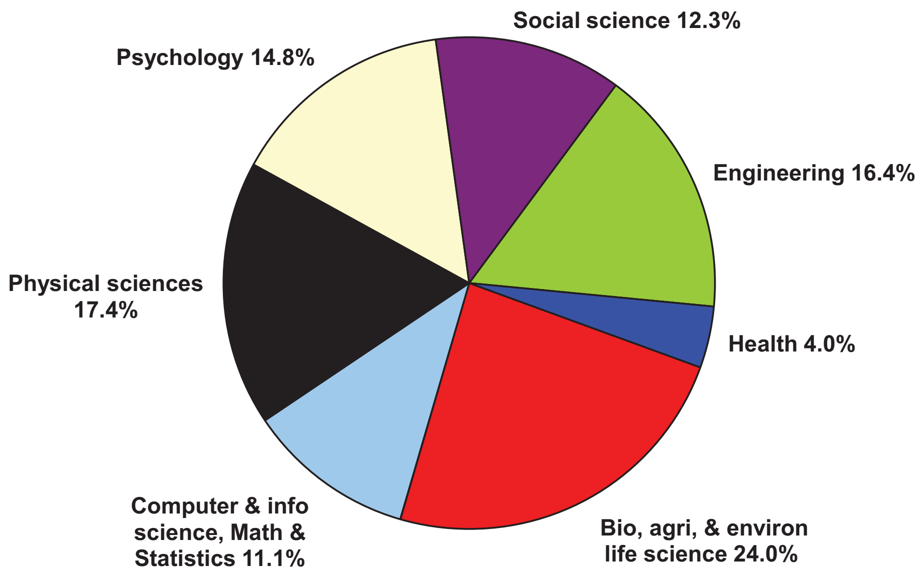
Why This Is Significant

Doctoral level researchers design and lead the research and development programs that generate new products, processes, technologies, and services. They also build vital linkages between Maine business and institutions with international R&D expertise. This indicator measures Maine's ability to attract and retain Ph.D. level workers.

Related

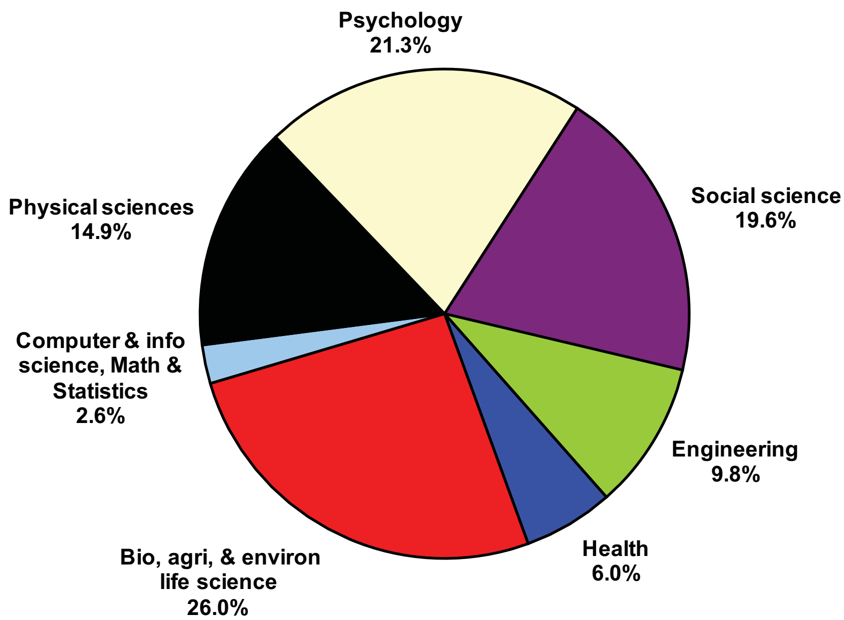
Both Maine and the U.S. states have about a quarter of the Ph.D. scientists and engineers in the workforce whose field of study was in the biological, agricultural & environmental life science field. The U.S. has a higher concentration of Ph.D. scientists and engineers from the engineering field and the computer & information science, math & statistics fields. Maine has a higher concentration of Ph.D. scientists and engineers from social science and psychology fields.

PH.D. Scientists & Engineers in the Workforce by Field of Study U.S. – 2006



Total PH.D Scientists & Engineers in the Workforce: 621,630

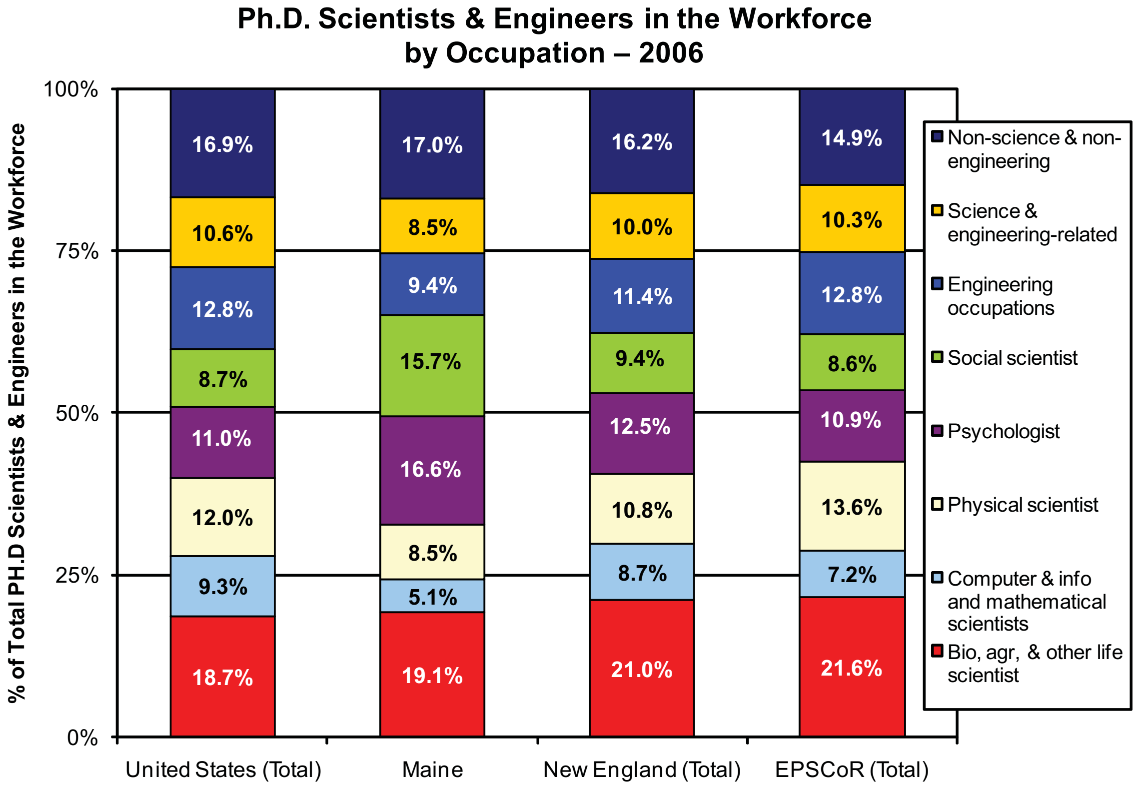
Ph.D. Scientists & Engineers in the Workforce by Field of Study
Maine – 2006



Total Ph.D Scientists & Engineers in the Workforce: 2,350

In addition to Maine having a higher level of Ph.D. scientists and engineers from the field of studies of social sciences and psychology, it also has a higher level of Ph.D. scientists and engineers working in those occupations compared to the United States as a whole, the New England States and the EPSCoR States. Maine lags behind the reference groups in the areas of physical sciences, computer & information and math sciences, engineering occupations, and science & engineering related occupations. Maine has a higher concentration of non-science and non-engineering based occupations.

Ph.D. SCIENTISTS AND ENGINEERS IN THE LABOR FORCE



Sources

Ph.D. scientists and engineers data is from Science and Engineering Indicators 2008; http://www.nsf.gov/statistics/seind08.

Workforce is based on civilian labor force and is from U.S. Department of Labor, Bureau of Labor Statistics, Local Area Unemployment Statistics - http://www.bls.gov/lau/home.htm.

Gross State Product Growth

— performance summary —

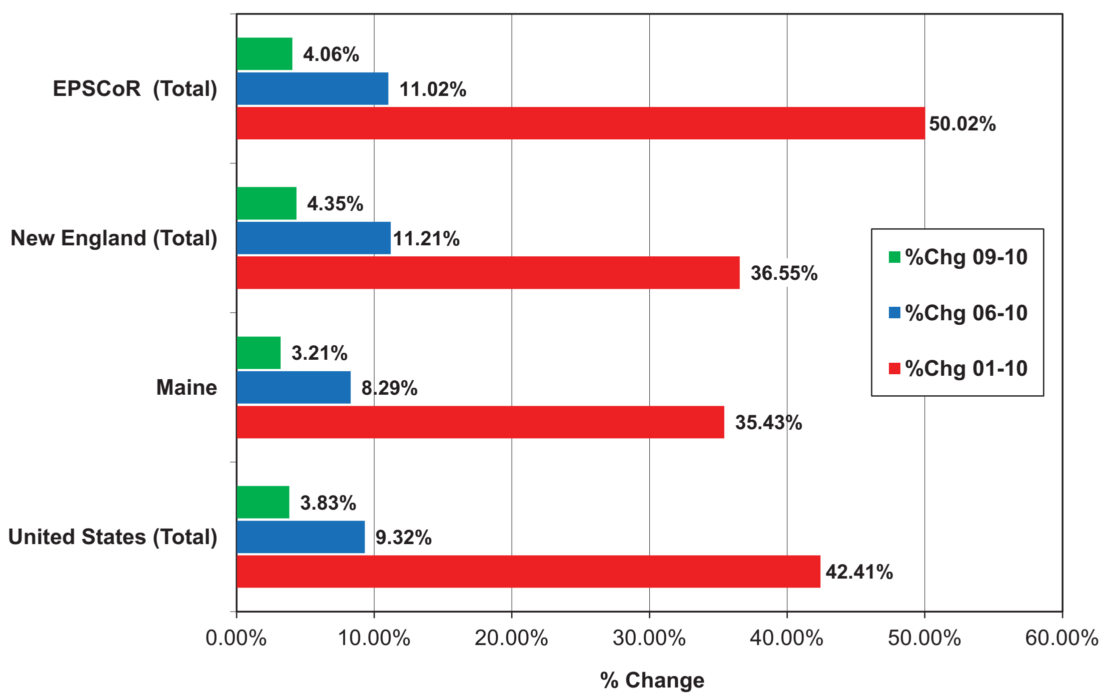
Maine 1-Year Trend	↓
Maine 5-Year Trend	↓
Maine Compared to EPSCoR	↓
Maine's National Ranking	**37**

Summary

Between 2009 and 2010, Maine's gross state product (GSP) grew 3.21 percent, a level that was lower than all the reference groups. During this same period, GSP increased 4.06 percent among the EPSCoR states, 4.35 percent in New England, and 3.83 percent in the U.S. as a whole. Maine also fell behind the reference groups in the five-year period, with a growth of 8.29 percent and ten-year period with a growth rate of 35.43 percent.

In the ten-year trend, Maine is ahead of New England and the U.S., and trailing the EPSCoR states average. Maine had a ranking of 37th in GSP growth for the last year.

Percent Change in Gross State Product - Maine

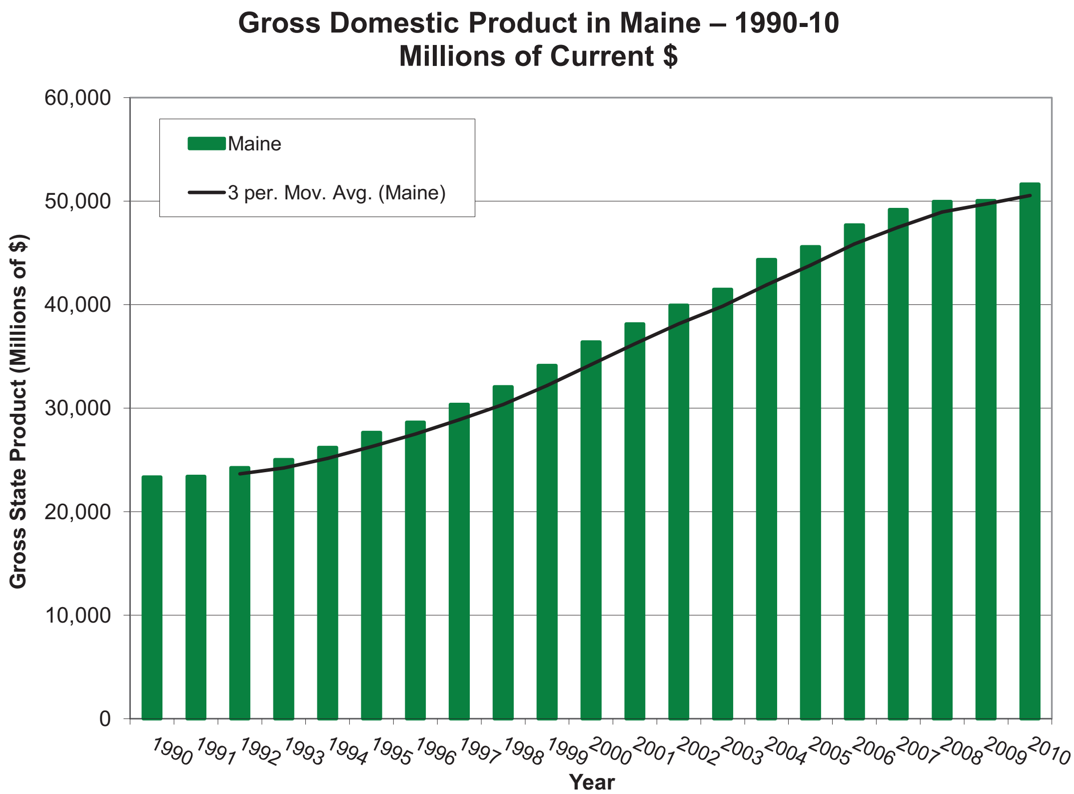


Why This Is Significant

Gross state product is a comprehensive indicator of statewide total economic output. Growth in GSP relative to other states indicates a strengthening of a state's overall economy.

Related

In 2010 Maine's GSP exceeded $51.6 billion. After a slow growth period in the early 1990's, GSP has since experienced steady growth in Maine with the exception of a leveling-off in 2008 and 2009 prior to the 2010 increase.



Sources

Gross state product is from Bureau of Economic Analysis, U.S. Department of Commerce, 1980-1996 data; and Revised Estimates for 1997-2010; http://www.bea.gov/regional/gsp/.

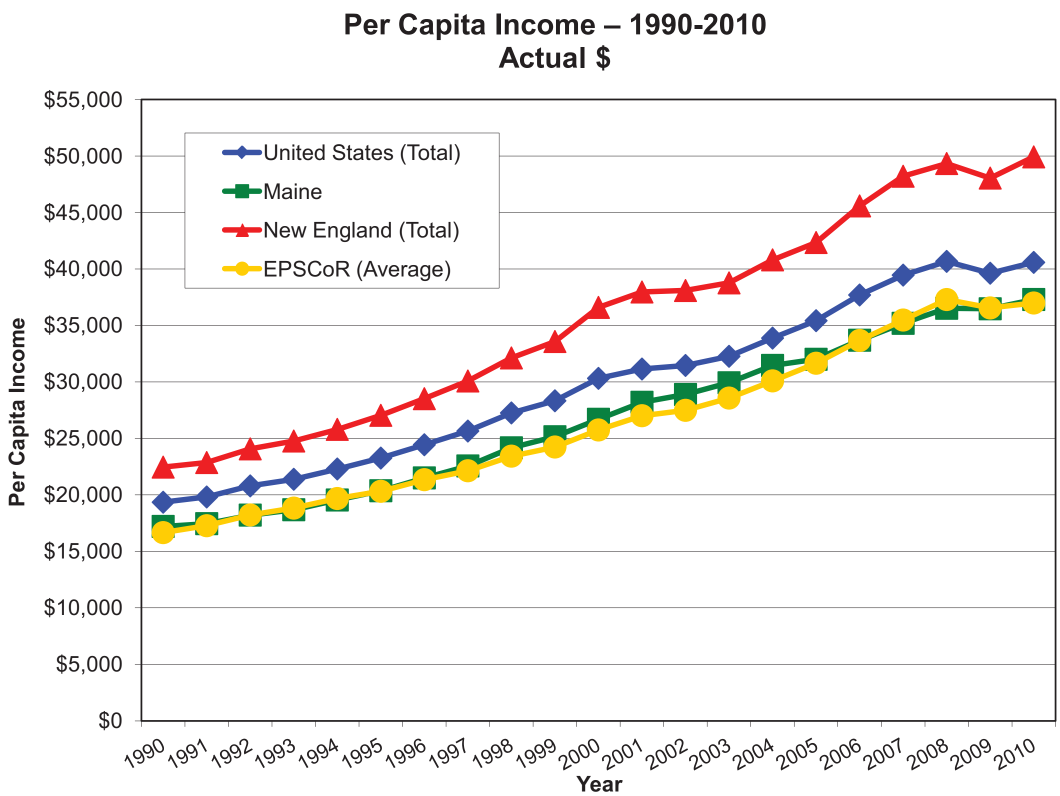
Per Capita Income

— performance summary —

Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	⇔
Maine's National Ranking	**30**

Summary

In 2010, Maine's per capita income was $37,300. This was similar to the EPSCoR states level of $36,990 and remained below that of the U.S. as a whole ($40,584) and the New England level of ($49,925). Since 1990, Maine and the EPSCoR states have followed the same trend and have remained below the United States as a whole and the New England states. The growth has remained relatively steady across all of the reference groups over this period of time until 2009 when all experienced decreases or no growth. Maine ranked 30th on this indicator in 2010.

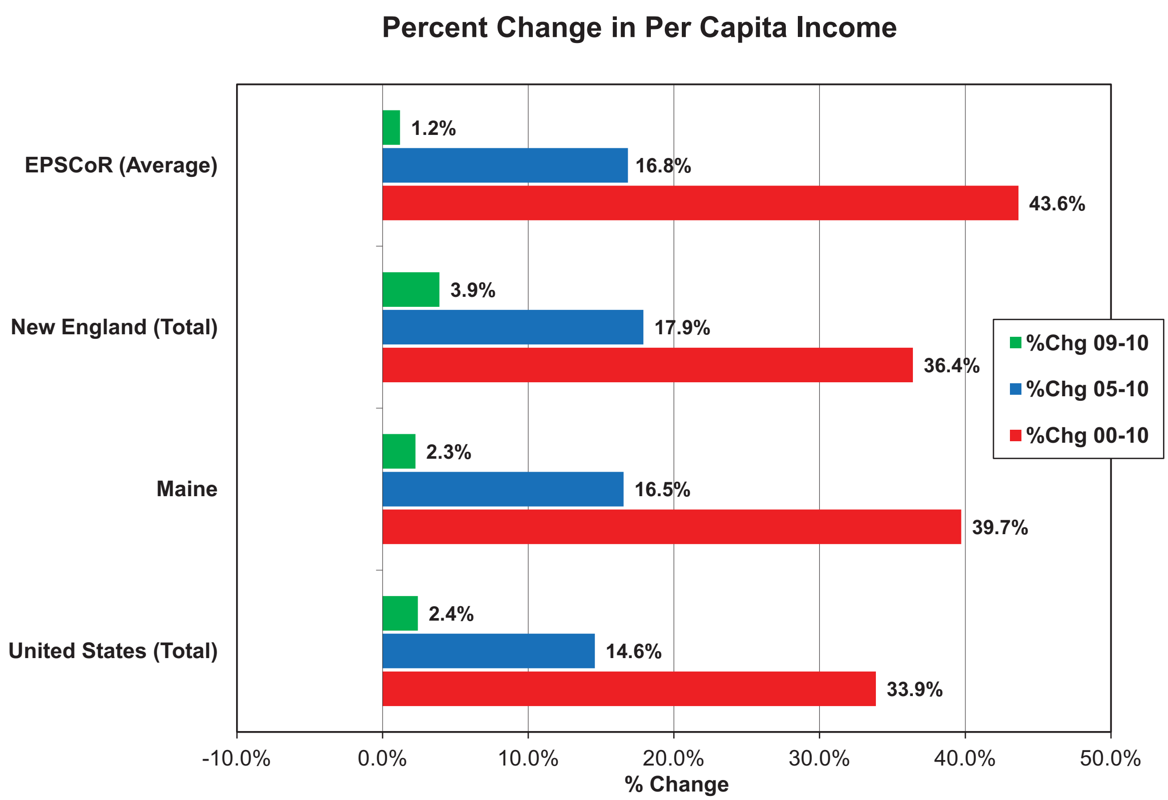


Why This Is Significant

While GSP measures comprehensive economic performance, income is an indicator of individual wealth. It is in this sense that per capita income is the ultimate end outcome for investing in science and technology: increasing personal wealth and therefore quality of life. Per capita income is the true bottom line measure of a state's prosperity.

Related

Between 2009 and 2010 Maine's per capita income increased by 2.3 percent, which was less than the New England region, on par with the United States as a whole, and a greater than the EPSCoR states.



Sources

Per capita income is from Bureau of Economic Analysis, U.S. Department of Commerce; http://www.bea.gov. All dollar estimates are in current dollars (not adjusted for inflation).

Endnotes

[1] Definition of Targeted Technology Sectors is from Maine Office of Innovation and is based on targeted sectors identified by State Legislature in late 1990's and further defined by Statewide Cluster Analyses in 2002 and 2008, most recently reported in: Maine's Technology Sectors and Clusters: Status and Strategy; Maine Center for Business and Economic Research, University of Southern Maine; Battelle Technology Partnership Practice, Battelle Institute; Planning Decisions Inc; and PolicyOne Research, March 2008. To this definition engineering and other scientific/technical was added as it relates to most of the tech sectors. They include the following:

NAICS Description	NAICS Code	Cluster Description
Pharmaceutical and medicine manufacturing	3254	Biotechnology
Medicinal and Botanical Manufacturing	325411	Biotechnology
Pharmaceutical Preparation Manufacturing	325412	Biotechnology
In-Vitro Diagnostic Substance Manufacturing	325413	Biotechnology
Biological Product (except Diagnostic) Manufacturing	325414	Biotechnology
Electromedical apparatus manufacturing	334510	Biotechnology
Analytical laboratory instrument mfg.	334516	Biotechnology
Irradiation apparatus manufacturing	334517	Biotechnology
Medical equipment and supplies manufacturing	3391	Biotechnology
Surgical and Medical Instrument Manufacturing	339112	Biotechnology
Surgical Appliance and Supplies Manufacturing	339113	Biotechnology
Dental Equipment and Supplies Manufacturing	339114	Biotechnology
Ophthalmic Goods Manufacturing	339115	Biotechnology
Dental Laboratories	339116	Biotechnology
Physical, engineering and biological research	541710	Biotechnology
Research and Development in Biotechnology	541711	Biotechnology
Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	541712	Biotechnology
Medical laboratories	621511	Biotechnology
Diagnostic imaging centers	621512	Biotechnology
Resin, rubber, and artificial fibers mfg.	3252	Composites & Advanced Materials
Plastics Material and Resin Manufacturing	325211	Composites & Advanced Materials
Synthetic Rubber Manufacturing	325212	Composites & Advanced Materials
Cellulosic Organic Fiber Manufacturing	325221	Composites & Advanced Materials
Noncellulosic Organic Fiber Manufacturing	325222	Composites & Advanced Materials
Boat building	336612	Composites & Advanced Materials
Engineering services	541330	Engineering & Scientific/Technical Services
Other technical consulting services	541690	Engineering & Scientific/Technical Services
Water, sewage and other systems	2213	Environmental & Energy
Water Supply and Irrigation Systems	221310	Environmental & Energy
Sewage Treatment Facilities	221320	Environmental & Energy
Steam and Air-Conditioning Supply	221330	Environmental & Energy
Waste treatment and disposal	5622	Environmental & Energy
Hazardous Waste Treatment and Disposal	562211	Environmental & Energy
Solid Waste Landfill	562212	Environmental & Energy
Solid Waste Combustors and Incinerators	562213	Environmental & Energy

Other Nonhazardous Waste Treatment and Disposal	562219	Environmental & Energy
Other electric power generation	221119	Environmental & Energy
Testing laboratories	541380	Environmental & Energy
Environmental consulting services	541620	Environmental & Energy
Forestry and logging	113	Forest Products & Agriculture
Timber Tract Operations	113110	Forest Products & Agriculture
Forest Nurseries and Gathering of Forest Products	113210	Forest Products & Agriculture
Logging	113310	Forest Products & Agriculture
Wood product manufacturing	321	Forest Products & Agriculture
Sawmills	321113	Forest Products & Agriculture
Wood Preservation	321114	Forest Products & Agriculture
Hardwood Veneer and Plywood Manufacturing	321211	Forest Products & Agriculture
Softwood Veneer and Plywood Manufacturing	321212	Forest Products & Agriculture
Engineered Wood Member (except Truss) Manufacturing	321213	Forest Products & Agriculture
Truss Manufacturing	321214	Forest Products & Agriculture
Reconstituted Wood Product Manufacturing	321219	Forest Products & Agriculture
Wood Window and Door Manufacturing	321911	Forest Products & Agriculture
Cut Stock, Resawing Lumber, and Planing	321912	Forest Products & Agriculture
Other Millwork (including Flooring)	321918	Forest Products & Agriculture
Wood Container and Pallet Manufacturing	321920	Forest Products & Agriculture
Manufactured Home (Mobile Home) Manufacturing	321991	Forest Products & Agriculture
Prefabricated Wood Building Manufacturing	321992	Forest Products & Agriculture
All Other Miscellaneous Wood Product Manufacturing	321999	Forest Products & Agriculture
Paper manufacturing	322	Forest Products & Agriculture
Pulp Mills	322110	Forest Products & Agriculture
Paper (except Newsprint) Mills	322121	Forest Products & Agriculture
Newsprint Mills	322122	Forest Products & Agriculture
Paperboard Mills	322130	Forest Products & Agriculture
Corrugated and Solid Fiber Box Manufacturing	322211	Forest Products & Agriculture
Folding Paperboard Box Manufacturing	322212	Forest Products & Agriculture
Setup Paperboard Box Manufacturing	322213	Forest Products & Agriculture
Fiber Can, Tube, Drum, and Similar Products Manufacturing	322214	Forest Products & Agriculture
Nonfolding Sanitary Food Container Manufacturing	322215	Forest Products & Agriculture
Coated and Laminated Packaging Paper Manufacturing	322221	Forest Products & Agriculture
Coated and Laminated Paper Manufacturing	322222	Forest Products & Agriculture
Coated Paper Bag and Pouch Manufacturing	322223	Forest Products & Agriculture
Uncoated Paper and Multiwall Bag Manufacturing	322224	Forest Products & Agriculture
Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses	322225	Forest Products & Agriculture
Surface-Coated Paperboard Manufacturing	322226	Forest Products & Agriculture
Die-Cut Paper and Paperboard Office Supplies Manufacturing	322231	Forest Products & Agriculture
Envelope Manufacturing	322232	Forest Products & Agriculture
Stationery, Tablet, and Related Product Manufacturing	322233	Forest Products & Agriculture
Sanitary Paper Product Manufacturing	322291	Forest Products & Agriculture

All Other Converted Paper Product Manufacturing	322299	Forest Products & Agriculture
Furniture and related product manufacturing	337	Forest Products & Agriculture
Wood Kitchen Cabinet and Countertop Manufacturing	337110	Forest Products & Agriculture
Upholstered Household Furniture Manufacturing	337121	Forest Products & Agriculture
Nonupholstered Wood Household Furniture Manufacturing	337122	Forest Products & Agriculture
Metal Household Furniture Manufacturing	337124	Forest Products & Agriculture
Household Furniture (except Wood and Metal) Manufacturing	337125	Forest Products & Agriculture
Institutional Furniture Manufacturing	337127	Forest Products & Agriculture
Wood Television, Radio, and Sewing Machine Cabinet Manufacturing	337129	Forest Products & Agriculture
Wood Office Furniture Manufacturing	337211	Forest Products & Agriculture
Custom Architectural Woodwork and Millwork Manufacturing	337212	Forest Products & Agriculture
Office Furniture (except Wood) Manufacturing	337214	Forest Products & Agriculture
Showcase, Partition, Shelving, and Locker Manufacturing	337215	Forest Products & Agriculture
Mattress Manufacturing	337910	Forest Products & Agriculture
Blind and Shade Manufacturing	337920	Forest Products & Agriculture
Support activities for crop production	1151	Forest Products & Agriculture
Cotton Ginning	115111	Forest Products & Agriculture
Soil Preparation, Planting, and Cultivating	115112	Forest Products & Agriculture
Crop Harvesting, Primarily by Machine	115113	Forest Products & Agriculture
Postharvest Crop Activities (except Cotton Ginning)	115114	Forest Products & Agriculture
Farm Labor Contractors and Crew Leaders	115115	Forest Products & Agriculture
Farm Management Services	115116	Forest Products & Agriculture
Support activities for animal production	1152	Forest Products & Agriculture
Support Activities for Animal Production	115210	Forest Products & Agriculture
Support activities for forestry	1153	Forest Products & Agriculture
Support activities for forestry	115310	Forest Products & Agriculture
Sugar and confectionery product manufacturing	3113	Forest Products & Agriculture
Sugarcane Mills	311311	Forest Products & Agriculture
Cane Sugar Refining	311312	Forest Products & Agriculture
Beet Sugar Manufacturing	311313	Forest Products & Agriculture
Chocolate and Confectionery Manufacturing from Cacao Beans	311320	Forest Products & Agriculture
Confectionery Manufacturing from Purchased Chocolate	311330	Forest Products & Agriculture
Nonchocolate Confectionery Manufacturing	311340	Forest Products & Agriculture
Fruit and vegetable preserving and specialty	3114	Forest Products & Agriculture
Frozen Fruit, Juice, and Vegetable Manufacturing	311411	Forest Products & Agriculture
Frozen Specialty Food Manufacturing	311412	Forest Products & Agriculture
Fruit and Vegetable Canning	311421	Forest Products & Agriculture
Specialty Canning	311422	Forest Products & Agriculture
Dried and Dehydrated Food Manufacturing	311423	Forest Products & Agriculture
Dairy product manufacturing	3115	Forest Products & Agriculture
Fluid Milk Manufacturing	311511	Forest Products & Agriculture

Creamery Butter Manufacturing	311512	Forest Products & Agriculture
Cheese Manufacturing	311513	Forest Products & Agriculture
Dry, Condensed, and Evaporated Dairy Product Manufacturing	311514	Forest Products & Agriculture
Ice Cream and Frozen Dessert Manufacturing	311520	Forest Products & Agriculture
Bakeries and tortilla manufacturing	3118	Forest Products & Agriculture
Retail Bakeries	311811	Forest Products & Agriculture
Commercial Bakeries	311812	Forest Products & Agriculture
Frozen Cakes, Pies, and Other Pastries Manufacturing	311813	Forest Products & Agriculture
Cookie and Cracker Manufacturing	311821	Forest Products & Agriculture
Flour Mixes and Dough Manufacturing from Purchased Flour	311822	Forest Products & Agriculture
Dry Pasta Manufacturing	311823	Forest Products & Agriculture
Tortilla Manufacturing	311830	Forest Products & Agriculture
Other food manufacturing	3119	Forest Products & Agriculture
Roasted Nuts and Peanut Butter Manufacturing	311911	Forest Products & Agriculture
Other Snack Food Manufacturing	311919	Forest Products & Agriculture
Coffee and Tea Manufacturing	311920	Forest Products & Agriculture
Flavoring Syrup and Concentrate Manufacturing	311930	Forest Products & Agriculture
Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing	311941	Forest Products & Agriculture\
Spice and Extract Manufacturing	311942	Forest Products & Agriculture
Perishable Prepared Food Manufacturing	311991	Forest Products & Agriculture
All Other Miscellaneous Food Manufacturing	311999	Forest Products & Agriculture
Beverage manufacturing	3121	Forest Products & Agriculture
Soft Drink Manufacturing	312111	Forest Products & Agriculture
Bottled Water Manufacturing	312112	Forest Products & Agriculture
Ice Manufacturing	312113	Forest Products & Agriculture
Breweries	312120	Forest Products & Agriculture
Wineries	312130	Forest Products & Agriculture
Distilleries	312140	Forest Products & Agriculture
Wet corn milling	311221	Forest Products & Agriculture
Soybean processing	311222	Forest Products & Agriculture
Other oilseed processing	311223	Forest Products & Agriculture
Ethyl alcohol manufacturing	325193	Forest Products & Agriculture
All other basic organic chemical manufacturing	325199	Forest Products & Agriculture
Cellulosic organic fiber manufacturing	325221	Forest Products & Agriculture
Nitrogenous fertilizer manufacturing	325311	Forest Products & Agriculture
Phosphatic fertilizer manufacturing	325312	Forest Products & Agriculture
Fertilizer (mixing only) manufacturing	325314	Forest Products & Agriculture
Pesticide and other agricultural chemical manufacturing	325320	Forest Products & Agriculture
Crop and animal production	11A0	Forest Products & Agriculture
Crop and animal production	11A000	Forest Products & Agriculture
Computer systems design and related services	5415	Information Technology
Custom Computer Programming Services	541511	Information Technology
Computer Systems Design Services	541512	Information Technology

Computer Facilities Management Services	541513	Information Technology
Other Computer Related Services	541519	Information Technology
Software publishers	511210	Information Technology
Internet publishing and broadcasting	516110	Information Technology
Wired telecommunications carriers	517110	Information Technology
Internet service providers	518111	Information Technology
Web search portals	518112	Information Technology
Data processing and related services	518210	Information Technology
Animal aquaculture	1125	Marine Technology & Aquaculture
Search, detection, and navigation instruments	334511	Marine Technology & Aquaculture
Fabricated metal product manufacturing	332	Precision Manufacturing
Iron and Steel Forging	332111	Precision Manufacturing
Nonferrous Forging	332112	Precision Manufacturing
Custom Roll Forming	332114	Precision Manufacturing
Crown and Closure Manufacturing	332115	Precision Manufacturing
Metal Stamping	332116	Precision Manufacturing
Powder Metallurgy Part Manufacturing	332117	Precision Manufacturing
Cutlery and Flatware (except Precious) Manufacturing	332211	Precision Manufacturing
Hand and Edge Tool Manufacturing	332212	Precision Manufacturing
Saw Blade and Handsaw Manufacturing	332213	Precision Manufacturing
Kitchen Utensil, Pot, and Pan Manufacturing	332214	Precision Manufacturing
Prefabricated Metal Building and Component Manufacturing	332311	Precision Manufacturing
Fabricated Structural Metal Manufacturing	332312	Precision Manufacturing
Plate Work Manufacturing	332313	Precision Manufacturing
Metal Window and Door Manufacturing	332321	Precision Manufacturing
Sheet Metal Work Manufacturing	332322	Precision Manufacturing
Ornamental and Architectural Metal Work Manufacturing	332323	Precision Manufacturing
Power Boiler and Heat Exchanger Manufacturing	332410	Precision Manufacturing
Metal Tank (Heavy Gauge) Manufacturing	332420	Precision Manufacturing
Metal Can Manufacturing	332431	Precision Manufacturing
Other Metal Container Manufacturing	332439	Precision Manufacturing
Hardware Manufacturing	332510	Precision Manufacturing
Spring (Heavy Gauge) Manufacturing	332611	Precision Manufacturing
Spring (Light Gauge) Manufacturing	332612	Precision Manufacturing
Other Fabricated Wire Product Manufacturing	332618	Precision Manufacturing
Machine Shops	332710	Precision Manufacturing
Precision Turned Product Manufacturing	332721	Precision Manufacturing
Bolt, Nut, Screw, Rivet, and Washer Manufacturing	332722	Precision Manufacturing
Metal Heat Treating	332811	Precision Manufacturing
Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	332812	Precision Manufacturing
Electroplating, Plating, Polishing, Anodizing, and Coloring	332813	Precision Manufacturing
Industrial Valve Manufacturing	332911	Precision Manufacturing
Fluid Power Valve and Hose Fitting Manufacturing	332912	Precision Manufacturing
Plumbing Fixture Fitting and Trim Manufacturing	332913	Precision Manufacturing

Other Metal Valve and Pipe Fitting Manufacturing	332919	Precision Manufacturing
Ball and Roller Bearing Manufacturing	332991	Precision Manufacturing
Small Arms Ammunition Manufacturing	332992	Precision Manufacturing
Ammunition (except Small Arms) Manufacturing	332993	Precision Manufacturing
Small Arms Manufacturing	332994	Precision Manufacturing
Other Ordnance and Accessories Manufacturing	332995	Precision Manufacturing
Fabricated Pipe and Pipe Fitting Manufacturing	332996	Precision Manufacturing
Industrial Pattern Manufacturing	332997	Precision Manufacturing
Enameled Iron and Metal Sanitary Ware Manufacturing	332998	Precision Manufacturing
All Other Miscellaneous Fabricated Metal Product Manufacturing	332999	Precision Manufacturing
Machinery manufacturing	333	Precision Manufacturing
Farm Machinery and Equipment Manufacturing	333111	Precision Manufacturing
Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing	333112	Precision Manufacturing
Construction Machinery Manufacturing	333120	Precision Manufacturing
Mining Machinery and Equipment Manufacturing	333131	Precision Manufacturing
Oil and Gas Field Machinery and Equipment Manufacturing	333132	Precision Manufacturing
Sawmill and Woodworking Machinery Manufacturing	333210	Precision Manufacturing
Plastics and Rubber Industry Machinery Manufacturing	333220	Precision Manufacturing
Paper Industry Machinery Manufacturing	333291	Precision Manufacturing
Textile Machinery Manufacturing	333292	Precision Manufacturing
Printing Machinery and Equipment Manufacturing	333293	Precision Manufacturing
Food Product Machinery Manufacturing	333294	Precision Manufacturing
Semiconductor Machinery Manufacturing	333295	Precision Manufacturing
All Other Industrial Machinery Manufacturing	333298	Precision Manufacturing
Automatic Vending Machine Manufacturing	333311	Precision Manufacturing
Commercial Laundry, Drycleaning, and Pressing Machine Manufacturing	333312	Precision Manufacturing
Office Machinery Manufacturing	333313	Precision Manufacturing
Optical Instrument and Lens Manufacturing	333314	Precision Manufacturing
Photographic and Photocopying Equipment Manufacturing	333315	Precision Manufacturing
Other Commercial and Service Industry Machinery Manufacturing	333319	Precision Manufacturing
Air Purification Equipment Manufacturing	333411	Precision Manufacturing
Industrial and Commercial Fan and Blower Manufacturing	333412	Precision Manufacturing
Heating Equipment (except Warm Air Furnaces) Manufacturing	333414	Precision Manufacturing
Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	333415	Precision Manufacturing
Industrial Mold Manufacturing	333511	Precision Manufacturing
Machine Tool (Metal Cutting Types) Manufacturing	333512	Precision Manufacturing
Machine Tool (Metal Forming Types) Manufacturing	333513	Precision Manufacturing

Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	333514	Precision Manufacturing
Cutting Tool and Machine Tool Accessory Manufacturing	333515	Precision Manufacturing
Rolling Mill Machinery and Equipment Manufacturing	333516	Precision Manufacturing
Other Metalworking Machinery Manufacturing	333518	Precision Manufacturing
Turbine and Turbine Generator Set Units Manufacturing	333611	Precision Manufacturing
Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	333612	Precision Manufacturing
Mechanical Power Transmission Equipment Manufacturing	333613	Precision Manufacturing
Other Engine Equipment Manufacturing	333618	Precision Manufacturing
Pump and Pumping Equipment Manufacturing	333911	Precision Manufacturing
Air and Gas Compressor Manufacturing	333912	Precision Manufacturing
Measuring and Dispensing Pump Manufacturing	333913	Precision Manufacturing
Elevator and Moving Stairway Manufacturing	333921	Precision Manufacturing
Conveyor and Conveying Equipment Manufacturing	333922	Precision Manufacturing
Overhead Traveling Crane, Hoist, and Monorail System Manufacturing	333923	Precision Manufacturing
Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing	333924	Precision Manufacturing
Power-Driven Handtool Manufacturing	333991	Precision Manufacturing
Welding and Soldering Equipment Manufacturing	333992	Precision Manufacturing
Packaging Machinery Manufacturing	333993	Precision Manufacturing
Industrial Process Furnace and Oven Manufacturing	333994	Precision Manufacturing
Fluid Power Cylinder and Actuator Manufacturing	333995	Precision Manufacturing
Fluid Power Pump and Motor Manufacturing	333996	Precision Manufacturing
Scale and Balance Manufacturing	333997	Precision Manufacturing
All Other Miscellaneous General Purpose Machinery Manufacturing	333999	Precision Manufacturing
Computer and electronic product manufacturing	334	Precision Manufacturing
Electronic Computer Manufacturing	334111	Precision Manufacturing
Computer Storage Device Manufacturing	334112	Precision Manufacturing
Computer Terminal Manufacturing	334113	Precision Manufacturing
Other Computer Peripheral Equipment Manufacturing	334119	Precision Manufacturing
Telephone Apparatus Manufacturing	334210	Precision Manufacturing
Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	334220	Precision Manufacturing
Other Communications Equipment Manufacturing	334290	Precision Manufacturing
Audio and Video Equipment Manufacturing	334310	Precision Manufacturing
Electron Tube Manufacturing	334411	Precision Manufacturing
Bare Printed Circuit Board Manufacturing	334412	Precision Manufacturing
Semiconductor and Related Device Manufacturing	334413	Precision Manufacturing
Electronic Capacitor Manufacturing	334414	Precision Manufacturing
Electronic Resistor Manufacturing	334415	Precision Manufacturing
Electronic Coil, Transformer, and Other Inductor Manufacturing	334416	Precision Manufacturing
Electronic Connector Manufacturing	334417	Precision Manufacturing

Printed Circuit Assembly (Electronic Assembly) Manufacturing	334418	Precision Manufacturing
Other Electronic Component Manufacturing	334419	Precision Manufacturing
Electromedical and Electrotherapeutic Apparatus Manufacturing	334510	Precision Manufacturing
Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing	334511	Precision Manufacturing
Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use	334512	Precision Manufacturing
Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	334513	Precision Manufacturing
Totalizing Fluid Meter and Counting Device Manufacturing	334514	Precision Manufacturing
Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	334515	Precision Manufacturing
Analytical Laboratory Instrument Manufacturing	334516	Precision Manufacturing
Irradiation Apparatus Manufacturing	334517	Precision Manufacturing
Watch, Clock, and Part Manufacturing	334518	Precision Manufacturing
Other Measuring and Controlling Device Manufacturing	334519	Precision Manufacturing
Software Reproducing	334611	Precision Manufacturing
Prerecorded Compact Disc (except Software), Tape, and Record Reproducing	334612	Precision Manufacturing
Magnetic and Optical Recording Media Manufacturing	334613	Precision Manufacturing

[2] S&E occupations are defined by NSF as 77 standard occupational codes that encompass mathematical, computer, life, physical, and social scientists; engineers; and postsecondary teachers in any of these S&E fields. People with job titles such as manager are excluded.

indicators:

- – Math and Science Skills of Students
- – Higher Education Enrollment among Young People
- – Science and Engineering Graduate Enrollments
- – Science and Engineering Degrees Awarded
- – Education Attainment

EDUCATION CAPACITY OVERVIEW

When asked about issues that have the greatest impact on business and economic development, business owners, economic developers, and site locators consistently rank the availability of a skilled and educated workforce as their top concern. Moreover, technology and innovation based companies require workers with advanced skills and education in math and sciences.

Success in developing math and science skills begins at the K-12 level. Maine eighth grade students continue to perform well relative to other states in math and sciences. Maine's average math score in 2011 on the National Assessment of Educational Progress (NAEP) placed its eighth graders 13th in the nation; up from the 2009 level of 19th. In 2009, Maine eighth graders turned in the 8th highest science scores in the country on the NAEP.

Today's science and technology intensive careers demand an education level beyond that of a high school level. In terms of advancing twelfth graders onto higher education, in 2008 Maine performed at a slightly lower level than 2006 but at a much higher level than previous years. In terms of college enrollment among 19 year-olds, Maine came in slightly below the level of New England but above both the EPSCoR States and U.S.

Supporting a vibrant technology and innovation economy requires a regular supply of workers with college and advanced degrees in science and engineering related fields. With regard to science and engineering enrollments and science and engineering degrees awarded, Maine has shown improvement but still lags the nation, New England, and EPSCoR states. Whether this is more of a demand or supply issue or both is beyond the reach of this Index. However it is clear that Maine need to do more to increase science and engineering higher education particularly at the advanced levels.

Finally, with regard to the adult population, Maine has remained consistent. In 2010, 26.8 percent of Maine's population twenty five years and older held four-year college degrees or more, similar to 26.9 percent in 2009. In 2010 the level for the US as a whole was 28.2 percent, for New England, it was 33.0 percent, and for the EPSCoR states 24.4 percent.

Math and Science Skills of Students

math performance summary

Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	13

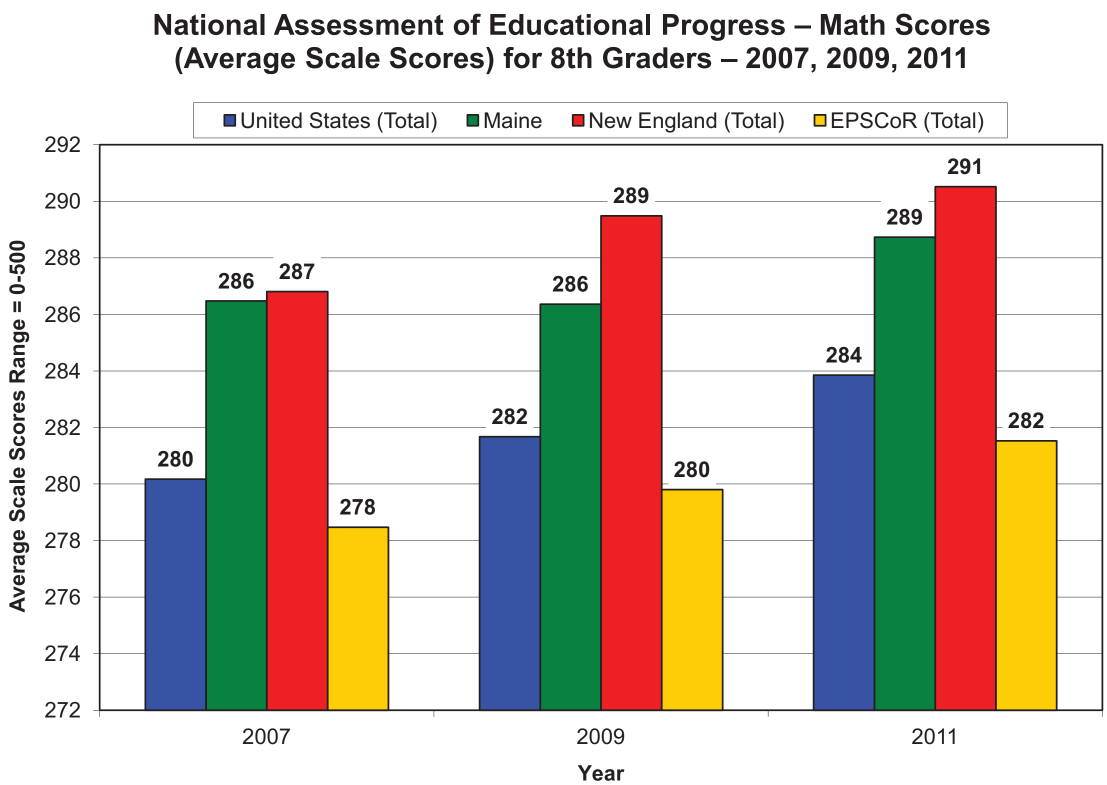
science performance summary

Maine 5-Year Trend	N/A
Maine Compared to EPSCoR	↑
Maine's National Ranking	8

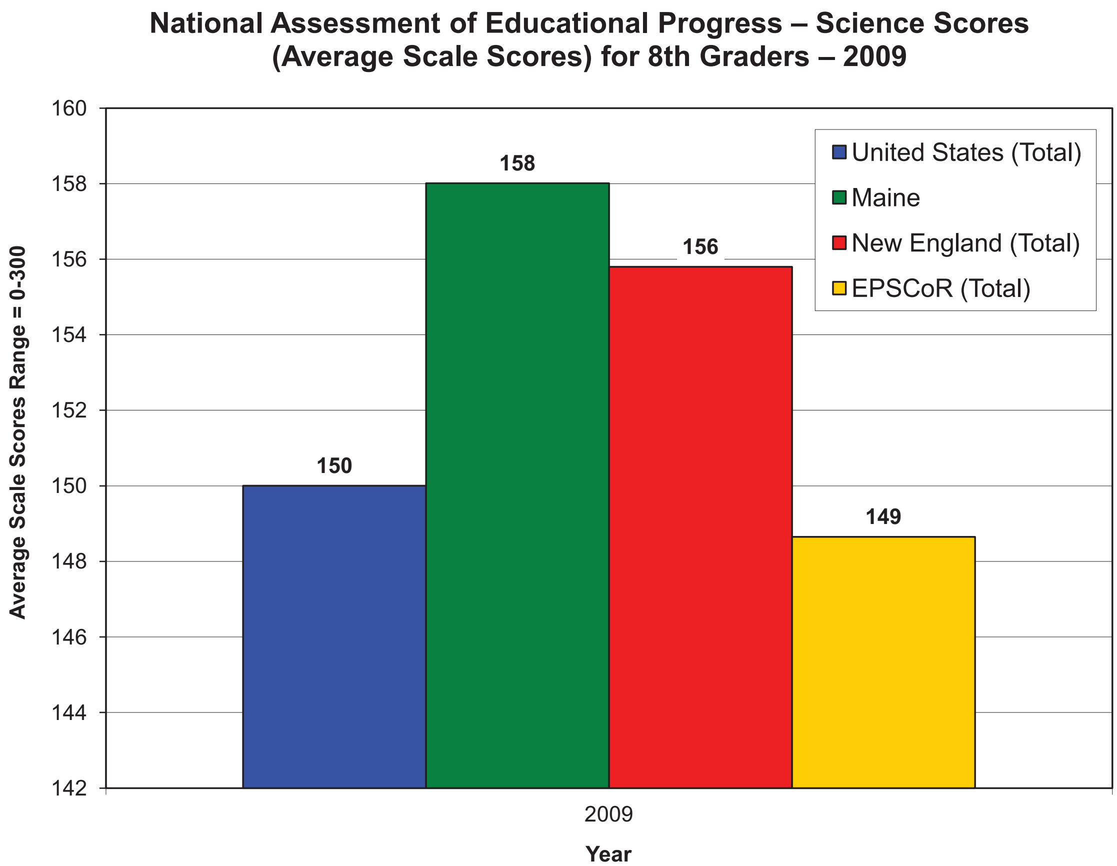
Summary

The National Assessment of Educational Progress, (NAEP) provides data to allow a comparison of education achievement across states. On the 2011 NAEP *mathematics* test, Maine eighth graders scored 289[1]. In 2011 Maine eighth graders scored higher than the New England states (281), the US average scaled score (284), and that of the EPSCoR states (282). Nationally, Maine ranked 13th on this indicator in 2011.

On the 2009 NAEP *science test*, Maine eighth graders turned in the eighth highest science scores in the country and Maine outperformed all the reference groups. Maine's average score was 158 compared to 150 for the US, 156 for New England, and 149 for the EPSCoR states.[2]



MATH AND SCIENCE SKILLS OF STUDENTS



Why This Is Significant

As technology becomes a part of most jobs, proficiency in both math and science is a fundamental requirement, especially for technology-related industries. The NEAP helps to measure performance in math and science among eighth graders in Maine and because it is conducted nationally allows comparisons among states.

Sources

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Science Assessments and 2005, 2007, 2009 and 2011 Mathematics Assessments; http://nces.ed.gov/nationsreportcard

Higher Education Enrollment among Young People

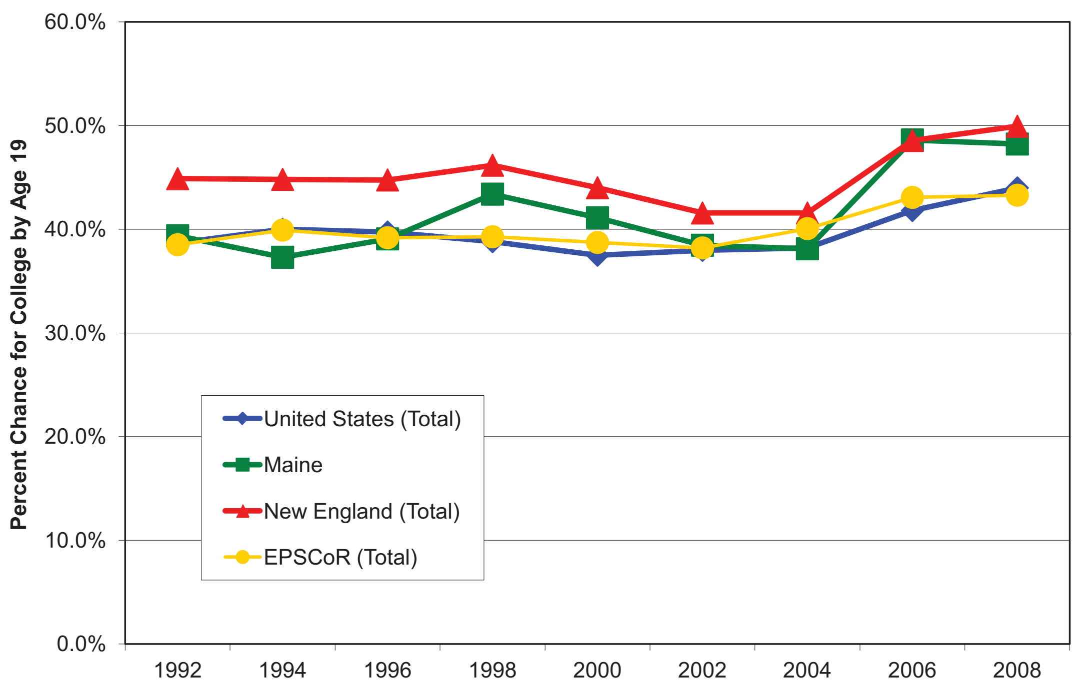
— performance summary —

Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	**14**

Summary

In 2008, Maine 19 year-olds had a 48.2 percent chance of being enrolled in post-secondary education. Chance for college is based on public high school graduation rates (high school graduates divided by the number of 9th grade enrollments 4 years prior) and the college continuation rate (number of fall freshman enrolled anywhere in the U.S. who were high school graduates the previous spring)[3]. This represents a 0.4 percent decrease from the state's 2006 level of 48.6 percent. On this indictor in 2008, Maine performed just below the level of the New England states (49.9 percent), but above the U.S. levels (44.0 percent) and the EPSCoR states (43.3 percent).

Chance for College Enrollment by Age 19 – 1992-2008

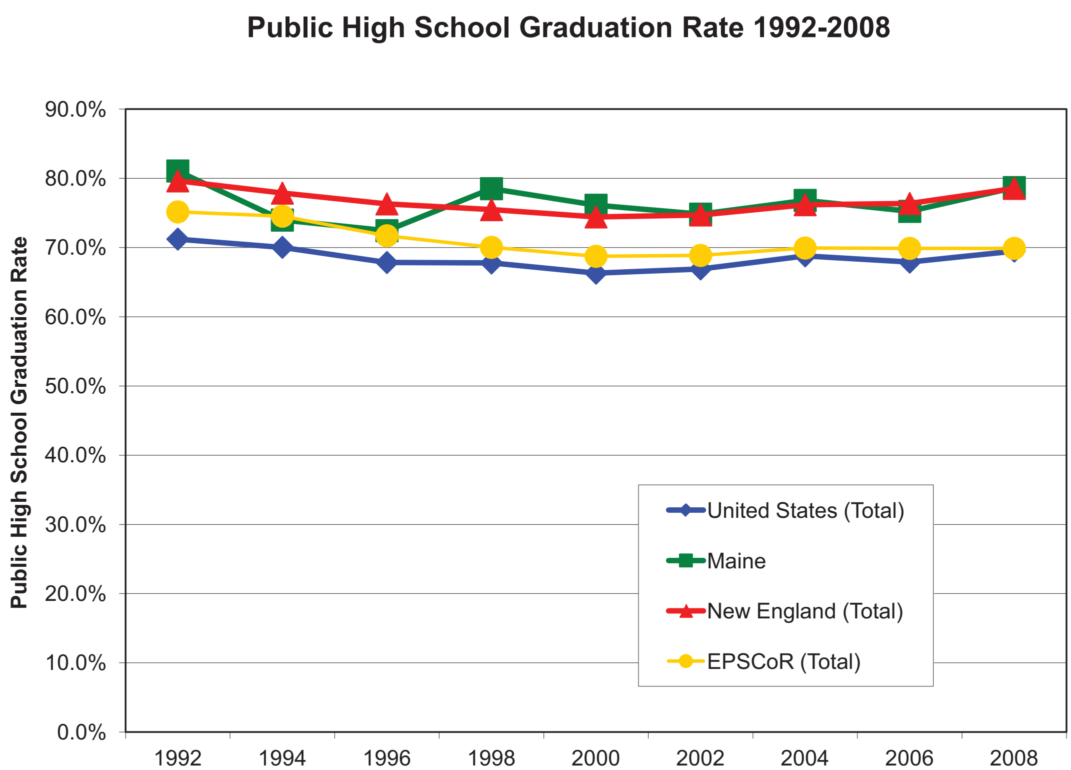


Why This Is Significant

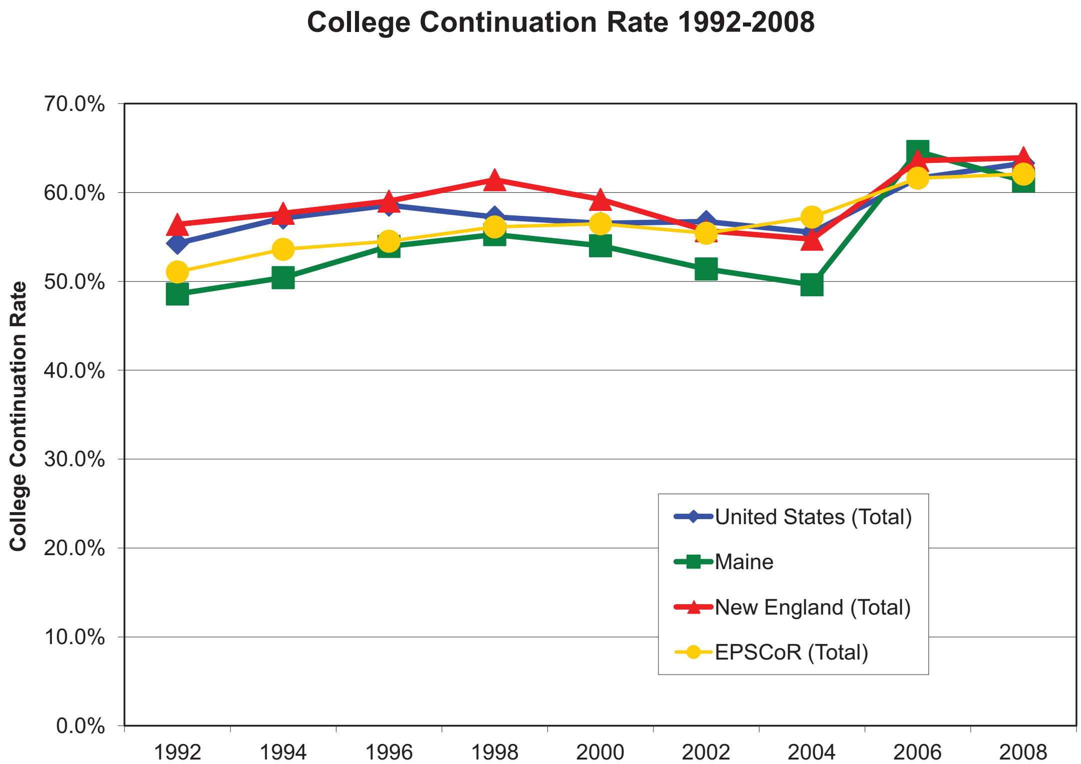
Higher education attainment among the population is increasingly important if Maine is to develop a technology-intensive economy that promotes personal economic well-being. The extent to which young adults complete high school and continue to higher education is an indicator of aspirations among young adults, accessibility of higher education, and future potential education attainment.

Related

Chance for college at the end of high school is a factor of both high school graduation and college continuation rates. In 2008, Maine's public high school graduation rate was 78.7 percent. This was similar to the New England average of 78.6 percent and higher than that for the U.S. as a whole (69.5 percent) and the EPSCoR states (69.9 percent).



In 2004, Maine's college continuation rate was 49.6 percent, but in 2006 it increased significantly to 64.6 percent and moved Maine from lower than all the reference groups to being on top. Since 2006, Maine has slipped somewhat to a level of 61.3 percent in 2008 while the other reference groups have all shown increases and have passed Maine with the U.S. at 63.3 percent, New England at 63.9 percent, and the EPSCoR states at 62.1 percent.



Sources

Data on chance for college is from "Chance for College by Age 19 by State- 1986-2008", Thomas Mortenson, Postsecondary Education Opportunity; 8/5/2010; http://www.postsecondary.org and is based on data from Public Elementary and Secondary Education Statistics and the biannual Integrated Postsecondary Education Data System of the National Center for Education Statistics, www.nces.ed.gov.

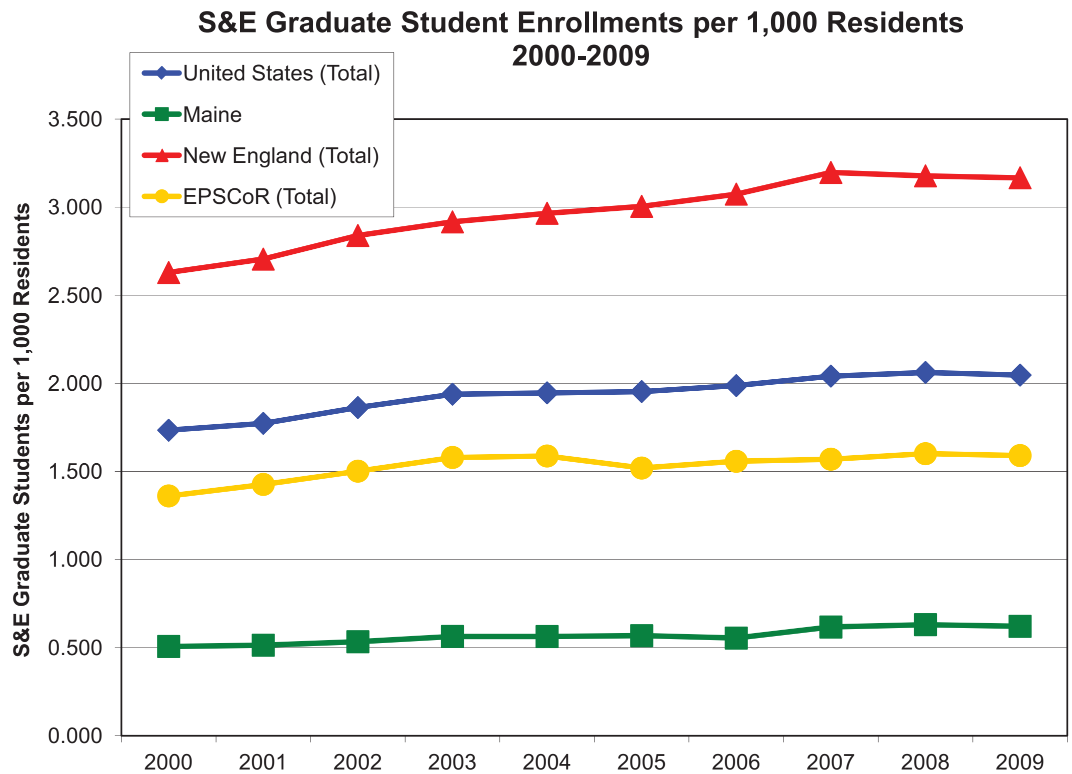
Science and Engineering Graduate Enrollments

— performance summary —

Maine 1-Year Trend	↓
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	**51**

Summary

In 2009, Maine had 817 graduate students enrolled in science and engineering programs. This represented 0.62 enrolled graduate students per 1,000 residents. On this indicator in 2009, Maine significantly lagged the indices of the U.S. (2.04), New England (3.16), and EPSCoR (1.59).

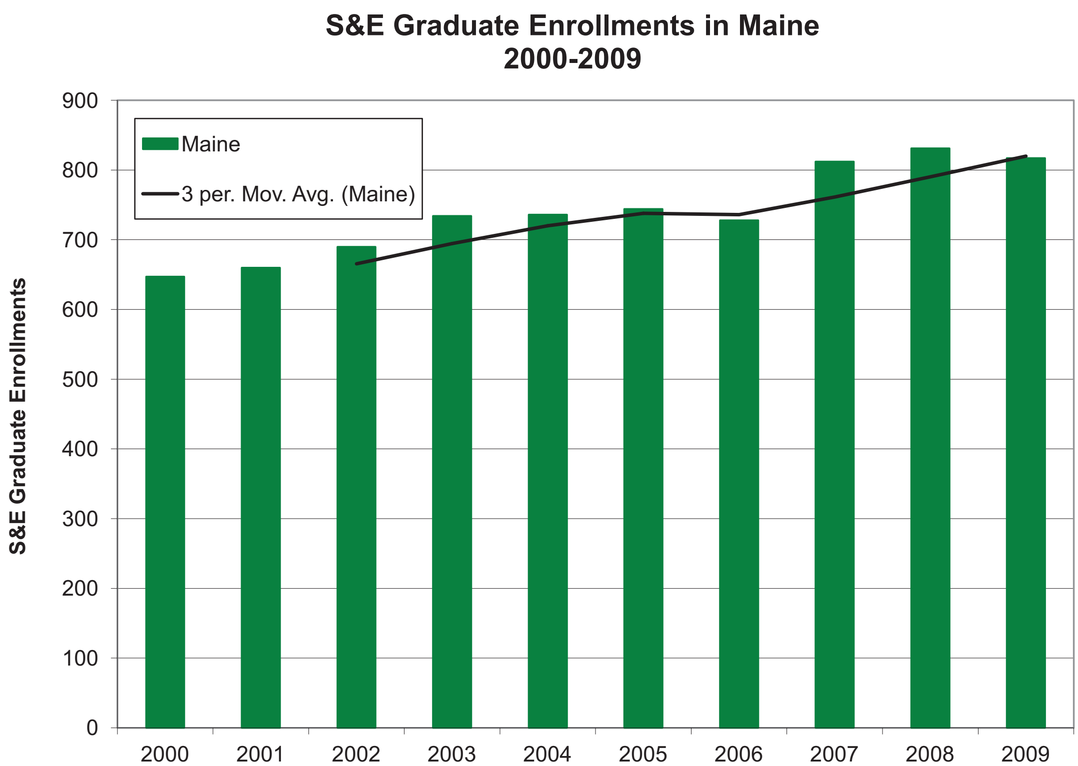


Why This Is Significant

The extent to which Maine colleges and universities are awarding science and engineering degrees is an indicator of both the science and technical capacity of the state's postsecondary schools and the potential for workers with science and technical abilities among Maine's workforce. Both of these are fundamental requirements for developing a solid foundation for research and long-term, technology-driven innovation. The National Science Foundation, the National Institutes of Health, and the Council of Graduate Schools also emphasize the importance of graduate level studies in these disciplines: "The goal that national science workforce policy seeks or needs to maximize is to produce high quality researchers as quickly and cheaply as possible. [It] emphasized that graduates enrolled in science and engineering fields more than those enrolled in other disciplines would likely remain connected to their chosen field: Most master's recipients [in science and engineering disciplines] were continuing in science and engineering-related employment or education…and those recipients with the highest GPAs were much more likely than other master's recipients to stay in science and engineering fields."[4]

Related

Maine colleges and universities were host to 817 students who were pursuing graduate degrees in science and engineering disciplines in 2009. This is a slight decline from 831 in 2008, but represents an increase not just over the five-year period since 2005, but also over the ten-year period since 1999 when 704 students studied graduate level degrees in science and engineering disciplines.



Sources

S&E Graduate Students - NSF WebCASPAR Database System based on "Survey of Graduate Students and Post-doctorates in Science and Engineering", National Science Foundation and National Institutes of Health; http://webcaspar.nsf.gov.

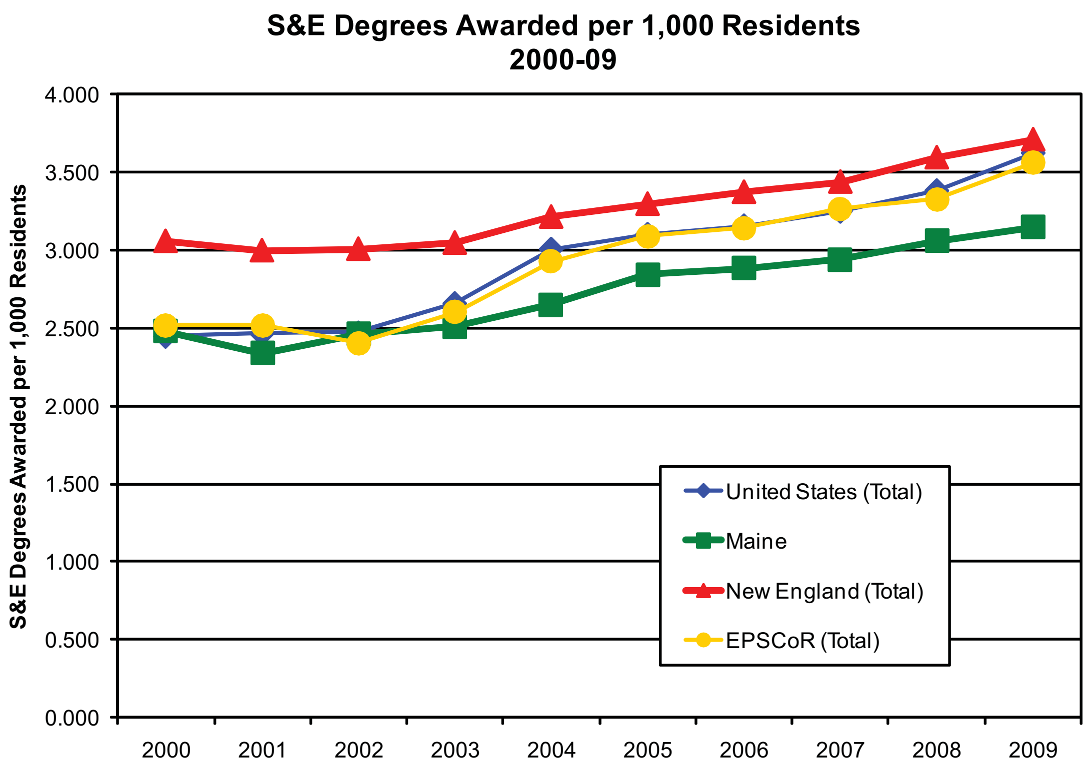
Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-alldata), Population Division, U.S. Census Bureau, Release Date: December, 2009; http://www.census.gov/popest/estimates.php

Science and Engineering Degrees Awarded

— performance summary —	
Maine 1-Year Trend	↑
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↓
Maine's National Ranking	38

Summary

In 2009, Maine colleges and universities awarded 4,151 degrees[5] in science and engineering disciplines. This represented 3.15 science and engineering degrees per 1,000 Maine residents. Despite Maine's increase in science and engineering degrees awarded, this increase has been slower than that of the other reference groups. In 2009, Maine's level was lower than the national level of 3.62, the New England level of 3.71, and the EPSCoR level of 3.56. This is also reflected in Maine's national ranking slipping from 35th in 2008 to 38th in 2009.

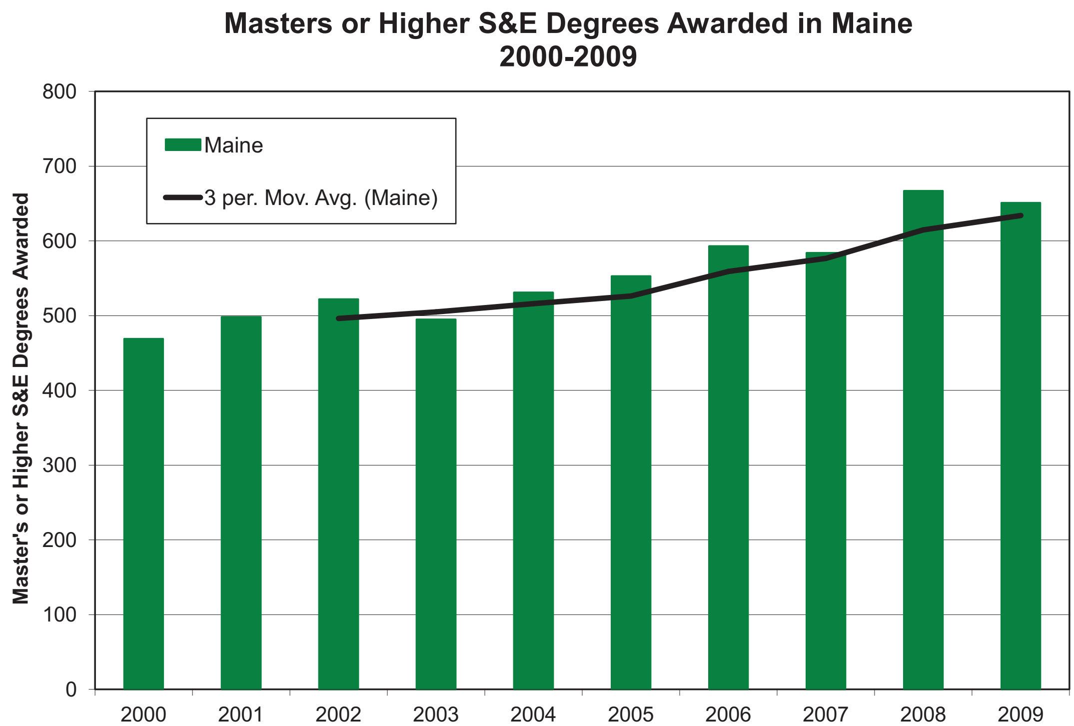


Why This Is Significant

The extent to which Maine colleges and universities are awarding science and engineering degrees is an indicator of both the science and technical capacity of the state's postsecondary schools and the potential for workers with science and technical abilities among Maine's workforce. Both of these are fundamental requirements for developing a solid foundation for research and long-term, technology-driven innovation.

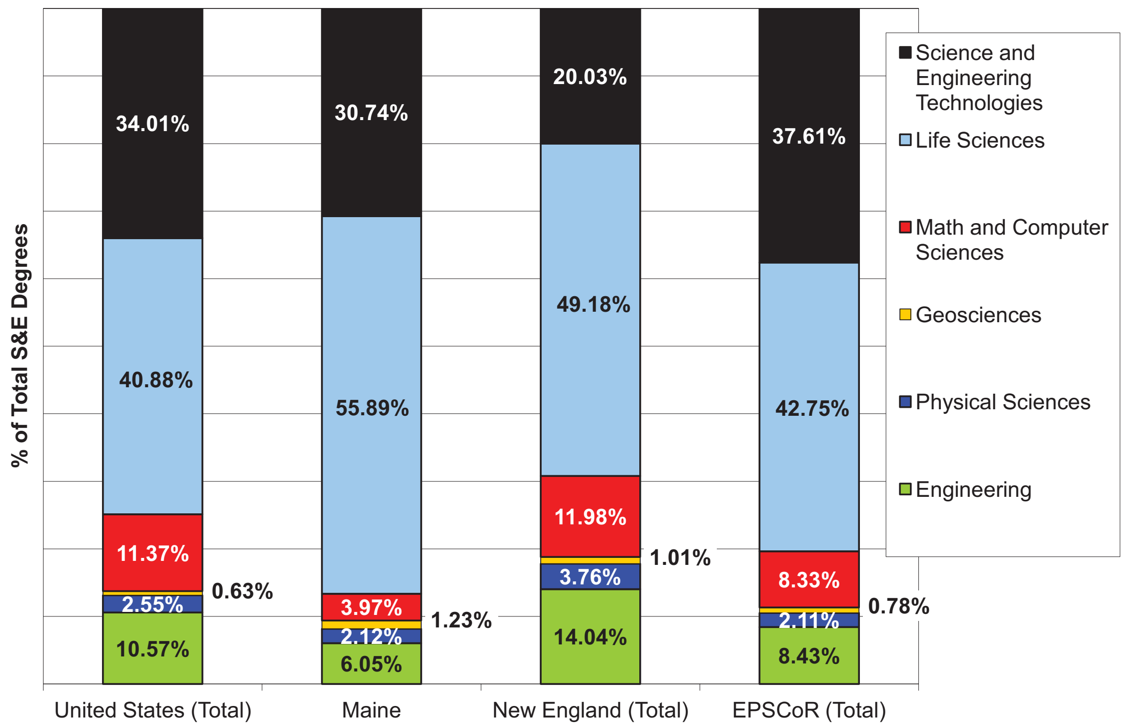
Related

Of the 4,151 science and engineering degrees awarded in Maine in 2009, 651, or 15.7 percent, were masters degrees or higher. The growing importance of advanced degrees was reflected in the award trend data: the number of graduate degrees (masters or higher) awarded in science and technology has increased steadily from a level of 14.8 percent in 2000.



In terms of the academic disciplines in which degrees were awarded by Maine and the U.S. in 2009, compared to the U.S. Maine had a higher concentration in life sciences and lower concentrations in engineering, science and engineering technologies, and math and computer sciences.

Science & Engineering Degrees by Discipline – 2009



Sources

S&E degrees awarded were extracted from NSF WebCASPAR Database System, http://webcaspar.nsf.gov, based on the Higher Education General Information Survey and Integrated Post-Secondary Education Data System, National Center for Education Statistics, U.S. Department of Education, www.nces.ed.gov.

Population is from Annual Estimates of the Population for the United States and States, and for Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-alldata), Population Division, U.S. Census Bureau, Release Date: December, 2009; http://www.census.gov/popest/estimates.php

Education Attainment

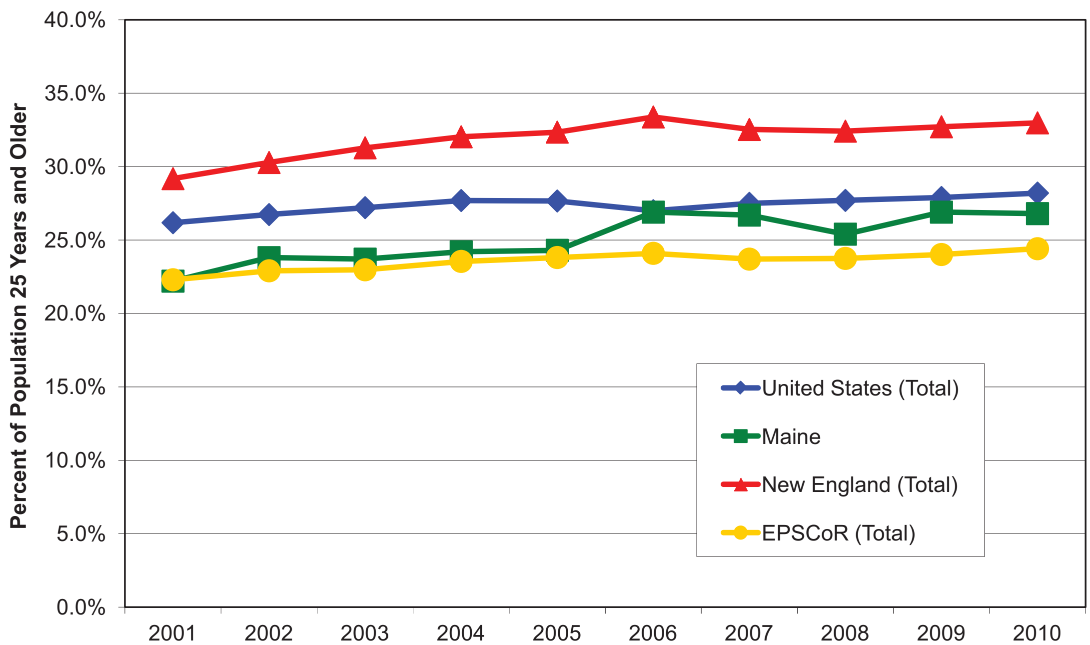
— performance summary —

Maine 1-Year Trend	⇔
Maine 5-Year Trend	⇔
Maine Compared to EPSCoR	↑
Maine's National Ranking	27

Summary

In 2009, 26.9 percent of Maine's population twenty five years and older held four-year college degrees or more. This was similar to the level experienced in 2006. In 2010, Maine was below the level for the U.S. as a whole (28.2 percent) and for New England (33.0 percent), but above the EPSCoR states (24.4 percent). In 2010, Maine ranked 27th highest in the country on this indicator.

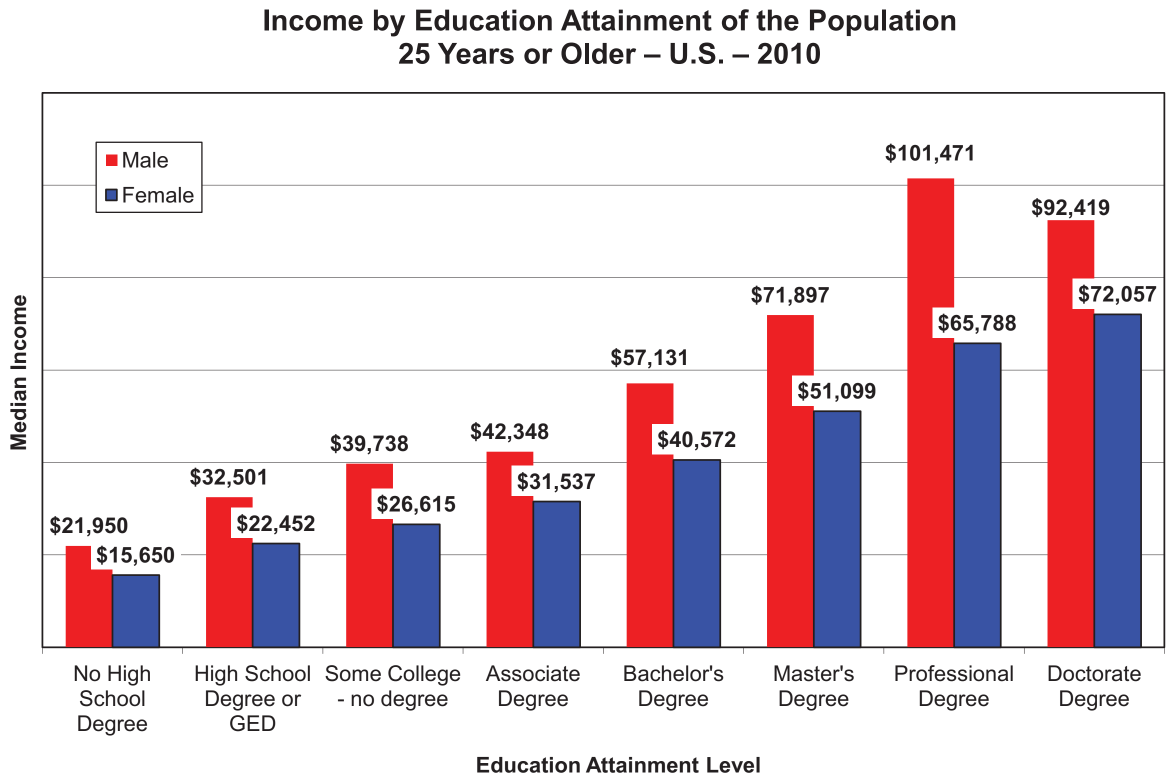
Percent of Population 25 Years and Older Who Have a Bachelors Degree or More 2001-2010



Why This Is Significant

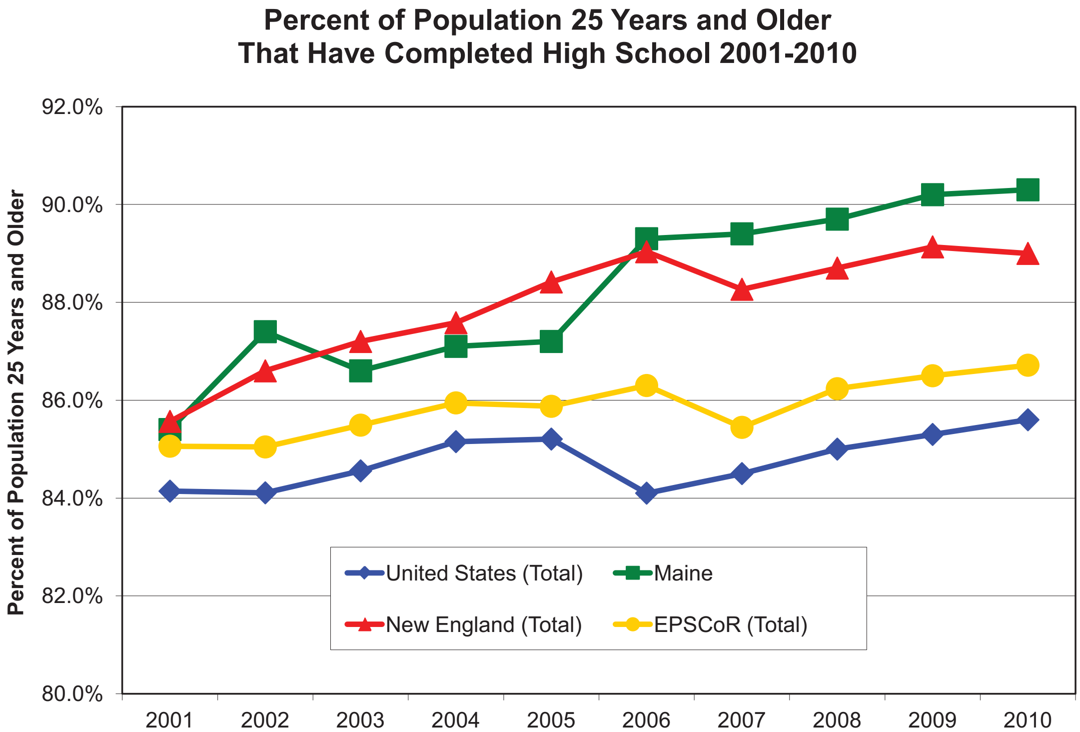
Education attainment leads to greater earning potential.[6] Also, wages are typically higher in technology-intensive industries; these are the same industries that increasingly require workers with higher education degrees.

EDUCATION ATTAINMENT



Related

In terms of the percentage of the population 25 years and older who have graduated from high school in 2010, Maine ranks 10th among all states. Maine's percentage of 90.3 percent placed Maine higher than the nation as a whole (85.6 percent), the New England states (89.0 percent), and the EPSCoR states (86.7 percent).



Sources

Education Attainment data is from U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement; 2001-2010; http://www.census.gov/population/www/socdemo/educ-attn.html; U.S. Census Bureau, American Community Survey; 2007-09; http://www.census.gov/acs/www/

Endnotes

[1] Math scale scores range from 0-500.

[2] Science scale scores range from 0-300. Methodology for the year 2009 results has changed and is not directly comparable to previous years.

[3] Chance for college by age 19 is calculated by the Mortenson Research Seminar on Public Policy Analysis of Opportunity for Postsecondary Education and equals the product of the public high school graduation rate and the college continuation rate. Public high school graduation rate equals high school graduates divided by the number of 9th grade enrollments 4 years prior, data is based on "Public Elementary and Secondary Education Statistics", National Center for Education Statistics, www.nces.ed.gov. College continuation rate equals the number of fall freshman enrolled anywhere in the U.S. who were high school graduates the previous spring. The data is from the biannual Integrated Postsecondary Education Data System, National Center for Education Statistics, www.nces.ed.gov.

[4] National Science Board, *HER Task Force on National Workforce Policies for Science and Engineering*, NSB/HER/NWP 00-4, December 13, 2000. /documents/2000/nwp004/nwp004.htm

[5] Degrees and awards earned but not yet conferred by branch institutions located in foreign countries, and of an honorary nature are not included; Includes the science fields of engineering, physical sciences, geosciences, math and computer sciences, life sciences, medical sciences, and science and engineering technologies; Excludes psychology, social sciences, and interdisciplinary sciences; Includes associate's, bachelor's, master's, first professional, and doctorate level degrees and certificates

[6] The Mortenson Research Seminar on Public Policy Analysis of Opportunity for Postsecondary Education, www.postsecondary.org for further analysis on this subject.

indicators:

– Household Connectivity

– High Speed Internet Access

– Classroom Connectivity

CONNECTIVITY CAPACITY OVERVIEW

The Internet has transformed every segment of society, from families to schools to businesses, from communities to states and nations. The ability to use the Internet represents the ability to connect, communicate, and participate directly in innovation. In today's digital economy, broadband access is becoming as important to business success as more traditional infrastructure such as roads and water and sewer facilities.

Maine's experience with connectivity varies. Relative to the U.S. as a whole and the EPSCoR states, Maine households have higher access to the Internet. However in terms of high speed access, Maine has fewer high speed Internet lines per 1,000 residents than its U.S. and New England counterparts.

In terms of classroom connectivity, fueled by the laptop initiative and local and state investments in technology, Maine continues to be a leader with more Internet computers per student and greater use of computers and the Internet by teachers compared to the reference groups.

Household Connectivity

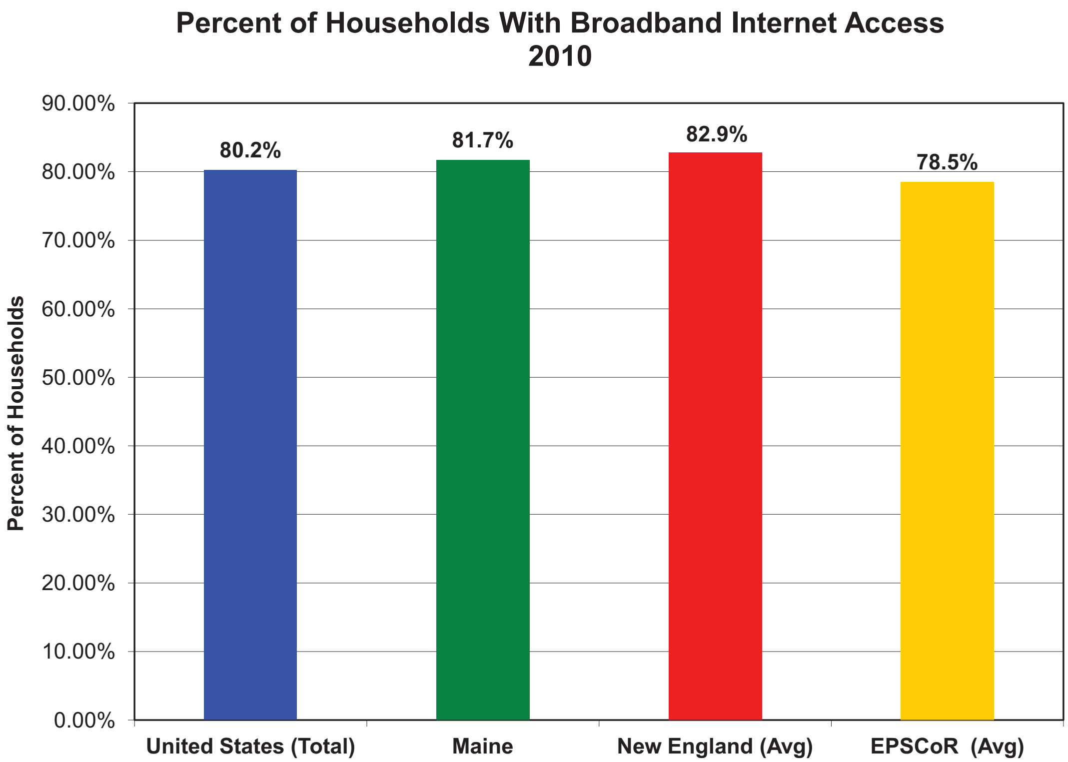
— Performance Summary —

Maine Compared to EPSCoR ↑

Maine's National Ranking 21

Summary

In 2010, 81.7% percent of Maine households had broadband access to the Internet. Maine was behind New England (82.9 percent) but ahead of the U.S. as a whole (80.2 percent) and the EPSCoR states (78.5 percent)[1]. Maine increased its national ranking from 34th in 2009 to 21st in 2010.



Why This Is Significant

Household Internet access provides citizens with the opportunity to utilize the Internet for business, education, and personal uses 24 hours a day. The Internet is gaining increasing significance as a means of information exchange, communications, business transactions and research. This indicator measures the ease with which Maine citizens can access this information tool compared to the rest of the nation.

Sources

Households Online: U.S. Department of Commerce, National Telecommunications Information Administration, Current Population Survey (CPS) Internet Use 2010; http://www.ntia.doc.gov/data/CPS2010_Tables.html

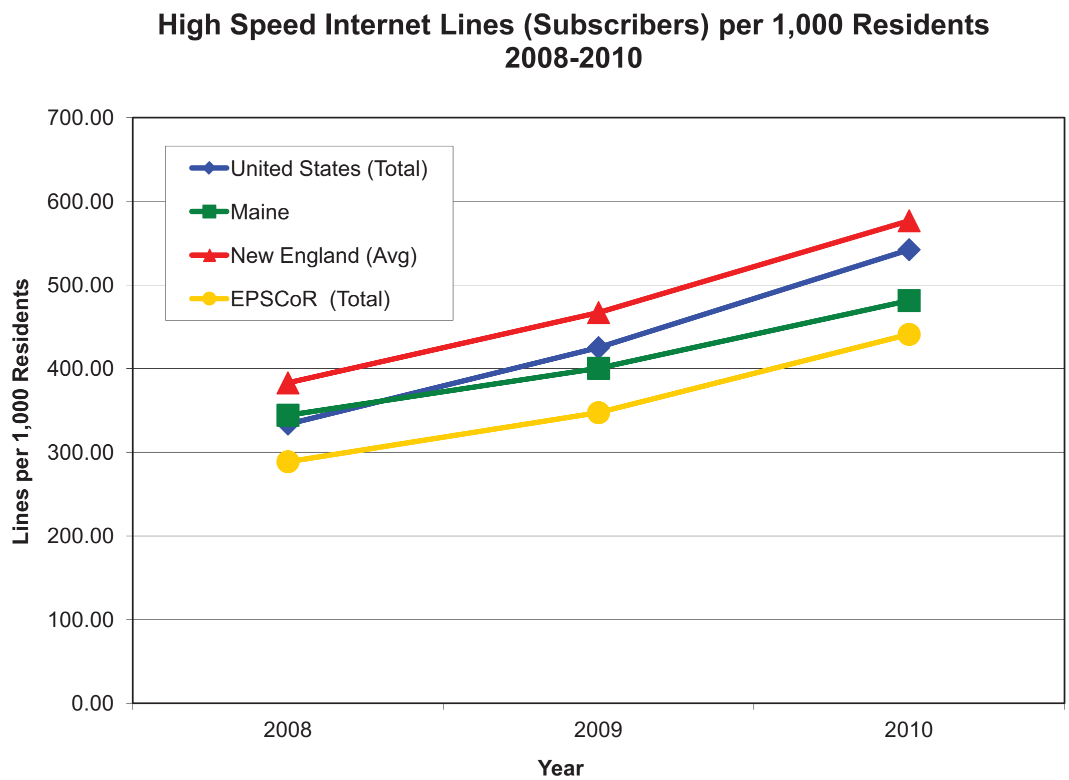
High Speed Internet Access

— Performance Summary —

Maine 1-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	**33**

Summary

Maine has seen a significant increase in broadband[2] Internet subscribers,[3] from 454,000 in 2008 to around 632,000 in 2010. However, relative to the United States and New England reference groups, Maine had fewer subscribers per 1,000 residents. In 2010, there were 481 Internet lines per 1,000 residents in Maine compared to 542 in the U.S. as a whole, 441 in the EPSCoR states and 577 in New England per 1,000 residents. Maine did outpace the EPSCoR average on this indicator. Maine's national ranking on this indicator is 33rd.

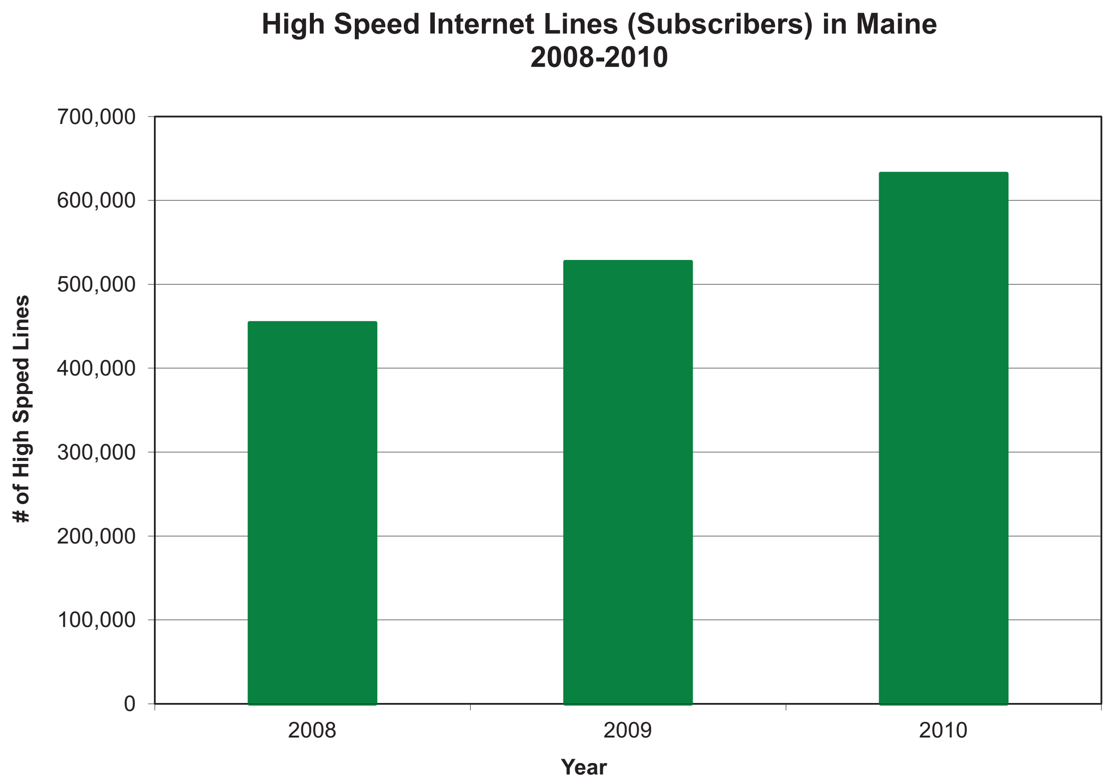


Why This Is Significant

The degree to which broadband technology is available and used in Maine determines, to a significant extent, the degree to which Maine is technologically competitive. For instance, companies that rely on e-commerce for sales transactions, require broadband technology. Likewise, entities engaged in research and development require high capacity communications technology. Moreover, the rise of Internet video and other technologies, including both consumer uses and business tools, places more demand on Internet traffic. Using these new tools and technologies is almost impossible without broadband access.

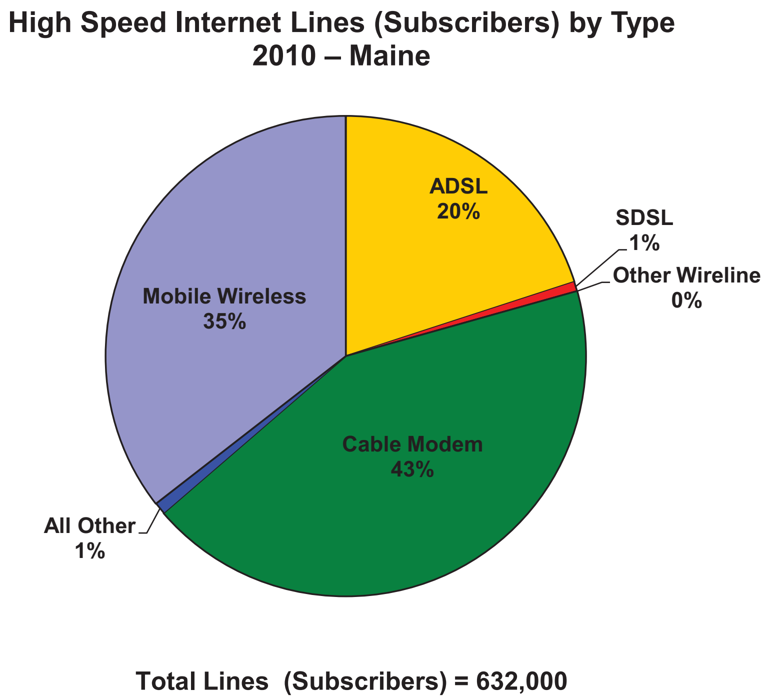
According to the American Electronics Association, an organization of more than 3,000 companies engaged in aspects of high technology, "Widespread broadband deployment will have a positive effect on many areas of everyday life, ranging from communications, entertainment, and healthcare to education and job training."

HIGH SPEED INTERNET ACCESS



Related

In terms of the method of high speed Internet access used in Maine in 2010, cable is dominant with 43 percent of high speed lines compared to 21 percent for digital subscriber lines (DSL)[4]. Mobile wireless represents more than a third of the high speed Internet access in the state.



Sources

Internet Access Services: As of 12/31/10, Released October, 2011, Federal Communications Commission; http://www.fcc.gov/wcb/iatd/comp.html; all data is based on annual reports. In 2008 there was a change in measurement methodology so comparisons to years prior to 2008 are not possible.

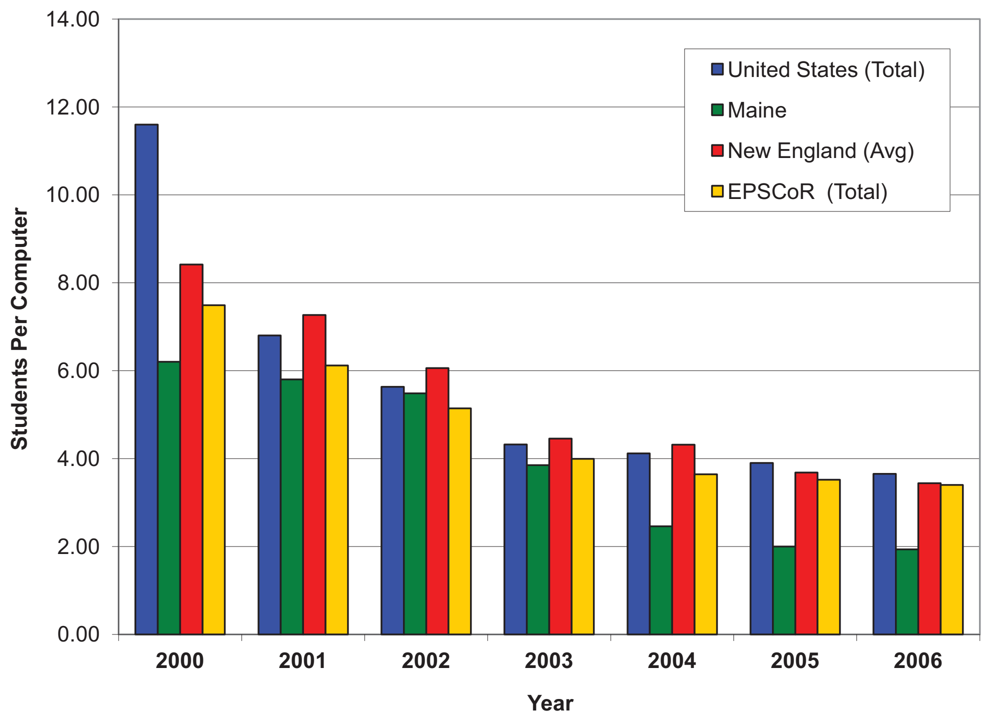
Classroom Connectivity

— Performance Summary —	
Maine 1-Year Trend	↔
Maine 5-Year Trend	↑
Maine Compared to EPSCoR	↑
Maine's National Ranking	2

Summary

Maine continues to be a leader with regard to access to computers and the Internet in the classroom. In 2006, there were 1.94 students per Internet connected computer in Maine compared to 3.65 in the U.S. as a whole, 3.44 in New England, and 3.40 among EPSCoR states[5]. Maine's program to provide a laptop to every 7th grade student made it one of a few states in the nation with classroom laptop programs.

K-12 Students Per Internet Connected Computer – 2000-2006



Why This Is Significant

The Internet provides access to research and information that can enhance classroom curriculum at every grade level. Easy access to Internet-connected computers is needed for teachers to effectively incorporate information technologies into the learning environment. Computer literacy is increasingly becoming a minimum requirement of employers.

Sources

Student to computer ratios are from Technology Counts 2000-2006, Education Week; http://edweek.org

Endnotes

[1] Source data for this indicator changed in the latest year so historical trends are not available.

[2] "Broadband" is defined as high-speed data lines that provide the subscriber with data transmissions at speeds in excess of 200 kilobits per second (kbps) in at least one direction.

[3] "Subscriber" is equivalent to a line in service. An active line may have one or more users.

[4] The mutually exclusive types of technology are, respectively: Asymmetric digital subscriber line (ADSL) technologies, which provide speeds in one direction greater than speeds in the other direction; symmetric digital subscriber line (SDSL) technologies; traditional wire line technologies "other" than ADSL and SDSL, including traditional telephone company high-speed services that provide equivalent functionality; cable modem, including the typical hybrid fiber-coax (HFC) architecture of upgraded cable TV systems; optical fiber to the subscriber's premises (e.g., Fiber-to-the-Home, or FTTH); satellite and fixed and mobile terrestrial wireless systems, which use radio spectrum to communicate with a radio transmitter; and electric power line.

[5] In 2005, indicator was changed from "internet" connected computer to "high-speed internet" connected computer

This report was produced by Camoin Associates, Inc. for the Maine Department of Economic and Community Development.

Camoin Associates is a full-service economic development firm that specializes in advising economic development organizations in creating strategies, policies and programs to support investment and job creation. Our core service areas are: Economic Development Strategic Planning, Industry Market Analysis, Economic & Fiscal Impact Analysis, Evaluating Economic Development Initiatives, Investments, and Programs, and Technology and Innovation Based Economic Development. **www.camoinassociates.com**

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