



Cornell University Economic Impact on New York State



February 2007

Cornell University

**Economic Impact on
New York State**

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Executive Summary

Cornell University is a public-private partnership—unique in American higher education—between a privately-endowed, Ivy League university and the State of New York. For nearly a century and a half, Cornell has provided a broad array of educational, research and outreach services to the people of New York. It is by several measures the state's leading research university. And as New York's land grant university, it fulfills a special responsibility to share its knowledge with people, communities and businesses throughout the state—and in doing so, to support the continued growth of New York's economy.

The resources that Cornell contributes to New York's economic evolution did not appear overnight. They are the product of decades of investment in the institution—both public and private, both intellectual and financial. Today, as a result of this investment:

- Cornell is one of New York State's largest non-governmental employers, and a significant contributor to the economic vitality of both Central New York and New York City. Directly and indirectly, Cornell accounted for more than \$3.3 billion in economic activity in New York State in 2005, and 36,600 jobs.
- With \$561 million in research spending in 2004–2005, Cornell is New York's leading research university, and ranks eleventh nationwide.
- Of the 202,000 Cornell alumni whose addresses are known, 56,000 (about 28 percent) live and work in New York. Cornell's graduates contribute to the overall skill level of New York's workforce, and thus increase the productivity and competitiveness of companies and communities throughout the state.
- Working in partnership with hundreds of New York businesses both large and small, Cornell researchers contribute regularly to the vitality of industries throughout the state—from apple growers, food processors, and wineries to software developers, investment companies, and biotech firms.
- Between 2000 and 2004, the University facilitated the launch of 28 start-up companies based on technologies first developed at Cornell.
- Cornell's Weill Medical College contributes not only to New Yorkers' physical and mental health but also to the economic health of New York City and the surrounding region, through its world-class programs of education, research and patient care.
- As New York State's land grant university, Cornell provides a wide array of services to New Yorkers, their businesses, and their communities through outreach programs offered by all of the University's colleges, and most especially through the services provided by Cornell Cooperative Extension and Industrial and Labor Relations Extension. An estimated 535,000 families, professionals, individuals, school children, small businesses, farmers, and community agencies throughout the state were direct beneficiaries of these services in 2005.

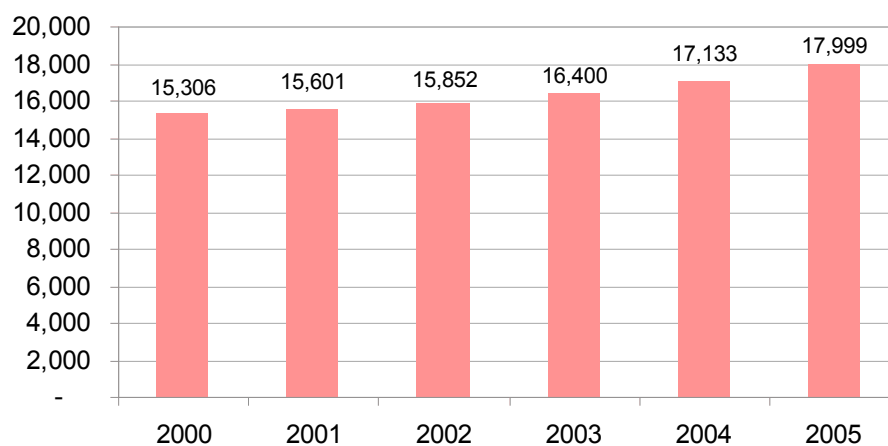
In the following pages we highlight Cornell’s statewide impact as a major enterprise in its own right; its role in workforce development, research, and business development; the regional economic impact of Cornell-Ithaca in Central New York and Weill Cornell in New York City; and the impact of Cornell Cooperative Extension on citizens and communities throughout the state.

Cornell as an Enterprise: Its Impact in 2004–2005

Cornell directly contributes to New York’s economy through its spending on payroll, its purchases of goods and services from companies based in New York, and its investment in university construction. Spending by students and visitors to Cornell, and by 55 Cornell Cooperative Extension associations located throughout the state, add to this impact. These direct expenditures also produce indirect, or “multiplier,” effects, as each dollar spent in New York circulates through the local and state economies. Taking into account these direct and indirect effects, in 2004–2005:

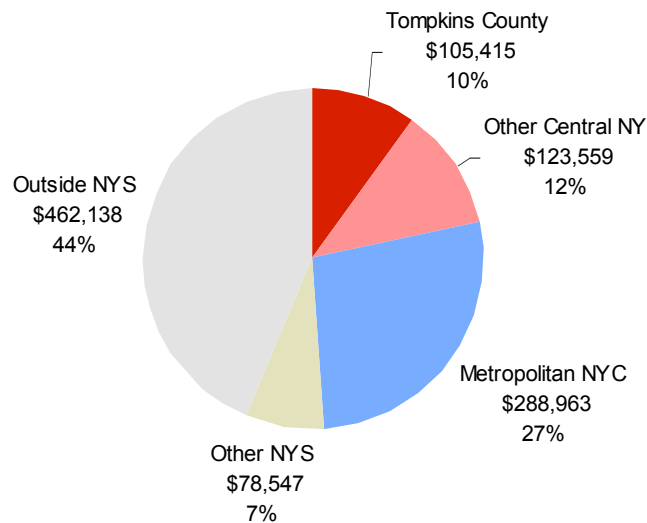
- Cornell’s expenditures generated more than \$3.3 billion in total economic activity throughout the state, including \$1.8 billion in Central New York State, and \$1.06 billion in the City of New York.
- Cornell directly and indirectly accounted for a total of more than 36,000 jobs statewide, of which 23,000 jobs were in Central New York and 9,300 in New York City.
- The University purchased nearly \$425 million in goods and services from suppliers in New York State.
- Capital investments totaled almost \$200 million, with nine out of every ten construction dollars paid to New York State contractors.

Figure 1: Cornell University employment growth, 2000-2005



(Source: Cornell University)

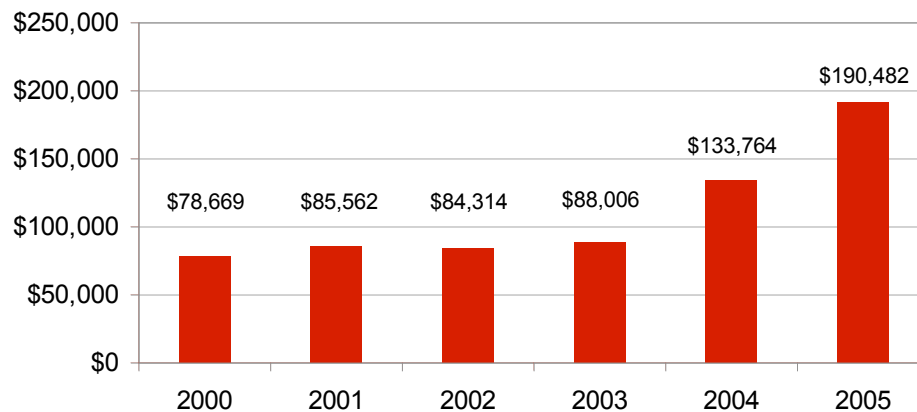
Figure 2: Cornell University purchasing and construction spending, by location of vendor/contractor, 2005 (\$ thousands, total: \$1.06 billion)



(Source: Cornell University)

- Cornell-Ithaca students spent an estimated \$74 million off-campus in 2005, and visitors to Cornell spent an additional \$40 million in Tompkins County.
- Through taxes paid by its employees, vendors and contractors—as well as local taxes and fees that the university pays directly—Cornell in 2005 directly or indirectly generated an estimated \$173 million in state and local tax revenues. For every dollar that New York State spent in support of Cornell's operations, it got back 72 cents in state and local tax revenues.

Figure 3: Cornell University construction spending, 2000-2005 (\$ thousands)



(Source: Cornell University)

Table 1: Summary of Cornell University's Economic Impact in New York State, Central New York and New York City¹

	<i>Direct University spending</i>		<i>Indirect and induced impact of spending by employees, vendors and contractors</i>		<i>Total impact</i>
	<i>Payroll</i>	<i>Purchasing/construction</i>	<i>Impact of employee spending</i>	<i>Impact of vendor and contractor spending</i>	
New York State²	\$ 1,040 m	\$ 595 m	\$ 970 m	\$ 465 m	\$ 3,070 m
	17,797 jobs	4,750 FTE	6,225 FTE	3,500 FTE	32,272 FTE
Central New York	\$611 m	\$229 m	\$565 m	\$160 m	\$1,565 m
	12,464 jobs	2,315 FTE	4,325 FTE	1,495 FTE	20,599 FTE
New York City	\$ 415 m	\$ 258 m	\$ 235 m	\$ 150 m	\$ 1,058 m
	5,184 jobs	1,780 FTE	1,275 FTE	1,055 FTE	9,294 FTE

(Source: Cornell University, Appleseed)

Workforce Development

In today's knowledge-based economy, one of the most important determinants of whether a state's economy flourishes or falters is the depth and quality of its human resources. Cornell helps New York develop and maintain the educated, skilled workforce it needs to be competitive in a global economy.

- In fall of 2004, more than 20,000 undergraduate and graduate students were enrolled at Cornell, of whom more than 8,500 were from New York State (in the four New York State contract colleges, approximately 60 percent of undergraduates were from New York State). The University thus plays a dual role in the development of the state's human capital—building the skills and knowledge of young New Yorkers, and each year attracting to the state thousands of talented students from around the nation and the world.
- Through its fourteen colleges, Cornell provides graduates who are well prepared to meet the needs of some of the largest and fastest-growing sectors of New York's economy. For example, Cornell's School of Hotel Administration is a leading provider of highly-trained professionals for the state's hospitality and tourism industry; the Johnson Graduate School of Management prepares students for careers in finance, management and business services; and graduates of the College of Agriculture and Life

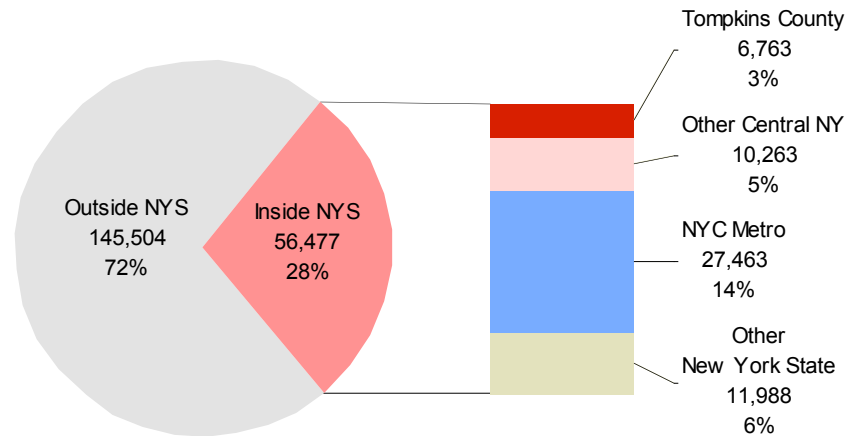
¹ This table does not include the impact of student and visitor spending.

² Cornell's New York State employment is greater than the sum of Central New York and New York City employment because of Cornell jobs elsewhere in the state.

Sciences are prepared for a range of growing industries in the state—from the wine industry to biomedical research.

- Of the 202,000 Cornell's alumni whose addresses are known, 28 percent reside in New York State. Of those who received their degrees between 1995 and 2005, 34 percent were still living in New York State in 2006.

Figure 4: Cornell University degree holders, by current address (total: 201,981)



(Source: Cornell University)

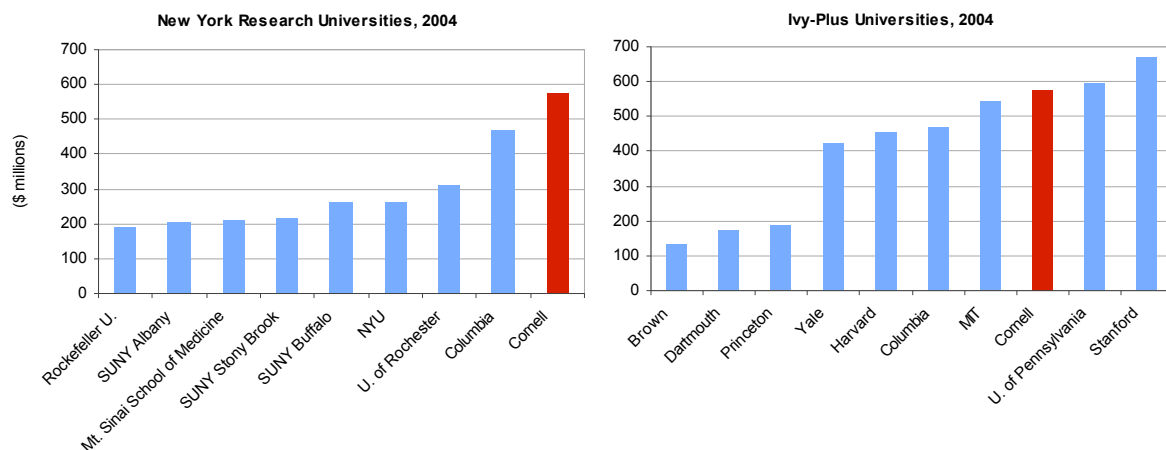
- Cornell provides support to the state's math and science teachers through a variety of ongoing programs, including the *Cornell Institute for Biology Teachers* and the *Cornell Nanoscale Systems Institute for Physics Teachers*. During 2005, these programs and others provided training, equipment, and other resources to hundreds of New York State schoolteachers.
- In 2005, the School of Industrial and Labor Relations (ILR) Division of Extension and Public Service enrolled more than 20,000 students in continuing education courses. Many of the students attend courses in classrooms in Albany, Buffalo, New York City, and Rochester. ILR offers 18 certificate programs in areas ranging from financial management to hospitality and food service management.

Research

Cornell is New York's leading research university. Cornell is especially strong in several areas of research that are likely to emerge as important sources of new economic growth, such as computational biology, computer science and nanotechnology.

- Cornell is New York's top-ranking university in agricultural research, engineering, computer science, the physical sciences, and the social sciences.
- In 2005, Cornell spent more than \$561 million on research, ranking first in research spending among all New York universities, and third among a comparison group of Ivy League and other major research universities.

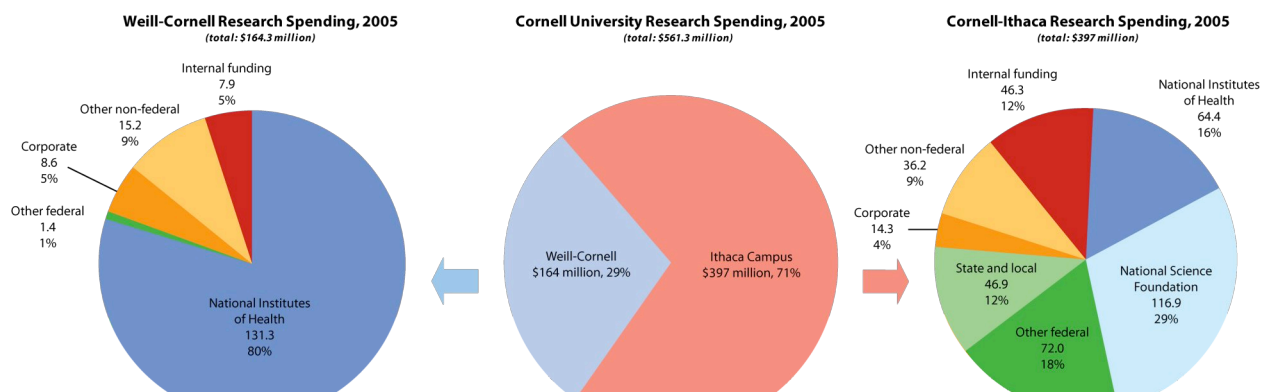
Figure 5: Selected New York State and Ivy-plus universities, ranked by total research expenditures, fiscal year 2004



(Source: National Science Foundation, Cornell University)

- Federal, corporate, and foundation sources funded about 75 percent of this total in 2005, including the National Institutes of Health (\$195 million) and the National Science Foundation (\$115 million).
- With research expenditures totaling \$165 million in 2004-05, Weill Cornell Medical College (Weill Cornell) accounted for 29 percent the University's total research spending, and helped make New York City one of the world's leading centers of biomedical research.

Figure 6: Cornell University research expenditures, by source, 2005

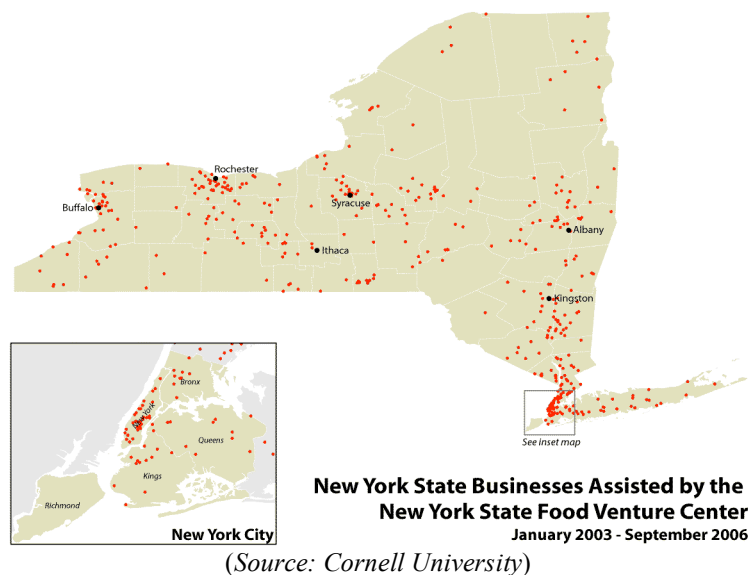


Technology Transfer and Business Development

Cornell actively seeks to identify commercially viable technologies and support the progression of new technologies from University labs to the marketplace. The result is cutting-edge companies that put down roots in New York State—and remain to take advantage of new ideas at Cornell.

- Between 2000 and 2005, Cornell executed more than 400 licenses and options for use of technologies first developed at the University, and spun off 28 start-up companies engaged in the development of such technologies for commercial use.
- Among New York's research universities, Cornell ranks first in patents issued, first in commercial license agreements executed, and second in formation of start-up companies.
- A 2006 Milken Institute report on biotechnology technology transfer and commercialization ranked Cornell University 16th in the U.S. in patents issued, licenses executed, license income, and start-up formation.
- The Cornell Business and Technology Park, located near the Ithaca campus, is one of the largest university-based research parks in the northeastern U.S. Founded in 1988, the 300-acre Business and Technology Park encompasses 24 buildings, housing 80 companies that together employ more than 1,600 workers.
- The 2006 report, *Cornell's Research Serves the Region and Beyond: Small Business Development*, tracks 90 small businesses in New York State that rely on Cornell's research and intellectual resources. Of the 1,800 workers employed by these companies in New York State, 92 percent work in Central New York.
- The Food Venture Center at the Agricultural Experiment Station in Geneva assisted 164 New York State businesses during 2005 and more than 450 between 2003 and 2006.

Figure 7: Map of New York State businesses assisted by the Food Venture Center, 2003 - 2006



Cornell-Ithaca — a \$1.6 billion impact in Central New York

Cornell's central campus is located on 745 contiguous acres in Ithaca, New York. Its manifold operations in the upstate region make Cornell one of Central New York's largest employers.

- In the spring of 2005, Cornell's Ithaca-based colleges and programs employed a total of 13,000 regular full- and part-time employees, and 8,000 students who worked part-time. The Cornell-Ithaca payroll that year totaled \$636 million.
- Between 2000 and 2005, Cornell-Ithaca increased the size of its work force by more than 10 percent, making it one of the fastest-growing major employers in Central New York.
- Cornell-Ithaca spent \$276 million on goods and services in New York State in 2005, supporting 2,300 full-time equivalent (FTE) jobs.
- Cornell-Ithaca spent \$100 million on construction in 2005, generating approximately 835 FTE construction-related jobs in New York State.
- Taking into account indirect and induced (or "multiplier") effects, spending by Cornell-Ithaca on payroll, purchasing and construction in 2004-05 generated approximately \$1.6 billion in economic activity and 20,600 jobs in the eighteen-county Central New York region.
- Taking into account taxes and fees paid directly by the University, taxes paid by its employees and vendors, and additional tax revenues produced through the multiplier effect, we estimate that in 2005 Cornell-Ithaca directly or indirectly generated \$61 million in state personal income, sales and other taxes; and \$33 million in local property, sales and other taxes.

Weill Cornell — a \$965 million impact in New York City

Located in Manhattan for more than a century, and a thriving enterprise in its own right, Cornell's medical division contributes to the economy in the New York City area in several ways.

- In 2005, Weill Cornell employed almost 5,000 regular employees and 440 student employees.
- In 2005, Weill Cornell spent a total of \$208 million on goods and services and construction in New York City—directly supporting 1,480 FTE jobs within the city.
- Taking into account indirect and induced (or "multiplier") effects, spending by Weill Cornell on payroll, purchasing and construction in 2004-05 generated more than \$965 million in economic activity in New York City, and more than 8,500 jobs.
- Taking into account taxes and fees paid directly by the University, taxes paid by its employees and vendors, and additional tax revenues produced through the multiplier, we estimate that in 2005 Weill Cornell directly or indirectly generated

- nearly \$38 million in state personal income, sales and other taxes; and nearly \$43 million in local income, property, sales and other taxes.
- In that same year, Weill Cornell physicians saw almost 270,000 patients, bringing in total revenues of \$340 million: \$122 million of it paid by patients from outside New York City, and \$66 million of that from patients who came from out of state.

Cornell Cooperative Extension

Cornell Cooperative Extension's (CCE) role is to help residents, businesses, and communities throughout the state get access to, understand, and use effectively the wealth of knowledge created at Cornell. CCE has an impact on New York State both as a significant enterprise in its own right, and through the services it provides.

- With more than 1,900 employees (1,400 FTEs), CCE's payroll was \$41 million in 2005.
- The program purchased \$33 million worth of goods and services from New York State businesses in 2005, supporting 300 jobs.
- The total direct, indirect, and induced impact of CCE on the state economy was \$143 million and 2,230 FTE jobs.
- In 2004-05, CCE directly served approximately 535,000 New Yorkers through a variety of programs in nutrition and food safety, agriculture, natural resources management, community development, youth development and family well-being.
- In 2005, 40,000 New Yorkers provided 1.7 million volunteer service hours to support CCE's programs—the equivalent of \$25 million in unpaid work.

Summary

While Cornell's economic data show the university is an economic force in New York State, this report also shows that the university's greatest contributions are directly related to the quality and dedication of its faculty, staff, and students, whose many accomplishments and contributions we have attempted to highlight. By creating this report the University seeks to demonstrate its stewardship of the assets provided to it and how that stewardship manifests itself in educational opportunities, new discoveries, commercial applications, and services to individuals, businesses, and communities throughout the state. Cornell is proud of its land grant reputation and believes that the information provided here makes it clear that the university has remained true to the core principles established by its founder 143 years ago of strengthening New York State's economic strength, quality of life, and cultural vitality.

Part One: Cornell University's Impacts on New York State's Economy—an Overview

Cornell University—with its main campus in Ithaca, in New York's Finger Lakes region, and Weill Cornell Medical College (Weill Cornell) in New York City—is one of New York's great universities. Cornell is the state's leading center of scientific research, and a leading provider of skilled graduates in fields as diverse as agriculture, computer science and medicine. It is also New York's land grant university; and as such has a special responsibility for dissemination and application of new knowledge to families, businesses and communities throughout the state. Among the state's universities, Cornell is also a leading generator of new businesses and new jobs, particularly in upstate New York.

Cornell's unique combination of strengths means that the University is well positioned to help the state respond most effectively to the forces that are reshaping its economy. In particular, Cornell can help New York address a series of interrelated challenges:

- How to take advantage of the opportunities created by the continuing process of global economic integration.
- How to create and maintain the research base, and the capacity to translate research into practical results, that the state will need to compete effectively in a world where knowledge and innovation are among the primary drivers of economic growth.
- How to overcome disparities in economic performance between the downstate area (New York City and the surrounding suburbs) and most parts of upstate New York.
- How to ensure that all New Yorkers are prepared to participate in the growth of an increasingly knowledge-driven, globally integrated economy—and have the opportunity to do so.

This report highlights Cornell's impact on New York State's economy, and its role in helping the state respond to these challenges.

A Primer on Cornell University

Formally founded in 1865, Cornell University first opened its doors to students in 1868. From the beginning it was unique—combining the role of New York's land grant college with that of the privately endowed institution founded by Ezra Cornell. In the 139 years since, it has grown into a comprehensive, first-tier research university comprised of fourteen colleges and schools—seven undergraduate and seven graduate and professional schools—and four other academic units (Table 2). During the fall of 2004, enrollment across all of these schools totaled 20,322: 13,619 undergraduates and 6,703 graduate and professional students.

Table 2: Cornell University Colleges and Schools

<i>Undergraduate colleges:</i>
College of Agriculture and Life Sciences ³
College of Architecture, Art and Planning
College of Arts and Sciences
College of Engineering
School of Hotel Administration
College of Human Ecology ³
School of Industrial and Labor Relations ³
<i>Graduate and professional schools:</i>
Graduate School
Law School
Johnson Graduate School of Management
Weill Cornell Medical College (NYC)
Weill Cornell Medical College (Qatar)
Weill Cornell Graduate School of Medical Sciences (NYC)
College of Veterinary Medicine ³
<i>Other academic units:</i>
Faculty of Computing and Information Sciences
School of Continuing Education
Division of Nutritional Sciences
Cornell University Library

Four of Cornell’s colleges are specifically charged by the state with missions related to Cornell’s role as the state’s land grant university—the College of Agriculture and Life Sciences, the College of Human Ecology, the School of Industrial and Labor Relations, and the College of Veterinary Medicine. These “contract” colleges are simultaneously integral units of Cornell and units of the State University of New York; they are managed by Cornell, but the state funds a portion of their operating budgets and most capital facilities.

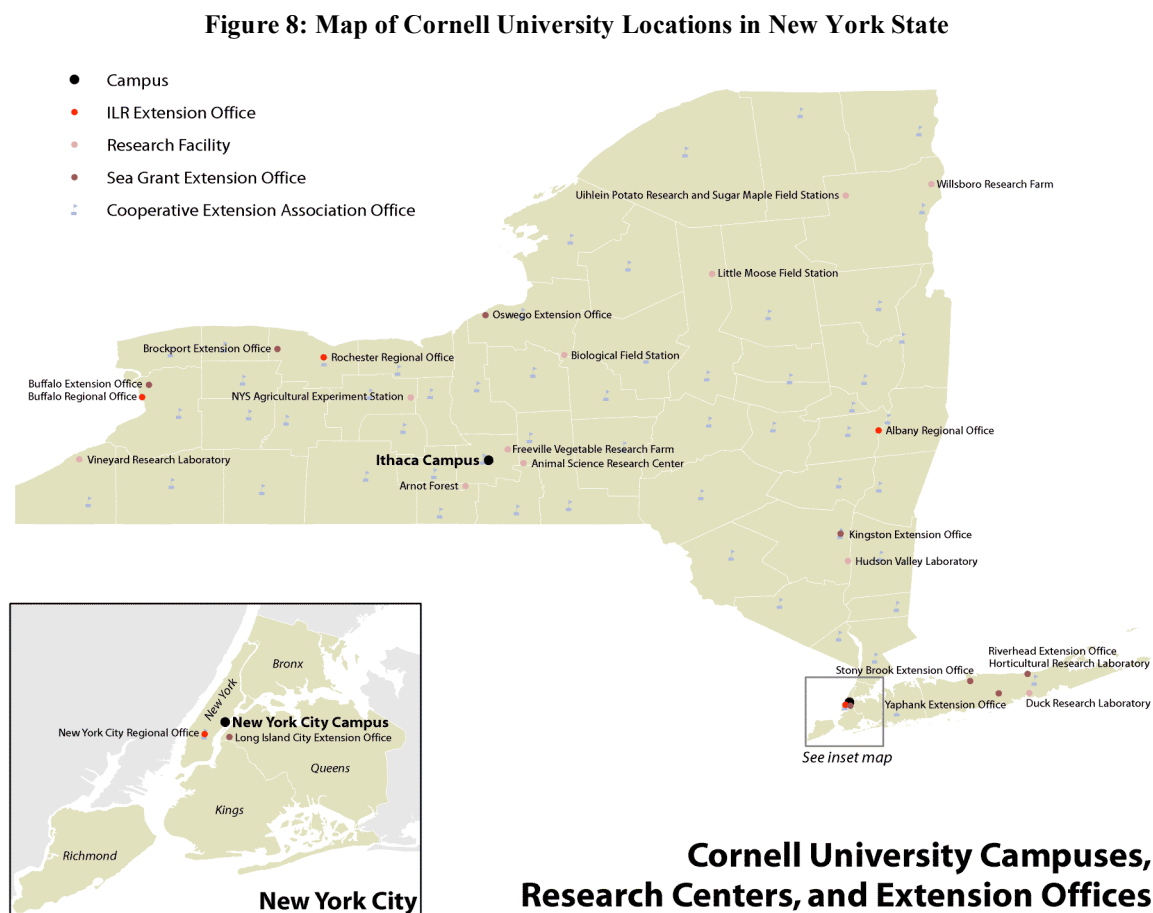
Cornell’s central campus, located on 745 contiguous acres in Ithaca, New York, is home to its undergraduate colleges and four of its graduate and professional schools. Weill Cornell Medical College and the Weill Cornell Graduate School of Medical Science are located in New York City. In addition to its Ithaca and New York City campuses, Cornell

³ New York State contract college

conducts research and offers educational services at a number of other locations throughout the state.

As the state's land grant university, Cornell is charged with extending the benefits of its research and scholarship to families, communities and businesses throughout New York. This commitment is most visible in the work of two outreach networks associated with the University's contract colleges—Cornell Cooperative Extension (CCE) and Industrial and Labor Relations (ILR) Extension. CCE operates through 55 county cooperative extension associations, as well as an office in Manhattan that serves the five boroughs of New York City; and ILR Extension through offices located in Buffalo, Rochester, Ithaca, Albany, and New York City.

The locations of Cornell's major campuses and research centers, as well as CCE and ILR Extension offices, are shown below in Figure 8.



(Source: Cornell University)

Outside New York State, Cornell facilities and programs include the Shoals Marine Laboratory (located off the coast of Maine), the Arecibo Observatory in Puerto Rico, and

environmental field stations in the Dominican Republic. The University's newest major division, Weill Cornell Medical College in Qatar, is the first branch of a U.S. medical school to be established overseas.

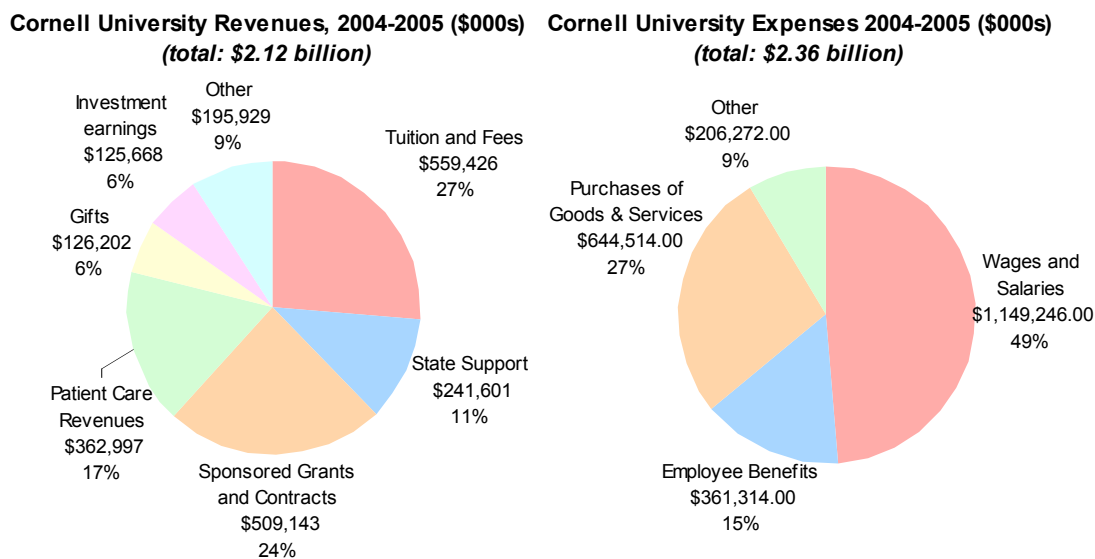
A brief look at Cornell's revenues and expenditures highlights the University's role as a major income generator for New York State. As Figure 9 shows, Cornell's operating revenues from all sources in fiscal year 2005 totaled nearly \$2.12 billion. Six sources accounted for about 91 percent of this total:

- Tuition and fees (27 percent);
- Sponsored programs, grants and contracts (24 percent);
- Patient care revenues, Weill Cornell physicians' organization (17 percent);
- State support, including direct appropriations as well as state payment of certain fringe benefit and debt service costs (11 percent);
- Gifts (6 percent); and
- Investment earnings, including interest, dividends and net gains (6 percent).

Expenditures during fiscal year 2005 (including fringe benefits and debt service paid directly by the state) totaled \$2.36 billion. Major categories of expenditure included:

- Wages and salaries (49 percent);
- Employee benefits (15 percent); and
- Purchases of goods and services (27 percent).

Figure 9: Cornell University Revenues and Expenses, 2004-2005⁴



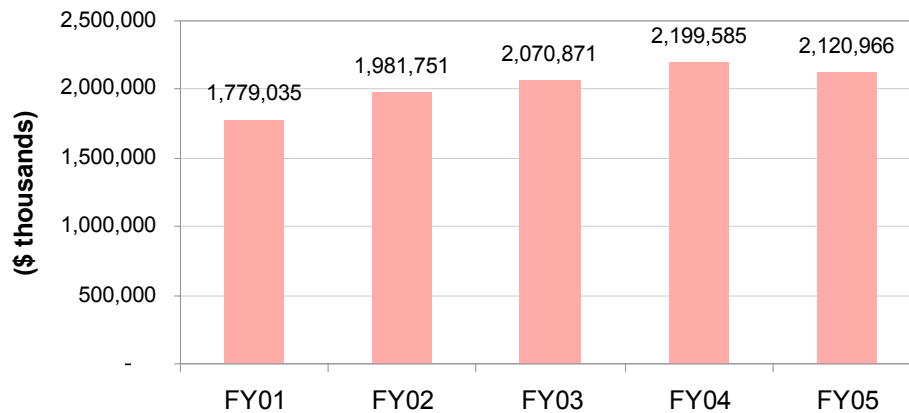
(Source: Cornell University)

As shown in Figure 10, Cornell University revenues increased by 19 percent between 2001 and 2005. During the same period, state support in the form of appropriations, as

⁴ Note: The difference between revenues and expenses includes transfers to/from non-current operations.

well as fringe benefits and debt service paid directly by the state, remained roughly stable. As a percent of University revenues, state support declined from 14 percent in 2001 to 11 percent in 2005.

Figure 10: Cornell University Revenues, FY 2001-2005



(Source: Cornell University)

Cornell as an Enterprise: The University as Employer, Buyer and Builder

As the figures on its revenues and expenditures suggest, Cornell is a major enterprise in its own right—a major employer, a buyer of hundreds of millions of dollars in goods and services, and a sponsor of construction projects large and small. Our examination of the University’s economic impact starts with this reality.

Cornell as an employer

In the spring of 2005, Cornell University employed 17,999 people in the U.S. in full-time, part-time and temporary positions.⁵ Of these, 17,797 worked at various locations in New York State, making the University one of New York’s 50 largest non-governmental employers.⁶

In addition to the 17,999 employees cited above, about 8,500 students worked part-time for Cornell in the spring of 2005. Nearly a third of these were graduate assistants; the remainder worked in a variety of on-campus jobs.

Of Cornell’s 17,999 non-student employees, 92 percent lived in New York State.

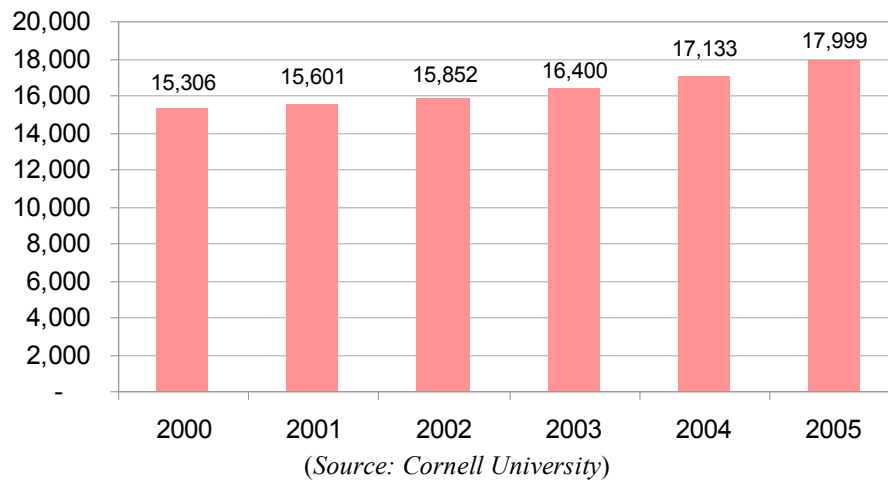
⁵ These figures do not include University employees working at the Arecibo observatory (Puerto Rico), or at Weill Cornell in Doha; nor do they include Cornell students who work for the University.

⁶ Source: New York State Department of Labor

The University's payroll in 2005 totaled approximately \$1.04 billion,⁷ of which \$962 million was paid to New York State residents. We estimate that in 2005, household spending by University employees generated 4,000 jobs in New York.

In contrast to many other large employers in New York, Cornell's workforce has grown in recent years. Figure 4 shows that between 2000 and 2005, total University employment grew by 16 percent – an average of 3 percent annually. During the same period, non-governmental payroll employment in New York State shrank by 1.3 percent.

Figure 11: Cornell University Employment Growth, 2000-2005



Purchasing and construction

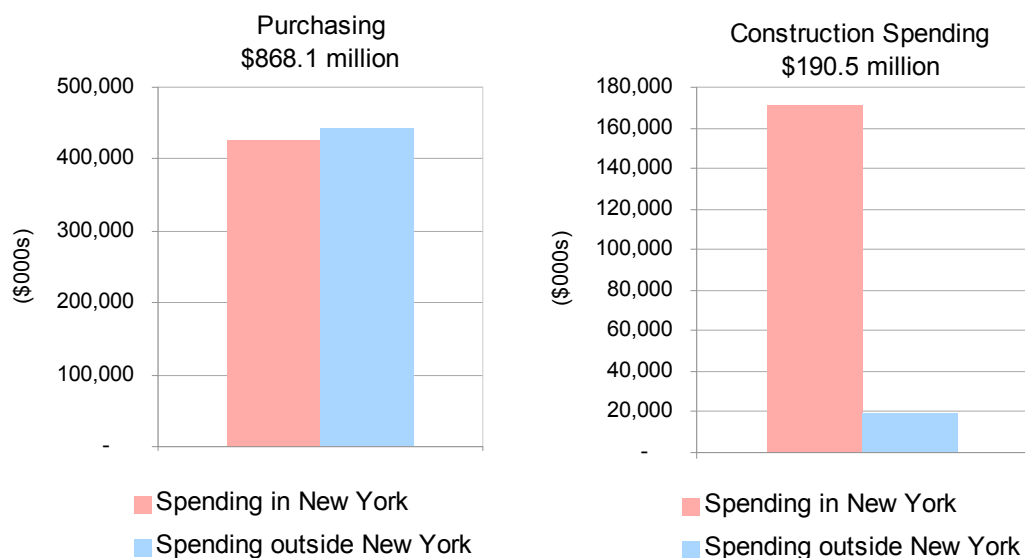
In 2005, Cornell spent \$1.1 billion on purchases of goods, services and construction, of which \$595 million was paid to New York State vendors and contractors, supporting more than 4,750 full-time-equivalent jobs throughout the state

Of this total, Cornell spent \$868 million on purchases of goods and services, of which nearly half – \$425 million – was paid to businesses located in New York State as shown in Figure 5. We estimate that in 2005 University spending directly supported more than 3,000 jobs with New York State businesses.

The University also spent \$190 million on construction in 2005, of which \$170 million was paid to New York-based contractors. We estimate that in 2005, University construction supported 1,730 full-time equivalent positions in New York in construction and related industries.

⁷ This figure excludes compensation payments of \$58.4 million for faculty and support staff who support New York Presbyterian Hospital.

Figure 12: Cornell University Purchasing and Construction Spending, by Location of Vendor/Prime Contractor, 2005



(Source: Cornell University)

Indirect and induced impacts of University spending

Cornell University's spending on payroll, purchasing and construction—and the jobs associated with that spending—provide a direct measure of the University's impact on New York State. The University's local, regional and statewide impact, however, goes beyond these direct measures. Each dollar the University spends produces what economists sometimes call indirect and induced effects—the “multiplier effect.”

Cornell's *indirect impact* is a product of spending by the local, regional or New York State companies from which the University buys goods and services. Construction contractors, utility companies, temporary services, caterers and other firms use the payments they receive from Cornell to pay their employees, rent space, buy equipment, supplies and telephone services—and all of these expenditures have an impact on the economy. The University's *induced impact* represents the impact of routine household spending by its own employees—for rent, food, clothing, transportation and child care—and by the employees of its suppliers.

The multiplier effect is described in additional detail in Appendix A.

New York State impact

As noted above, Cornell employed 17,797 people in New York State in 2005, to whom the University paid a total of \$1.04 billion in salaries and wages.⁸ Cornell also paid a total of \$595 million to suppliers and contractors in New York State, supporting 4,750 jobs in New York during 2005.

Using the IMPLAN input-output modeling system (see Appendix A for more detail), we estimate that:

- Household spending by University employees living in New York State generated \$970 million in economic activity and 6,225 jobs at other businesses within the state.
- Spending by the University's New York-based suppliers and contractors generated \$465 million in economic activity and 3,500 jobs.

Thus, as shown below in Table 3, in addition to the 17,797 people employed directly by the University, Cornell's spending on payroll, purchasing and construction in 2005 directly or indirectly supported approximately 14,500 additional jobs at New York State businesses.

Central New York impact

As one of the largest employers in the eighteen-county Central New York area, Cornell University has a particularly significant impact on this part of upstate New York:⁹

- In 2005 Cornell's Ithaca-based colleges employed 12,464 people in Central New York, with salaries and wage totaling \$611 million.
- University payments of \$229 million to suppliers and contractors located in Central New York directly accounted for 2,315 jobs;
- Household spending by Cornell employees living in the region, and spending by contractors, vendors and their employees, generated nearly \$725 million in output in 2005, and 5,820 jobs in other businesses throughout the region.

These impacts are summarized in Table 3.

New York City impact

Through its spending on payroll, purchasing and construction, Cornell also has a significant impact on New York City's economy. Weill Cornell, regional offices of the School of Industrial and Labor Relations and other programs based in the City employed

⁸ Students employed by the University are not counted toward total employment, but their wages are included in the University's total payroll.

⁹ Includes Cayuga, Chemung, Cortland, Schuyler, Seneca, Tioga, Tompkins, Broome, Chenango, Livingston, Madison, Monroe, Onondaga, Ontario, Oswego, Steuben, Wayne, and Yates Counties.

5,184 people in 2005, with a total payroll of \$415 million. Payments to New York City-based suppliers and contractors supported 1,780 jobs in the city. And through the multiplier effect:

- Household spending by Cornell employees living in the City generated \$235 million in economic activity, accounting for 1,275 jobs;
- Local spending by Cornell's New York City-based suppliers and contractors and their employees generated \$150 million in economic activity, accounting for 1,055 jobs.

Thus, as shown below in Table 3, in addition to the 5,184 people employed directly by the University, Cornell's spending on payroll, purchasing and construction in 2005 directly or indirectly supported approximately 4,110 additional FTE jobs at New York City businesses.

Table 3: Summary of Cornell University's Economic Impact in New York State, Central New York and New York City

	<i>Direct University spending</i>		<i>Indirect and induced impact of spending by employees, vendors and contractors</i>		<i>Total impact</i>
	<i>Payroll</i>	<i>Purchasing/construction</i>	<i>Impact of employee spending</i>	<i>Impact of vendor and contractor spending</i>	
<i>New York State¹⁰</i>	\$ 1,040 m	\$ 595 m	\$ 970 m	\$ 465 m	\$ 3,070 m
	17,797 jobs	4,750 FTE	6,225 FTE	3,500 FTE	32,272 FTE
<i>Central New York</i>	\$611 m	\$229 m	\$565 m	\$160 m	\$1,565 m
	12,464 jobs	2,315 FTE	4,325 FTE	1,495 FTE	20,599 FTE
<i>New York City</i>	\$ 415 m	\$ 258 m	\$ 235 m	\$ 150 m	\$ 1,058 m
	5,184 jobs	1,780 FTE	1,275 FTE	1,055 FTE	9,294 FTE

(Source: Cornell University, Appleseed)

As an enterprise, Cornell Cooperative Extension (CCE) has a similar impact on the State of New York. CCE employed more than 1,900 people in New York State (1,440 full-time equivalents) in 2005, with a total payroll of \$40.5 million. CCE associations also spent \$31.9 million on purchases of goods and services from businesses in New York State. We estimate that, as shown in Table 4, purchasing by CCE, household spending by CCE employees, and the multiplier effect of these expenditures, supported approximately 790 jobs at businesses throughout the state.

Table 4: Economic Impact of Cornell Cooperative Extension on New York State, 2005

¹⁰ Cornell's New York State employment is greater than the sum of Central New York and New York City employment because of Cornell jobs elsewhere in the state.

Direct spending		Indirect and induced impact of spending by employees, vendors and contractors		Total impact
<i>Payroll</i>	<i>Purchasing</i>	<i>Impact of employee spending</i>	<i>Impact of vendor and contractor spending</i>	
\$41 m	\$32 m	\$48 m	\$22 m	\$143 m
1,440 FTE	310 FTE	310 FTE	170 FTE	2,230 FTE

(Source: Cornell University, Appleseed)

Impact on state and local tax revenues

Like other non-profit colleges and universities, Cornell is not required to pay state sales taxes on the goods and services that are needed to support its mission. Despite its tax-exempt status, Cornell generates a significant amount of tax revenue for New York State and local governments.

The University's impact on state revenues includes personal income taxes and other taxes paid by University employees; taxes paid by University suppliers, contractors and their employees as a result of Cornell's spending; and taxes derived from the "indirect and induced" economic activity generated through the multiplier effect. Our estimates of the impact of these various factors are presented below in Table 5.

Table 5: New York State Taxes Indirectly Attributable to Cornell University, 2005 (\$ thousands)

Type of Tax	\$
Taxes paid by or on behalf of University employees	
Personal income taxes	\$ 53,790
Sales and use taxes	10,425
Taxes paid by vendors, contractors and their employees	14,030
Taxes generated through the multiplier effect	20,430
Total State tax revenues	\$ 98,675

(Source: Cornell University, Appleseed)

Cornell University similarly had an indirect impact on local revenues in New York City and Tompkins County, including personal income taxes and other taxes paid by University employees; taxes paid by University suppliers, contractors and their employees as a result of Cornell's spending; and taxes derived from the "indirect and induced" economic activity generated through the multiplier effect. We estimate that in 2005, Cornell indirectly generated \$33 million in local tax revenues in New York City, and \$30.5 million in Tompkins County.¹¹

¹¹ Additional detail on local tax revenues is presented in Parts Five and Six of the report.

In addition to these indirectly generated local tax revenues, Cornell University directly paid more than \$12.9 million in real property taxes and other taxes and fees to local governments and school districts during 2005.

In total, Cornell directly and indirectly accounted for more than \$98 million in state tax revenues and more than \$76 million in local government revenues. For every dollar that New York State spent in 2005 to support Cornell's operations, it got back 72 cents in state and local revenues.

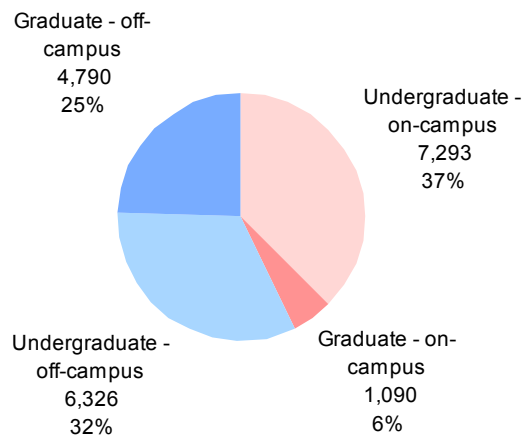
Student/visitor spending

In addition to the economic activity that the University itself generates through its spending on payroll, purchasing and construction, Cornell University also contributes to the local economies of Ithaca and New York City through off-campus spending by students, and by visitors to its campuses.

In the fall of 2004, a total of 19,499 students were enrolled at Cornell-Ithaca. As shown in Figure 13, about 43 percent (8,383 students) lived on-campus, while the rest (11,116 students) lived elsewhere—primarily in and around Ithaca.

Using estimates of living costs provided by Cornell's financial aid office, we estimate that in fiscal year 2005, off-campus spending by Cornell-Ithaca students—on rent, food, personal items, transportation, entertainment, etc.—totaled approximately \$137 million.

Figure 13: Undergraduate and Grad/Professional Students Living On-/Off-Campus, Fall 2004



(Source: Cornell University)

Before calculating the impact of student spending on the local economy, however, we need to adjust our estimate of total spending to take into account the fact that some of it is financed out of wages the University pays to student workers. After deducting students' earnings, we estimate that net off-campus spending in 2005 totaled \$74 million.

Using IMPLAN, we estimate that student spending directly supported approximately 1,000 jobs in businesses within Tompkins County. Through the multiplier effect, we estimate that students' off-campus spending indirectly generated an additional \$25 million in economic output and 250 additional jobs within the county.

Each year, thousands of visitors come to Ithaca for reasons related to the University. We estimate that in 2005, off-campus spending on lodging, food, transportation, shopping, entertainment and other services by these visitors totaled approximately \$38 million. We further estimate that visitor spending directly supported 780 FTE jobs in Tompkins County—and through the multiplier effect, generated \$14 million in economic output and 145 FTE jobs.

Table 6: Impact of Student and Visitor Spending, 2005

	<i>Direct spending</i>	<i>Direct spending net of payroll</i>	<i>Indirect/induced impact</i>	<i>Total impact</i>
<i>Student Spending</i>				
Output (\$ millions)	\$ 140	\$ 74	\$ 25	\$ 99
Jobs created	-	1,000 FTE	250 FTE	1,250 FTE
<i>Visitor Spending</i>				
Output (\$ millions)	\$ 38	\$ 38	\$ 14	\$ 52
Jobs created	-	780 FTE	145 FTE	925 FTE

(Source: Cornell University, Appleseed)

Cornell's Mission: Education, Research, Outreach

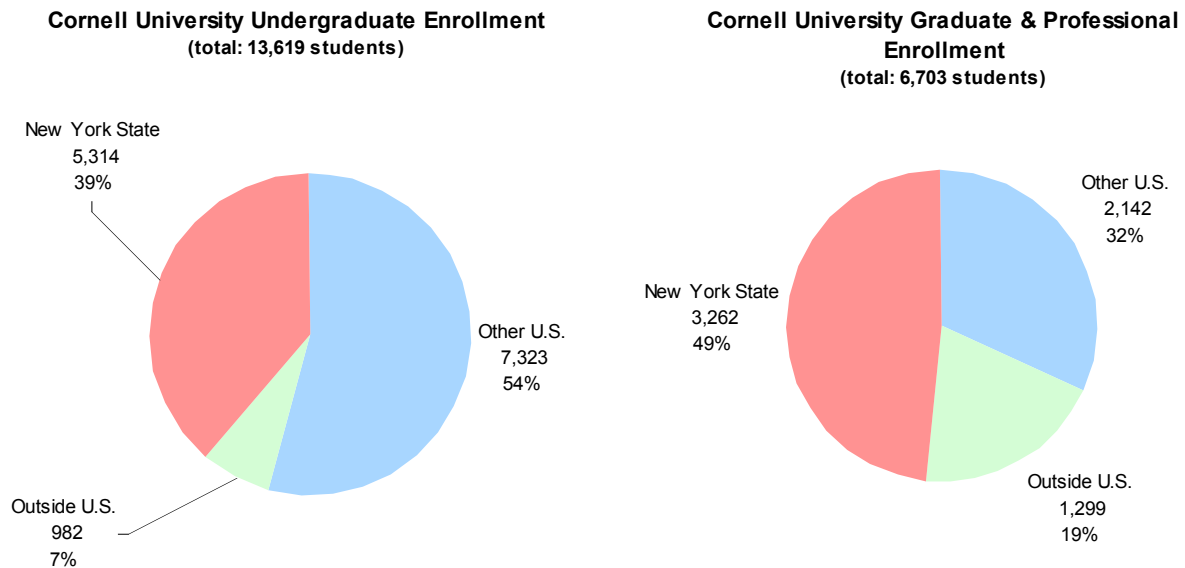
Cornell's impact on New York's economy should be defined not only in terms of the University's role as a major enterprise in its own right, but also by the contributions the University makes to New York's economic vitality through activities related to its mission—education, research, business development, outreach and community service.

Developing New York's human capital

In today's knowledge-based economy, the single most important determinant of whether a state's economy flourishes or falters is the depth and quality of its human resources. Cornell helps build New York's stock of human capital in several ways—by providing a wide range of educational opportunities for young New Yorkers; by attracting talented students to New York each year; and by helping working New Yorkers refresh their skills or acquire new ones.

In the fall of 2004 20,322 students were enrolled at Cornell (13,619 students in the University's undergraduate colleges and 6,703 in its graduate and professional schools). About 39 percent of all undergraduates, and 49 percent of all graduate and professional students, were New York State residents.

Figure 14: Cornell University Undergraduate, Graduate and Professional Enrollment, by Student's Permanent Residence, Fall 2004



(Source: Cornell University)

At Cornell, students can acquire the knowledge and skills required for success in many of New York's leading industries—and in emerging areas that are likely to drive the growth of the nation's economy in the years ahead. Notable examples include:

- Undergraduate, master's and doctoral programs in biomedical engineering;
- An undergraduate major in information systems;
- An M.D.-Ph.D. program that prepares physician-scientists to conduct advanced biomedical research;
- Undergraduate degree programs in viticulture and enology (a leading source of skilled workers for New York's wineries);
- Undergraduate and master's degree programs in hotel and hospitality management.

A significant percentage of those who have graduated from Cornell have stayed in New York State. Of the 202,000 Cornell alumni whose addresses are known, 28 percent are New York residents. It is worth noting that in recent years the percentage of each graduating class that stays in New York after graduation has risen. Among Cornell graduates who were awarded degrees between 1996 and 2005, 34 percent were still living in New York as of 2006. This is due in part to students who attend graduate school in New York after receiving a degree or otherwise remain in the State for just a few years

after graduation. Nonetheless, recent college graduates have newly-acquired skills and enthusiasm that make them particularly attractive to the state's employers.

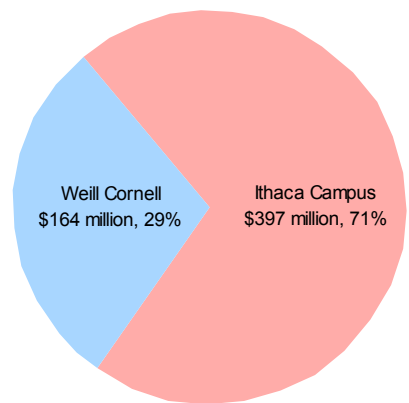
As a major employer of highly skilled workers, Cornell also contributes to the development of New York's human capital by providing opportunities for its own employees to acquire new knowledge and upgrade their skills. In 2004-05, for example, approximately 1,000 University employees either took courses tuition-free on the Ithaca campus, or took courses at other institutions for which Cornell provided tuition assistance.

New York's leading research university

Cornell is New York's leading academic research center, and one of the leading research universities nationwide. Cornell University spent \$561 million on research in 2005. Federal funding, most of which came from the National Institutes of Health and the National Science Foundation, accounted for 69 percent of the University's research expenditures (see Figure 15).

Figure 15: Cornell University Research Spending, by Campus and Source, 2005

Source	Cornell-Ithaca (\$ M)	Weill Cornell (\$M)
National Institutes of Health	64.4	131.3
National Science Foundation	116.9	-
Other federal	72.0	1.4
Federal Subtotal	253.3	132.7
State and local	46.9	-
Corporate	14.3	8.6
Foundation	4.9	10.8
Non-profit	29.9	1.2
Other non-federal	1.4	3.2
Internal funding	46.3	7.9
Grand total	397.0	164.3

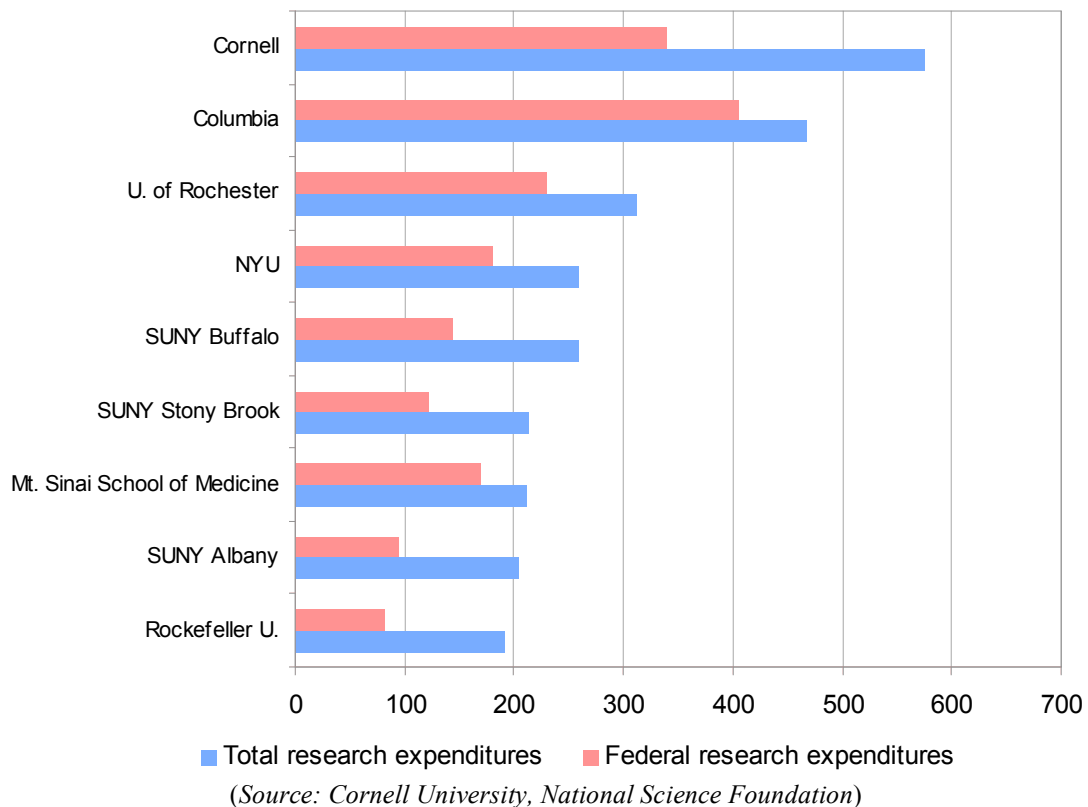


(Source: Cornell University)

As Figure 16 shows, Cornell in 2004 ranked first in total research spending among the state's universities, and 11th among all universities nationwide.¹² Notable areas of strength at Cornell include agricultural research, biomedical research, math and computer science, and the physical sciences.

¹² 2004 is used as a comparison year because it is the most recent available from the National Science Foundation.

Figure 16: Total and Federal Research Expenditures, New York State Universities, 2004 (\$ millions)



It is not just the scale of Cornell's research enterprise, however, that defines its value to New Yorkers. Many of the greatest challenges that confront both science and society today are too complex to be contained within the boundaries of a single scientific discipline. They often require collaboration among specialists in the physical and life sciences, mathematics and computer science, and the social sciences as well.

Working across disciplinary lines has long been an integral part of Cornell's approach to research, and it is today evident in the work of more than 100 interdisciplinary research centers. We cite here just a few examples of areas—some well-established, some just emerging—in which Cornell is playing a leading role.

- Cornell University is a leader in nanotechnology research, with three dedicated nanotechnology centers—*the Nanotechnology Science and Technology Facility, the Nanobiotechnology Center and the Center for NanoScale Information Systems*—and additional centers that support nanotechnology research. These centers make possible research that could lead to new materials, more efficient sources of energy, improved medical diagnostics and drug delivery systems, and massive increases in the speed and capacity of data storage.
- Weill Cornell's *Institute for Computational Biology* focuses on development of a deeper understanding of the complex interactions of cells, tissues and organs, through sophisticated mathematical modeling, computer simulations, and the manipulation of

massive amounts of data. The Institute's work—much of which involves ongoing collaboration among Weill Cornell researchers and their colleagues at Rockefeller University and Memorial Sloan-Kettering Cancer Center—could lead to better prevention and treatment of disease.

- ***The New York State Agricultural Experiment Station*** in Geneva, operated by Cornell's College of Agriculture and Life Sciences, is one of the country's leading centers of applied agricultural research. During the past three decades, research conducted at Geneva has contributed to the growth of New York's billion-dollar wine industry—from 9 wineries in the early 1970's to 214 in 2005, ranging from eastern Long Island to the Niagara frontier. Cornell researchers have, for example, developed new varieties of wine grapes especially suited to New York's soil and climate conditions; and, through extensive research on factors affecting flavor, helped winemakers improve the quality of their products.
- The ***Mass Casualty Response Logistics Program*** uses high-performance computing to address questions about resource allocation in the event of public health crises, such as how health care providers and emergency workers can best be deployed in the event of a major pandemic, flood or bioterror attack. Its creation was funded in part by a seed grant designed to foster collaboration between Weill Cornell and Cornell-Ithaca researchers.

Supporting business development

Research universities can play an important role not only in conducting the basic research that produces new knowledge, but also in the process of translating that knowledge into new products, new businesses and new jobs. Working with both new and established companies, Cornell uses a variety of approaches to support this transition from the laboratory to the marketplace.

- ***Technology transfer***

Cornell's Center for Technology, Enterprise and Commercialization (CCTEC) manages the University's "technology transfer" program: identifying technologies developed at Cornell that might have some commercial application; securing patents; negotiating agreements with commercial ventures for use of the University's intellectual property—and in some cases, helping to launch new companies based on research conducted at Cornell.

During the past several years, Cornell has ranked first among New York universities on several measures of technology transfer. Table 7 compares Cornell's record over the past few years with those of other New York institutions, and with a selected group of Ivy League and other first-tier research universities.¹³

¹³ In the case of Columbia, Princeton and University of Pennsylvania, one or more years of data were unavailable. In those cases, we averaged the available years.

Table 7: Five-Year Average of Annual Technology Transfer Performance, 2000-2004

	<i>Invention disclosures</i>	<i>New patent applications filed</i>	<i>Licenses / options executed</i>	<i>Licensing income (\$M)</i>	<i>Patents issued</i>	<i>Start-up companies formed</i>
<i>Ivy-Plus Group</i>						
Brown University	48	42	8	1.7	17	3
Columbia University (3 years)	203	157	56	141.4	67	7
Cornell	198	326	68	6.4	106	5
Dartmouth University	33	27	12	14.3	10	1
Harvard University	143	134	74	16.2	49	4
MIT	464	342	118	36.1	152	24
Princeton University (2 years)	117	104	26	2.4	28	4
Stanford University	312	315	127	42.8	101	10
University of Pennsylvania (4 years)	306	267	79	13.0	47	9
<i>New York State Group</i>						
Columbia University (3 years)	203	157	56	141.4	67	7
Cornell	198	326	68	6.4	106	5
NYU	68	56	23	58.4	24	4
SUNY Research Foundation	212	130	38	15.2	53	5
University of Rochester	109	98	12	29.1	19	3

(Source: Cornell University, Association of University Technology Managers)

• ***Other University-related start-ups***

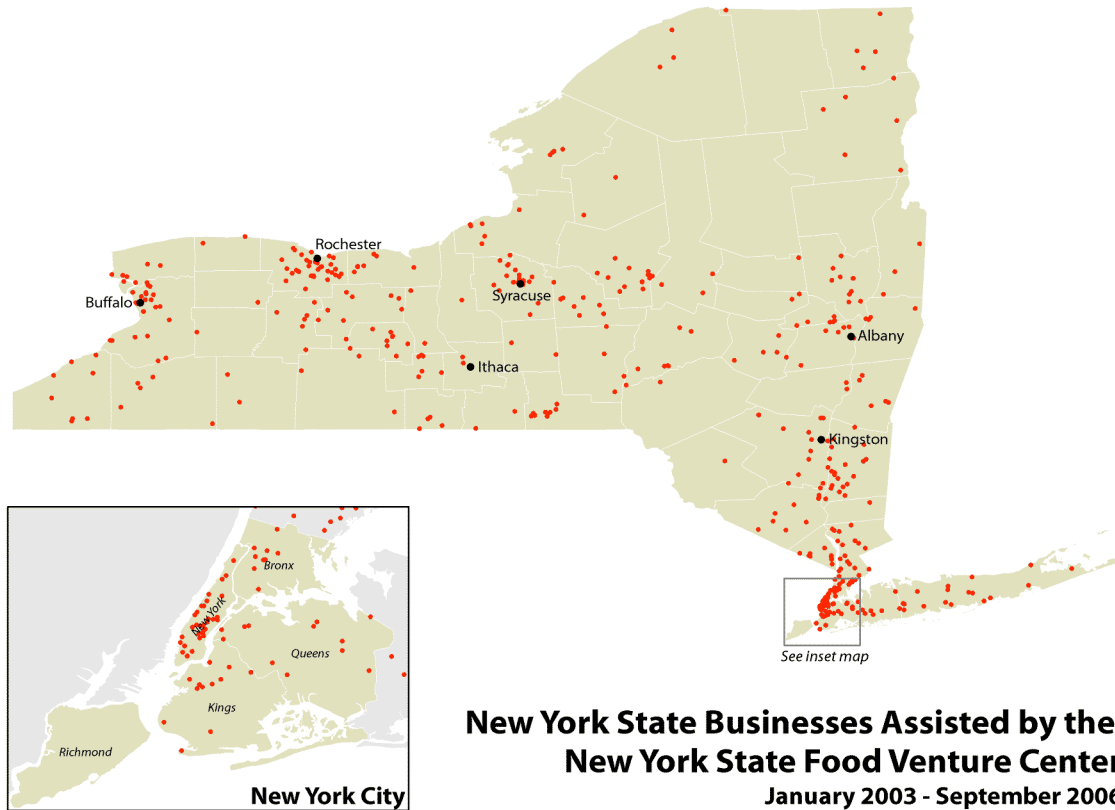
Formal technology transfer agreements are not the only way start-up companies can draw upon Cornell's intellectual capital. CCTEC has identified 90 technology companies in New York that have roots in Cornell research. These include companies started by faculty members, staff or alumni; and companies that in other ways rely on access to university facilities or resources. Collectively, they employ nearly 1,800 people. Examples include:

- ***Primet Precision Materials***, a manufacturer of nanoscale materials for use in a variety of applications from solar devices to fuel cells.
- ***CherryPharm***, a food-industry start-up that is commercializing a drink that uses natural properties of tart cherries to aid in muscle recovery after strenuous exercise.
- ***Tetragenetics***, a biotechnology firm that has recently introduced a vaccine ("IchVax") to treat a well-known fish disease.
- ***Novomer LLC***, which makes polymers and plastics from carbon dioxide and other renewable materials, for use in food packaging, drug delivery and durable film applications.

In the food industries, the New York State Food Venture Center—located at the Agricultural Experiment Station in Geneva and operated by Cornell—assists small companies in developing and testing new food products, or improving existing products. In 2005, the Food Venture Center worked with 164 small companies and, as

Figure 17 shows, more than 450 companies from virtually every corner of the state between 2003 and 2006.

Figure 17: Map of New York State Businesses Assisted by the Food Venture Center, 2003 - 2006



(Source: Cornell University)

- ***Providing room for new companies to grow***

Cornell University has also supported the development of new businesses through strategic investments in real estate.

The ***Cornell Business and Technology Park*** is a 300-acre complex adjacent to Ithaca-Tompkins County Airport in Lansing, New York, just a few miles from the Ithaca campus. Launched in 1988, the Park has grown to 24 buildings with a total of more than 700,000 square feet, and 80 companies employing more than 1,600 people. Many of the companies located in the Park are Cornell spin-off companies, or have collaborative research relationships with the University.

Cornell's ***Agriculture and Food Technology Park*** in Geneva, New York—known as "The Technology Farm"—offers start-up companies the physical space and access to Cornell researchers and equipment they need to be successful. The first phase of the 72-acre park, including construction of a 20,000 square-foot multi-tenant building, was financed with a combination of federal, state and private funds totaling more than \$8 million.

- ***Training the next generation of entrepreneurs***

Through its Entrepreneurship@Cornell program, Cornell University helps to create a culture of entrepreneurship that touches every school and college on campus. During 2005, about 4,000 students took courses in the multidisciplinary ***Entrepreneurship and Personal Enterprise*** program. These include general courses such as Business Planning and Financial Accounting and specialized courses such as Designers as Entrepreneurs (offered through the Fiber Science & Apparel Design department) and Entrepreneurship in Chemical Enterprise (offered through the Chemistry department).

- ***Support for more established businesses***

Cornell's support for the ongoing development of New York State businesses is not limited to new ventures. Through a wide range of research, technical assistance and training programs that are offered throughout the University, Cornell helps companies large and small develop new products, explore new markets, solve production problems, and improve productivity and profitability. Examples include:

- The Cornell Theory Center's work with Corning to develop its understanding of the structure of glass at the molecular level, and with both Kodak and Xerox on product design strategies and simulations;
- Assistance provided by the Food Venture Center in helping small companies develop and test new products;
- Research on the nutritional qualities of alfalfa that has helped farmers reduce the quantities of feed required to maintain optimum production levels;
- Development of synthetic fibers for use in New York's textile and apparel industries;
- Assistance from the School of Industrial and Labor Relations in helping companies explore the human resource management implications of expansion into Asia or eastern Europe; and
- Helping pharmaceutical companies explore the use of nanotechnology in the development of new drug therapies.

Through its support for new business development, and its extensive collaboration with more established companies as well, Cornell helps to ensure that the knowledge created at the University is translated effectively into new businesses, new products and new jobs in New York State.

Outreach: Extending the benefits of Cornell's knowledge

Many colleges and universities engage in various forms of outreach to their local communities. Cornell, however, is unique among New York State institutions both in terms of the resources committed to outreach, and the extent to which its land grant mission informs the work of the entire University. While virtually every part of the University is to some extent engaged in outreach, there are two organizations at Cornell for which outreach to New York's businesses, communities and families is the primary mission: Cornell Cooperative Extension and Industrial and Labor Relations Extension.

Founded in 1914, Cornell Cooperative Extension operates through a network of 55 county-level Extension Associations in the upstate and suburban counties, and through offices in New York City. With more than 1,900 professional and administrative staff, the local associations provide services to their communities in six broad areas:

- Agriculture and horticulture;
- Family well-being;
- Youth development;
- Community and economic vitality;
- Environment and natural resources; and
- Nutrition, food safety and health.

Cornell Cooperative Extension is also notable for the scale of its volunteer efforts. In 2005 approximately 40,000 New Yorkers performed a total of approximately 1.7 million hours of volunteer work in conjunction with CCE programs. Examples of outreach programs and services that Cornell Cooperative Extension delivers across the state may be found in Section Seven of this document.

The Extension Division operated by the School of Industrial and Labor Relations (ILR) maintains offices in Buffalo, Rochester, Ithaca/Syracuse, Albany, and New York City. Through these offices it delivers training on work-related topics for employers and managers, unions and workers, and policy makers. ILR Extension also offers consulting and customized technical assistance to help companies address contemporary issues in the workplace. More than 20,000 working adults are served by ILR Extension every year.

As noted above, Cornell's engagement with local communities throughout the State is not limited to the work of its two major extension organizations. Examples of additional outreach programs with strong links to local communities include:

- The ***Cornell University Economic Development Center***, funded in part by the federal Economic Development Administration, links University resources to distressed communities. Among its projects, the Center has worked on main street revitalization in upstate communities, provided technical assistance on market analysis and retail trade development for cities and villages, and helped develop marketing strategies for North Country dairy farmers.
- The ***Community and Rural Development Institute*** (CaRDI) fosters collaboration among the College of Agriculture and Life Sciences, the College of Human Ecology, the City and Regional Planning program in the College of Art, Architecture and Planning and others at the University to address the community and economic development needs of rural New York. The Institute prepares research-based public policy recommendations and provides training workshops for state and local government officials.
- The ***New York State Sea Grant*** program provides information to communities and individual land-owners that they can use to preserve New York State's aquatic

resources. Sea Grant's programs support research and outreach that contributes to business development on the state's coasts, lakes and streams; helps avoid the spread of invasive species; and seeks to influence coastal development policies in ways that help to preserve both valuable economic assets and natural habitats.

An investment in the future

Cornell University is in many ways uniquely well positioned to help New Yorkers respond effectively to the demands of an increasingly knowledge-driven, globally integrated economy.

- Cornell is the state's leading center of academic research—and it also has more than a century's experience in translating the findings of scientific research into practical applications. It is simultaneously a truly global institution—and one with deep roots in communities throughout the state.
- Cornell is one of upstate New York's largest employers, and by some measures its leading university. It is at the same time an important contributor to New York City's economy, and to the city's role as a global center of biomedical research, education and clinical care.
- Cornell's expertise in agriculture and rural development are especially valuable in helping New York's rural communities respond to the challenges of a changing economy.
- Cornell's longstanding commitment to outreach—and the infrastructure it has developed to support that commitment—mean that it is especially well-positioned to help communities, companies, families and individuals throughout the state respond effectively to the challenges of a rapidly changing economy.

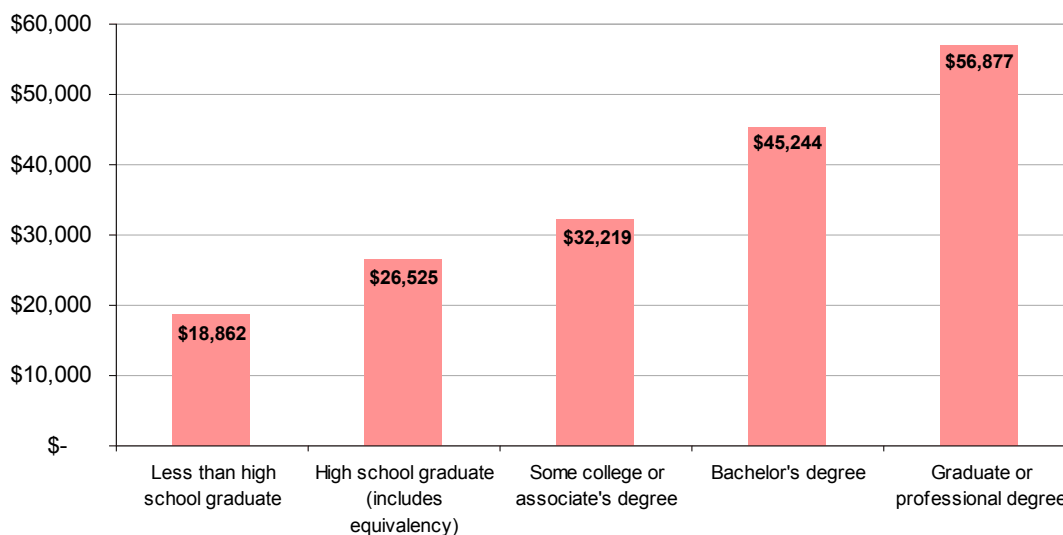
The capabilities that Cornell brings to this next stage of New York's economic evolution did not, of course, appear overnight. They are the product of nearly 150 years' investment in the institution—both public and private, both intellectual and financial. By sustaining and building on that investment, and by working in partnership with the state and the communities it serves—Cornell can ensure that its contributions to New York's economy will in the years ahead be even greater than those described in this report.

Part Two: Cornell Human Capital

Among the most important ways a research university contributes to regional prosperity and economic growth is through its educational mission. Earning a four-year college or graduate degree dramatically increases a worker's earning power. As shown in Figure 18, the median annual earnings for New York State adults with a bachelor's degree are 70 percent higher than for adults with only a high school diploma; and the median earnings of those with graduate or professional degrees are more than twice as high as the earnings of workers with no education beyond high school.

However, it is not just the fortunes of individual workers or households that depend on the level of knowledge and skills they have acquired—it is the overall strength of the local economy. During the past fifteen years, a growing body of research has confirmed that the depth and quality of a city or a region's human capital is the single most important determinant of whether it flourishes or falters economically.¹⁴

Figure 18: Median Annual Earnings for Adults in New York State, Age 25 and Older, by Educational Attainment, 2004



(Source: U.S. Census American Community Survey, 2004)

Conversely, communities or regions that fail to develop, attract or hold a well-educated work force appear destined to fall behind. Relatively low levels of educational attainment—and in particular, problems in retaining young, college-educated adults—have been an important contributor to the pattern of low earnings and slow (or no) growth that characterizes many parts of upstate New York. The *New York Times* recently took note of the problem:

¹⁴ For example, see 1) Glaeser, E.L. and Saiz, A. 2004. "The Rise of the Skilled City", in W.G. Gale and J. Rothenberg Pack (eds.) *Brookings-Wharton Papers on Urban Affairs* V. 5, 47-106. Washington, DC: Brookings Institution and 2) Berry, Chad and Edward L. Glaeser. 2005. "The Divergence of Human Capital Levels across Cities." *Papers in Regional Science* 84 (3): 407-444.

*From 1990 to 2004, the number of 25-to-34-year-old residents in the 52 counties north of Rockland and Putnam declined by more than 25 percent. In 13 counties that include cities like Buffalo, Syracuse and Binghamton, the population of young adults fell by more than 30 percent.*¹⁵

It is worth noting that in 2000 Tompkins County ranked fourth among all New York State counties in terms of the percentage of adult residents who had college degrees (behind only Manhattan, Rockland and Westchester County). Tompkins, moreover, was the only county in upstate New York to increase its population of 25-to-34-year-olds between 1990 and 2004.

Cornell students

Any examination of Cornell's role in developing the state's human capital starts with its students. In the fall of 2004, Cornell University enrolled 13,619 undergraduates (all in its Ithaca-based colleges) and 6,703 professional and graduate students (including 823 medical and MD-PhD students at Weill Cornell in New York City). Table 8 summarizes enrollment in Cornell's undergraduate, graduate and professional programs.

Table 8: Cornell University Undergraduate and Graduate Enrollment, Fall 2004

<i>Undergraduate programs</i>	<i>Enrollment</i>
College of Agriculture & Life Sciences	3,112
College of Architecture, Art, and Planning	547
College of Arts and Sciences	4,354
College of Engineering	2,700
College of Human Ecology	1,248
School of Hotel Administration	820
School of Industrial and Labor Relations	797
Undecided	41
<i>SUBTOTAL</i>	<i>13,619</i>
<i>Graduate/professional programs</i>	<i>Enrollment</i>
The Graduate School	4,743
Johnson Graduate School of Management	696
College of Veterinary Medicine	441
Weill Cornell	823
<i>SUBTOTAL</i>	<i>6,703</i>
<i>GRAND TOTAL</i>	<i>20,322</i>

(Source: Cornell University)

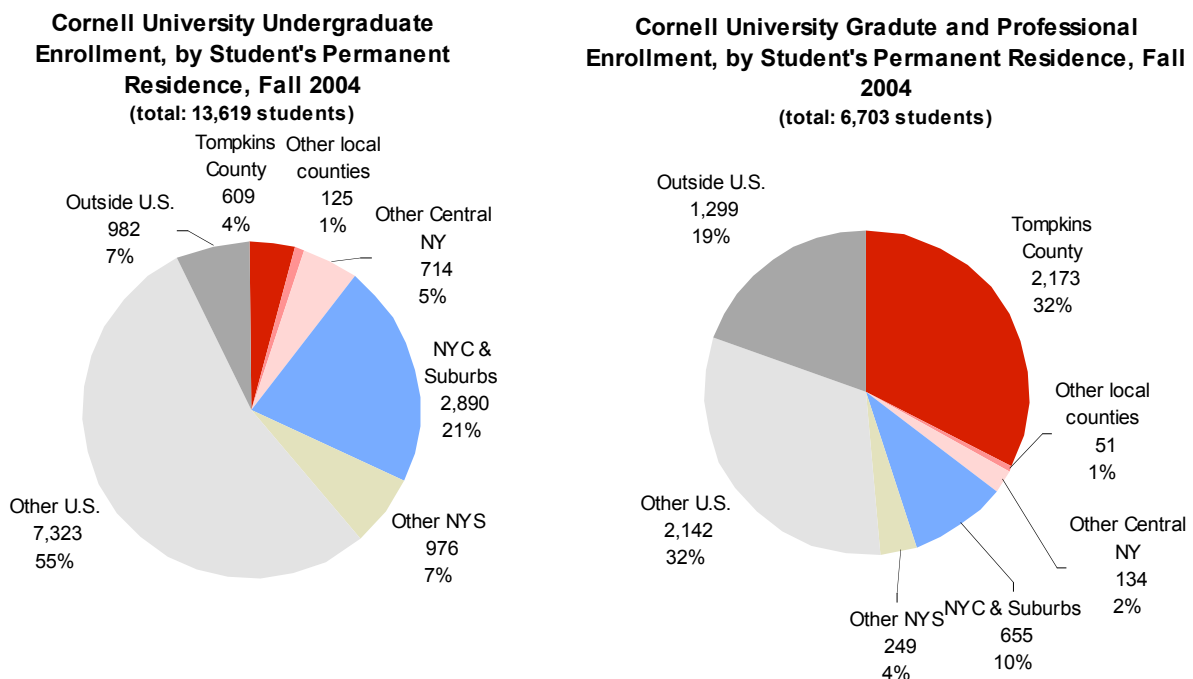
¹⁵ Roberts, Sam. "Flight of Young Adults Is Causing Alarm Upstate." New York Times. June 13, 2006. Available on-line: <http://www.nytimes.com/2006/06/13/nyregion/13census.html>

During the past ten years, enrollment in Cornell University's undergraduate degree programs has generally been stable, growing by a total of 3.4 percent between 1994 and 2004. The University's graduate student population has grown slightly faster—by about 5.4 percent between 1994 and 2004. The Johnson Graduate School of Business has led the University in enrollment growth, with total enrollment growing by 44 percent during the past ten years. The Graduate School's endowed division has also grown strongly in recent years, with enrollment increasing by 16 percent since 2000.

In the fall of 2004, a majority of Cornell-Ithaca's undergraduates (almost 62 percent) came from outside New York State. About 10 percent came from Central New York—21 percent from the New York City metro area—and about 7 percent from other parts of New York State.

A greater proportion of Cornell's graduate and professional students come from within New York State—about 49 percent of all graduate and professional students enrolled during the fall 2004 semester. About 32 percent came from other U.S. states, and 19 percent from outside the U.S.

Figure 19: Cornell University Undergraduate, Graduate and Professional Enrollment, by Student's Permanent Residence, Fall 2004



(Source: Cornell University)

In 2004-05, Cornell granted 3,468 undergraduate and 2,469 graduate and professional degrees. About 40 percent of all undergraduate degrees conferred in the spring 2005 went to students whose permanent addresses were in New York State.

Cornell University graduates a disproportionate number of students in the so-called "STEM" fields—science, technology, engineering and mathematics. While Cornell's students made up about 11 percent of all graduates from New York State's major research universities during the 2003-2004 academic year, the University's share of students graduating with a degree in a STEM field was 19 percent (see Table 9).

Table 9: Bachelors, Masters and Doctoral Degrees Conferred in "STEM" Fields for Selected New York State Universities, 2003-2004

<i>Institution Name</i>	<i>Computer & information sciences</i>	<i>Engineering</i>	<i>Biological sciences</i>	<i>Math</i>	<i>Physical sciences</i>	<i>STEM subtotal</i>	<i>Grand total</i>
Cornell University	272	1,156	493	87	195	2,203	6,056
Columbia University	237	597	287	152	147	1,420	7,476
New York University	305	25	226	154	85	795	11,875
Rensselaer Polytechnic Institute	381	936	48	43	64	1,472	2,123
Rochester Institute Of Technology	577	419	113	35	53	1,197	3,088
University Of Rochester	63	206	254	65	155	743	2,336
SUNY – Albany	143	-	134	107	73	457	4,363
SUNY – Buffalo	229	670	170	51	97	1,217	6,265
SUNY - Stony Brook	401	254	316	206	128	1,305	5,111
Syracuse University	461	371	117	35	45	1,029	4,921
Grand Total	3,069	4,634	2,158	935	1,042	11,838	53,614

(Source: Integrated Postsecondary Education Data System)

Cornell-Ithaca alumni: contributing to New York's human capital

Of the 202,000 Cornell alumni whose current addresses are known (out of a total of about 228,000 living Cornell degree-holders), more than 28 percent (approximately 56,400 graduates) live in New York State.

New York City and its suburbs attract many Cornell graduates. About 14 percent of all Cornell University alumni live in the city and its surrounding suburbs. (This excludes those Cornell alumni who live in New Jersey or Connecticut and commute to work in New York State.) Figure 20 shows the current distribution of Cornell degree-holders by their current place of residence.

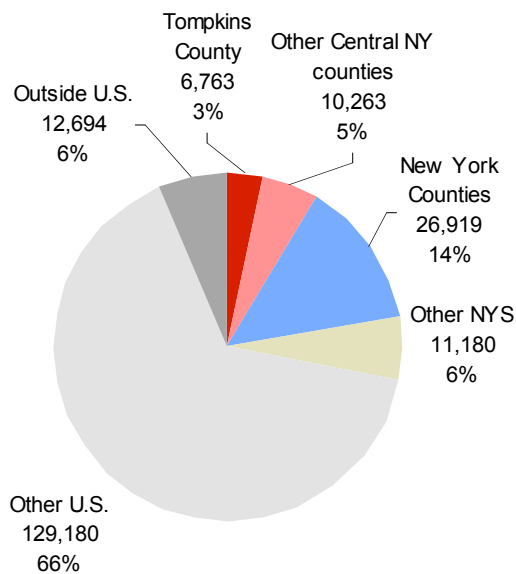
In recent years the percentage of each graduating class that stays in New York after graduation has risen. Among Cornell graduates who were awarded degrees between 1996 and 2005, 34 percent were still living in New York as of 2006. This is due in part to students who attend graduate school in New York after receiving a degree or otherwise

remain in the state for just a few years after graduation. Nonetheless, recent college graduates have newly acquired skills and enthusiasm that make them particularly attractive to the state's employers.

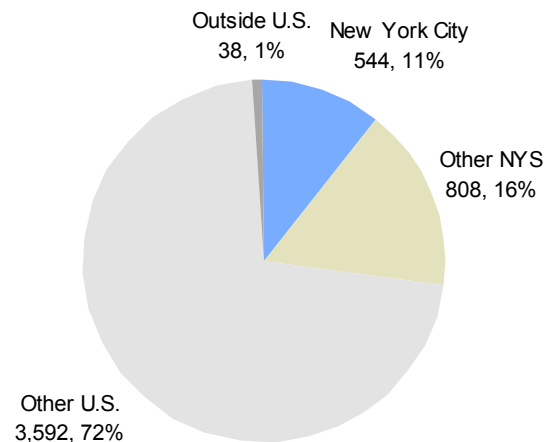
Figure 21 illustrates the total number and current address of all Cornell University-Ithaca alumni by the year their degree was conferred. While the numbers are roughly constant for each graduating class in the 1980's and early 1990's, the number of graduates still living in New York begins to rise with those who graduated in late 1990's.

Figure 20: Residence of Cornell University Alumni and Degree Holders, as of 2006

Cornell-Ithaca Alumni and Degree Holders
(total: 196,999)



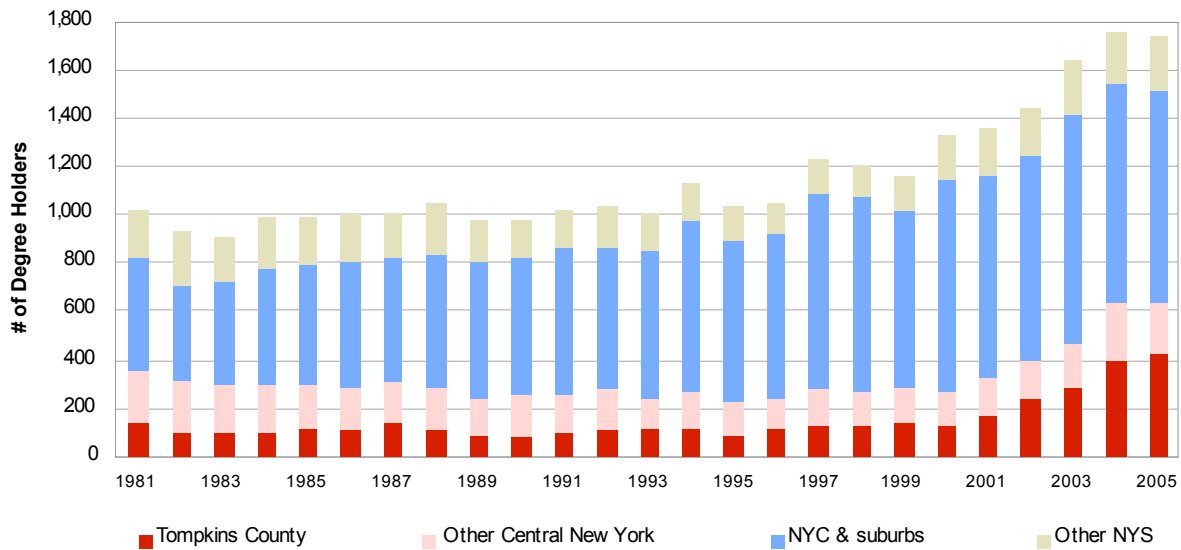
Weill Cornell Alumni and Degree Holders
(total: 4,982)



(Source: Cornell University)

To some extent, this no doubt reflects a natural evolution, with some recent graduates either taking their first jobs or going to graduate school within the same area, and then gradually migrating elsewhere. But it may also reflect the increased attractiveness of some parts of the state since the late 1990's. Either way, the concentration of recent Cornell graduates in Tompkins County and New York City is particularly noteworthy.

Figure 21: Current Residence of Cornell-Ithaca Alumni and Degree Holders, by Year Degree Conferred, 1981 - 2005



(Source: Cornell University)

Developing Talent for New York Industries

Cornell's contributions to New York's human capital are not simply a matter of overall numbers. Cornell's undergraduate, graduate and professional colleges offer a wide range of programs – some with roots that go back several decades, and some as new as the latest discoveries in science – that help students develop the knowledge and skills they need to succeed in many of New York's (and the nation's) leading industries. We will cite here just a few examples.

- Cornell's Hotel School was the first in the country to offer a ***B.S. degree in hotel administration*** (in 1922), and today its program remains one of the most respected in the field. The School also offers a master of management in hospitality (MMH) degree—an intensive twelve-month program aimed at preparing students to work both as managers and as entrepreneurs in the hospitality industry. In 2006, the Hotel School also launched a new joint MMH program, in collaboration with Nanyang Technological University in Singapore.
- In 1994, the College of Engineering established undergraduate, masters, and doctoral programs for ***Biomedical Engineering***. The programs bridge the life sciences, the physical sciences and engineering. The program includes a mandatory six-week immersion term during the summer in which biomedical engineering students work in a clinical setting with Weill Cornell physicians.

- New York's grape and wine industries have grown dramatically during the past three decades; today there are 600 vineyards and 214 wineries in New York State, generating about \$1 billion annually in gross sales. To meet a growing demand for talented grape growers and winemakers, Cornell's College of Agriculture and Life Sciences in 2003 established the first ***undergraduate majors in viticulture (grape growing) and enology (wine making)*** outside the West Coast. The program prepares students to work as vineyard managers and introduces techniques that address the challenges associated with growing grapes in a cool climate. Undergraduates must spend at least six months working in the industry in order to graduate.
- Today's students will live in a world that is year-by-year becoming more and more integrated. Cornell offers a variety of programs that help undergraduates develop a deeper understanding of this wider world. Through the Einaudi Center for International Studies, all seven of Cornell's undergraduate colleges offer a ***concentration in international relations***. Alongside the courses required to earn a degree in their major field of study, international relations students take courses in international economics and development, world politics and foreign policy, cultural studies and foreign languages. Students who complete the program are especially well prepared to pursue their chosen careers. In 2005-06, more than 200 undergraduates were enrolled in the program.

Through ***Cornell Abroad***, undergraduates can also spend either a semester or a full academic year studying or working as academic interns at universities or other sites in 75 countries. The College of Art, Architecture and Planning also offers ***Cornell in Rome***, a semester-long program of courses in architecture, art, planning, Italian, history and other fields of study.

- At the Johnson School of Management, the ***Parker Center for Investment Research*** takes a unique approach to preparing MBA students for careers as fund managers. In addition to providing opportunities for students to learn about (and be involved in) cutting-edge research in financial services, the Parker Center is home to the Cayuga MBA Fund, a \$7 million investment fund for which teams of MBA students serve as portfolio managers. In 2005, the fund earned a return of 18.6 percent.
- During 2005, about 4,000 students took courses in the multidisciplinary ***Entrepreneurship and Personal Enterprise*** program. These include general courses such as Business Planning and Financial Accounting and specialized courses such as Designers as Entrepreneurs (offered through the Fiber Science & Apparel Design department) and Entrepreneurship in Chemical Enterprise.
- Computers and information technologies are becoming increasingly important tools for knowledge workers to solve problems in every industry and discipline—from biology to airline reservation systems. Starting in 2004, Cornell began offering an undergraduate degree in ***Information Systems*** (in addition to its earlier minor). Students in the Information Systems program develop skills that allow them not only

to design complex computer applications, but to manage multi-disciplinary project teams.

- Cornell's *Cognitive Studies* program involves 75 faculty in departments ranging from psychology to neurobiology. The program, expanded in the fall of 2006, now offers 12 undergraduate courses in cognitive science. It also provides opportunities for interaction between graduate students and faculty in Ithaca and those at the Sackler Institute of Developmental Psychobiology at Weill Cornell.

Educating physicians and physician-scientists: a collaborative approach

Weill Cornell's approach to educating physicians and physician-scientists is designed to take advantage of the college's location in an area that includes several outstanding health care and research institutions—New York-Presbyterian Hospital, Memorial Sloan-Kettering Cancer Center, the Hospital for Joint Diseases and Rockefeller University.

In 1981, Weill Cornell joined with Memorial Sloan-Kettering and Rockefeller to create a Tri-Institutional MD-PhD Program. The program gives students pursuing combined MD-PhD degrees unparalleled access to the resources of all three institutions. Graduates of the program receive the MD degree from Weill Cornell and, depending of their course of study, can receive the PhD degree either from Cornell or Rockefeller. The program helps to provide the continuing stream of highly talented, highly educated researchers on whom the continued success of New York's biomedical research industry depends.

Continuing education and workforce development

In a knowledge-based economy, higher education is not just a process of earning a four-year or graduate degree—it is increasingly a process of life-long learning. Cornell University provides New York State residents with a wide variety of opportunities to upgrade their skills, to launch new careers—or simply to pursue learning for the sake of personal enrichment. Here are a few examples:

- Through the School of Continuing Education's *Extramural Program*, local area residents can take individual Cornell courses for credit; and through the Cornell Visitors program, may also choose to sit in on courses without earning credit. In 2005-06, about 1,000 students took courses through these programs.
- The School of Continuing Education also offers extensive opportunities for *distance learning*, with both credit and non-credit courses available. SCE also provides distance learning programs tailored to the needs of specific corporate clients. In 2005-06, 302 people participated in Cornell's distance learning programs.

- In 2005, *the School of Industrial and Labor Relations (ILR) Extension School* enrolled more than 20,000 students in continuing education courses. Many of the students attend courses in classrooms in Albany, Buffalo, New York City, and Rochester. ILR offers 18 certificate series to students in areas ranging from financial management to hospitality and food service management.
- *The Cornell Food Executive Program* is an intensive, two-week educational program for senior executives in food and food-related industries, including food products companies, wholesale distributors and retailers. The program, which is offered annually, regularly draws participants from many of New York's (and the nation's) leading companies.
- The School of Hotel Administration's *Professional Development Program* brought in more than 400 people from 70 countries to participate in its courses during 2005.
- The Johnson School's *Executive MBA program* is designed to allow mid-career executives and professionals to earn an MBA while working full-time, through classes held on alternate weekends in the New York metropolitan area, and four one-week residencies in Ithaca.
- The College of Veterinary Medicine is a leading provider of continuing education conferences and other programs for practicing veterinarians, and for others who work with animals, such as breeders and farriers.

Cornell's skilled workforce helps keep Central New York competitive

Cornell University is one of Central New York's leading knowledge-based enterprises. The University has invested significantly in enhancing the skills and knowledge of its own workforce through programs such as in-house training programs, online professional development opportunities and tuition reimbursement. In 2004-05, for example, approximately 1,000 University employees either took courses tuition-free on the Ithaca campus, or took courses at other institutions for which Cornell provided tuition assistance.

These educational benefits help Cornell stay competitive—both by attracting talented people who want to take advantage of the educational opportunities the University provides, and by enhancing employees' job-related skills. In the long run, Cornell's investments in its employees can improve the competitiveness of other Central New York businesses as well. Inevitably, some Cornell employees will leave to join other Central New York companies (or start their own) and will take with them the skills they learned as Cornell employees.

Additional detail on Cornell's educational benefits is presented in Part Five.

- Weill Cornell offers opportunities for continuing medical education to physicians and other health care professionals, including “grand rounds” at New York Presbyterian Hospital, and conferences on a wide range of specialized topics in fields as diverse as sports medicine, women’s health and neurosurgery.

Improving primary and secondary education in New York State

In the long run, the depth and quality of a state’s or a region’s human resources depend not only on the strength of its universities and colleges, but also on the quality of primary and secondary education. While Cornell does not have a school of education, it nevertheless contributes in a variety of ways to ongoing efforts to improve elementary and high school education in New York—through teacher training and professional development programs, through direct engagement with elementary and high school students, and through the work of Cornell Cooperative Extension. Below we highlight examples of teacher training, professional development and student enrichment programs. Part Seven of the report focuses on the work of Cornell Cooperative Extension.

Providing support for New York State schoolteachers

Cornell provides training and resources to New York State schoolteachers (and future schoolteachers) through a variety of programs. We highlight several below.

- Cornell's College of Agriculture and Life Science offers a Master of Arts in Teaching through its ***Cornell Teacher Education*** program. Undergraduate students who want to pursue teaching certification in agriculture education, biology, chemistry, earth science, general science, mathematics, or physics may opt to take classes toward the M.A.T. during their junior and senior years, and receive both the M.A.T. and New York State teaching certification one year after graduating. About 40 students enroll in the program every year.
- The ***Cornell Institute for Biology Teachers*** provides workshops for biology teachers in grades K through 8. Programs include training for new teachers and those who are enrolled in a university-level program that will lead to certification in secondary education. The programs give teachers—most of whom come from school districts in New York State—a chance to learn "how science is done," and how to convey ideas to students most effectively.

In partnership with the Center for Life Science Enterprise, the Institute also provided training and laboratory equipment to 289 high school and community college teachers in 2005 as part of its High School Equipment Lending Library program.

- In March 2006, more than 1,400 Central New York schoolteachers attended 125 workshops as part of the second annual ***Teacher Professional Development Day***. The day gives teachers an opportunity to network, enhance their own understanding of their subject area and to connect with Cornell faculty and other resources. Workshops covered topics such as *Cognitive Development and Language Learning in Infants and Toddlers* and *Hands-On Chemistry Activities for Elementary-Age Students*.

The grants that Cornell University secures from the National Science Foundation and other federal agencies do more than support cutting-edge research—they also support the education of math and science teachers and students. Here are some examples of NSF-supported research centers at Cornell that provide educational opportunities to New York State teachers and schoolchildren:

- During 2005, the ***Cornell Center for Materials Research*** (CCMR) offered 160 educational outreach events and presented more than 60 unique modules reaching about 55 undergraduates, 2,100 K-12 students, 295 parents of school children and 245 schoolteachers. Programs for schoolteachers include *Research Experiences for Teachers*, in which teachers spend a week in each of CCMR's experimental facilities, *Materials Science Workshop* and *MicroWorld*.
- The Cornell Nanobiotechnology Center supports a science club for middle school girls called the ***Tri-Sci Club***. The program is offered in three rural schools in New York State with high poverty rates. The club has 136 members. The Center also sponsors the Onondaga Nation School Science Club, which includes groups for students in grades 2-3 and 4-5. Out of 52 children in those grades, 32 participate in the club.
- The ***Cornell Nanoscale Systems Institute for Physics Teachers*** (CIPT) provides education and training to high school physics teachers, introducing them to concepts in nanotechnology and materials science that are both interesting to high school students and relevant to their studies. Between March 2003 and January 2006, more than 300 high school physics teachers attended the Institute; 44 percent of the teachers attended more than one workshop.

Table 10: Selected NSF Centers and Educational Impact, 2005

Center	<i>Undergraduates / graduates</i>	<i>K-12 students</i>	<i>Schoolteachers</i>
Center for Materials Research	55	2,100	245
Nanobiotechnology Center	4,250	3,077	406
Cornell Center for Nanoscale Systems	-	-	44

(Source: Cornell University)

Competing in an economy built on talent

As the world economy becomes more integrated, New York State companies compete not only with those in other U.S. states, but with those in other nations as well. In this environment, the ability to attract, develop and retain talented people is critical—not just for individual companies, but for communities and regions as well. As one of New York’s leading universities—and in some critical areas, its leading educational institution—Cornell is helping ensure that New York develops and maintains the human capital it needs to compete in today’s economy, and tomorrow’s.

Part Three: New York's Leading Research University

In a 2005 report to the National Academy of Sciences, a committee of CEOs, scientists and university presidents stated that:

*The prosperity the United States enjoys today is due in no small part to investments that nation has made in research and development at universities, corporations and national laboratories over the last 50 years.*¹⁶

Universities are a major source of the new knowledge that has become vital to the nation's economic growth; collectively, America's universities account for half of all basic research conducted in the U.S. While basic research does not always translate directly into new economic activity, it provides "the technological underpinnings for commercial innovation."¹⁷

New York State is home to ten of the nation's 100 leading research universities. Among the 50 states, New York ranked second (behind California) in total university research spending during 2004. Between 2000 and 2004, however, New York State ranked 20th in the *growth* of university research spending. Clearly, New York cannot afford to take for granted its status as a leader in research and development.

Research expenditures at Cornell

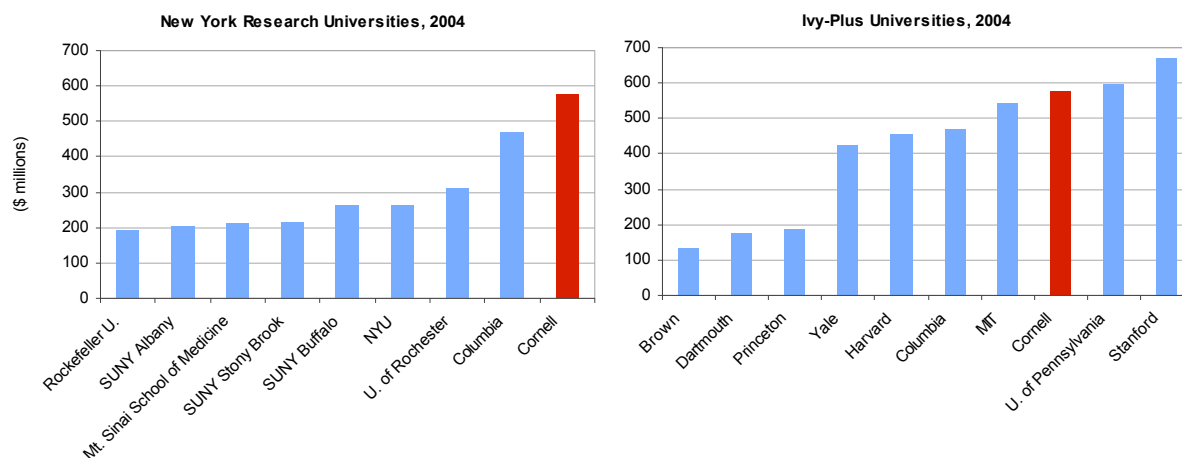
In fiscal year 2005, Cornell University spent more than \$561 million on research. Cornell ranked first in research spending among all New York universities and third among a comparison group of Ivy League and other major research universities.¹⁸ Figure 22 shows how Cornell's spending on research during FY 2004 compares with peer institutions in New York State and among the Ivy-plus universities.

¹⁶ Committee on Prospering in the Global Economy of the 21st Century, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Future* (Washington, National Academies Press, 2005), , pp. vii, ES-7.

¹⁷ National Academy of Engineering, *The Impact of Academic Research on Industrial Performance* (Washington, DC: National Academies Press, 2003), p. 3.

¹⁸ We refer to these research universities as the "Ivy-plus." They include Brown, Columbia, Dartmouth, Harvard, Massachusetts Institute of Technology, University of Pennsylvania, Princeton, Stanford and Yale.

Figure 22: Selected New York State and Ivy-plus Universities, Ranked by Total Research Expenditures, Fiscal Year 2004



(Source: Cornell University, National Science Foundation)

Among all universities nationwide, Cornell in 2004 ranked 11th in total research spending. Among private universities, Cornell ranked fourth.

Federal agencies provided about 68 percent of the University's total research funding in 2005 (Table 11). State and local government funding, in contrast, accounts for only 8.4 percent. State support for University research is nevertheless critical to the success of Cornell's research enterprise; it often provides the resources that University researchers need to secure higher levels of federal or corporate funding.

Table 11: Cornell University Research Expenditures, By Source, 2005 (\$ millions)

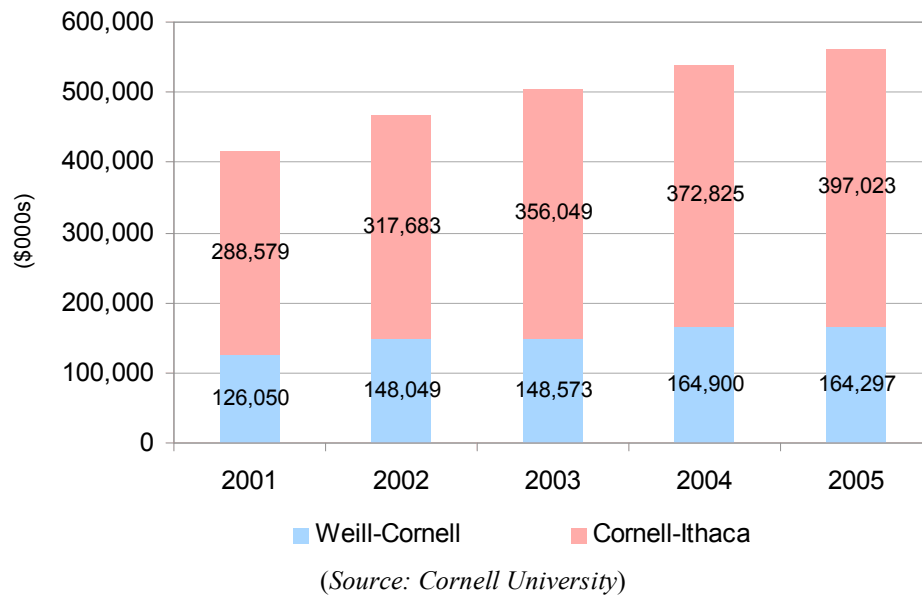
Source of Funding	Cornell-Ithaca	Weill Cornell	Total
National Institutes of Health	64.4	131.3	195.7
National Science Foundation	116.9	-	116.9
Other federal funding	72.0	1.4	73.4
Federal Subtotal	253.3	132.7	386.0
State and local	46.9	-	46.9
Corporate	14.3	8.6	22.9
Foundation	4.9	10.8	15.7
Non-profit	29.9	1.2	31.1
Other non-federal	1.4	3.2	4.6
Internal funding	46.3	7.9	54.1
Grand Total	397.0	164.3	561.3

(Source: Cornell University)

Between 2001 and 2005, Cornell University's total research spending grew by 35.4 percent (from \$415.6 million to \$561.3 million)—an average annual increase of more than 7.8 percent.

Figure 23 shows the growth of Cornell's research expenditures between 2001 and 2005.

Figure 23: University Research Expenditures, for Cornell-Ithaca and Weill Cornell, 2001-2005



Growth in research spending at Cornell has generally kept pace with overall growth in research spending at other “Ivy-plus” universities. Between 2000 and 2004 (the last year for which data on research spending is available from the National Science Foundation), Cornell's research expenditures increased by 30 percent, while growth in research spending at Ivy-plus institutions averaged 29 percent. At research universities in New York State, research spending grew slightly faster—an average of 35 percent between 2000 and 2004.

While Cornell's industry-funded research expenditures are down slightly from 2002, firms such as Microsoft, Eastman Kodak, and Goldman Sachs continue to invest in research at Cornell, in areas ranging from high performance computing to nanotechnology to financial engineering.

Cornell's rank among the nation's leading research universities is in part a reflection of the breadth and diversity of its research enterprise. As Table 12 shows, Cornell is New York's top-ranking university in agricultural research, engineering, computer science, the physical sciences, and the social sciences. The following examples provide just a glimpse into the depth and variety of research activity at Cornell, and its relationship to the state's economy.

Table 12: Cornell University's Ranking in Research Expenditures in New York State and Among "Ivy-plus" Institutions, by Area of Research, 2004

Area of research	Research expenditure (\$M)	Rank within NYS	Rank among Ivy-plus
Environmental sciences	\$ 5.2	# 4	# 6
Social sciences	\$ 22.4	# 1	# 3
Engineering	\$ 69.0	# 1	# 4
Psychology	\$ 5.4	# 3	# 6
Math and computer sciences	\$ 30.8	#1	# 3
Overall life sciences	\$ 356.5	# 1	# 4
Medical sciences	\$ 198.3	# 1	# 5
Biological sciences	\$ 78.8	# 5	# 5
Agricultural sciences	\$ 79.4	# 1	# 1
Physical sciences	\$ 86.2	# 1	# 4
Astronomy	\$ 17.6	# 1	# 2
Chemistry	\$ 20.6	# 1	# 3
Physics	\$ 39.7	# 1	# 3
Other physical sciences	\$ 8.3	# 3	# 5

(Source: Cornell University, National Science Foundation)

Biomedical research

With research expenditures totaling \$164.3 million in 2005, Weill Cornell accounted for 29 percent of Cornell University's total research spending. Most of Weill's research—79 percent—is financed by the National Institutes of Health. Other sources of funding include foundations, corporate research partners and the University itself.

The following examples highlight just a few of the areas for which Weill Cornell is noted.

- Weill Cornell's ***Institute for Computational Biology*** focuses on development of a deeper understanding of the complex interactions of cells, tissues and organs through sophisticated mathematical modeling, computer simulations, and the manipulation of massive amounts of data. Much of the Institute's work involves ongoing collaboration among Weill Cornell researchers and their colleagues at Rockefeller University and Memorial Sloan-Kettering Cancer Center.
- The ***Center for Reproductive Medicine and Infertility***—affiliated with both Weill Cornell and New York Presbyterian Hospital—is a world leader in research on and treatment of infertility.

- The ***Center for Aging Research and Clinical Care*** is one of the nation's leading centers for both basic and applied research in geriatrics. The Center's work ranges from identification of genetic markers for Alzheimer's to the design of living environments more attuned to the needs of the elderly.
- In September 2006, the Starr Foundation pledged \$100 million in support of collaborative cancer research at Weill Cornell, Memorial Sloan-Kettering Cancer Center, Rockefeller University, Cold Spring Harbor Laboratory and the Broad Institute. Together with the Starr Foundation, the five institutions will convene a committee to review proposals from the institutions' researchers.

Nanotechnology at Cornell

At the nanoscale, the boundaries between scientific disciplines blur as researchers in the life and physical sciences seek to understand—and manipulate—the basic building blocks of life and matter. Cornell University is among the leading U.S. universities in nanotechnology research that could lead to better medical diagnostics and treatments; stronger, cheaper and more environmentally-friendly materials; and efficient fuel cell generation.

In a survey conducted by the trade magazine, *Small Times*, Cornell's peers rated the University's nanotechnology programs highly in several categories.¹⁹ Cornell ranked:

- First in commercialization;
- Second in facilities;
- Fourth in research; and
- Tenth in outreach.

Cornell has developed an infrastructure for supporting nanotechnology research that few other institutions can match, and it has more than 100 faculty members from eight schools involved in nanotechnology research. Several of the centers at Cornell that support nanotechnology research are highlighted below.

- ***The Center for Nanoscale Systems and Information Technologies (CNS)*** is exploring and developing ways in which nanotechnology can be used to improve information technology. For example, the Center's researchers are working with Corning to develop optical fibers with even higher data transmission rates than existing fiber; and with IBM and Hitachi to develop the next generation of random access memory technology, with applications in laptop computers, mobile phones, PDA's and other devices.

¹⁹ Stuart, Candace, "Top 10 universities by category," *Small Times*, May 2006. Available on-line: http://www.smalltimes.com/articles/article_display.cfm?ARTICLE_ID=256496.

- ***The Cornell Nanobiotechnology Center (NBTC)***, launched with funding from the National Science Foundation, brings together researchers from Cornell-Ithaca, Weill Cornell and five other institutions to explore biological systems at nanoscale. The Center's researchers are working in areas such as cellular micodynamics, cell-surface interactions and the development of biomolecular devices. NBTC has research partnerships with 18 technology companies, ranging from Vybion, a Cornell start-up, to IBM.
- ***The Cornell NanoScale Science and Technology Facility (CNF)*** is part of the National Nanotechnology Infrastructure Network (NNIN), a network of user facilities at 13 institutions that was established by the National Science Foundation in 2004. Cornell's facilities—including Duffield Hall—are the most comprehensive in the network. Each year, about 350 Cornell faculty members, other researchers and students (and another 350 researchers from other institutions and from industry) use the Center's equipment and resources to build structures, devices and systems out of bits of matter as small as individual molecules and atoms.

These are by no means the only centers that sponsor nanotechnology research at Cornell. For example, researchers affiliated with the Cornell Center for Materials Research increasingly look to nanotechnology to discover new materials. Researchers affiliated with the Nanobiotechnology Center and the Institute for Biotechnology and Life Sciences Technologies frequently collaborate at the boundaries of nanotechnology and biology.

Bringing science to agriculture and related industries

Based on research expenditures, Cornell University ranks seventh among American universities in agricultural research, and is by far the leading center of agricultural and animal research in New York. Here we will cite just a few of the ways in which basic and applied research at Cornell contributes to the vitality of New York's farming and food industries.

- ***The New York State Agricultural Experiment Station*** in Geneva, operated by Cornell's College of Agriculture and Life Sciences, is one of the country's leading centers of applied agricultural research. Established in 1880, the Geneva Experiment Station has a long history of assisting farmers and food producers in New York and elsewhere through the development of new varieties of fruits and vegetables, improvements in production processes and other innovations. For example, the development of new apple varieties, such as Empire, Cortland and Macoun, has helped maintain the vitality of New York's \$194 million apple industry—and New York's position as the country's second-leading producer of apples.

During the past three decades, research conducted at Geneva has also contributed to the growth of New York's billion-dollar wine industry—from 9 wineries in the early 1970's to 214 in 2005. Cornell researchers have developed new varieties of wine

grapes especially suited to New York's soil and climate conditions; helped growers adopt innovative approaches to protecting their crops; and, through extensive research on factors affecting flavor, helped winemakers improve the quality of their products.

- ***The Integrated Pest Management (IPM) Program***, established by the New York State legislature in 1984, develops innovative ways to control pests with minimal impact on health and the environment, and educates farmers, gardeners and others in their use. IPM research has, for example, focused on the development of new pest-resistant crop varieties that enable growers to reduce their use of pesticides. IPM researchers have also pioneered the use of pheromones to trap insects such as fruit moths and corn borers, or to interfere with their mating patterns—in some cases allowing for dramatic reductions in the application of pesticides. In the 1990's, in a multi-year IPM demonstration project using mating disruption techniques, participating grape growers realized a 12 percent reduction in production costs, an 85 percent reduction in the use of pesticides—and a 100 percent reduction in loss of crops to the grape moth.
- Cornell's ***Animal Health Diagnostic Center***, located on the Ithaca campus, has been a leader in animal health research for decades. The Center is a crucial resource for diagnosing mad cow disease, foot and mouth disease and avian flu, with potential economic savings due to a protected food supply and healthy population.

The State of New York recently provided \$50 million of a \$56 million pledge to Cornell to construct a new building to accommodate the Center's continued growth. The University will finance an additional \$24 million to complete the facility. The 126,000 square foot facility will support up to 65 new jobs.

Although farmers, food producers and their communities are often the immediate beneficiaries of Cornell's agricultural research, such research can also have important benefits for city-dwellers as well. Since the early 1990's, for example, Cornell's Integrated Pest Management program has worked closely with the New York City Department of Environmental Protection, the Watershed Agricultural Council and farmers in the Catskill-Delaware region to reduce the use of chemical pesticides. Reducing pesticide runoff is a key element in the City's strategy for protecting its water supply by natural means, and thus avoiding the multi-billion-dollar cost of building a massive filtration system.

The New Life Sciences Initiative

Just as advances in the physical sciences led to rapid economic growth during the past century, the life sciences are likely to be a leading source of growth in the 21st century. In 2002, Cornell launched the \$600 million ***New Life Sciences Initiative***—a major investment in the people and facilities that will allow Cornell to expand research and educational opportunities in the life sciences.

The Initiative includes funding to support:

- Hiring more than 60 new faculty across eight colleges;
- Establishment of the ***Institute of Cell and Molecular Biology***. The Institute will be the hub of life sciences research at Cornell, with researchers focusing in three areas: developing new cellular imaging techniques; developing computational biology techniques; and improving understanding of cell structures at the atomic level; and
- Awarding ***Presidential Genomics Fellowships*** and other awards to top graduate students with an interest in life sciences research.

The Initiative also includes construction of the 271,000 square foot ***Life Sciences Technology Building***. The Life Sciences Building will house the Institute of Cell and Molecular Biology. In addition to adding office, teaching and laboratory space, the Building will be the home of the 11,000 square foot Innovation Development and Economic Application (IDEA) Center—an incubator facility that will give early-stage life sciences companies space to grow. Already, two companies are members of the IDEA Center's "virtual incubator." (The companies are described in more detail in Part Four.)

Other research at Cornell: a sampler

The areas of strength described above only begin to convey the breadth of research activity at Cornell, and the many ways it benefits New York. Here are a few examples from other areas.

- The ***Cornell Theory Center*** (CTC) provides high performance computing, education, and interdisciplinary support for Cornell researchers in fields including computational biology, computational materials, and data-driven computing. CTC is also a notable example of how Cornell's interdisciplinary research centers extend outreach services to business and industry. CTC has worked with Corning to develop its understanding of the structure of glass at the molecular level and the diffraction-limited optics in fused silica glass, and with both Kodak and Xerox on product design strategies and simulations. The CTC also provides a portal for K-12 teachers and students through which they can build basic science literacy through exploration of virtual worlds and simulations.

- In 2003, the U.S. Department of Energy's Basic Energy Sciences office established the \$2.5 million ***Cornell Fuel Cell Institute***. The Institute's six Cornell faculty members direct research that could help reduce the cost and improve the durability of fuel cells that operate at low temperatures—below 200°C. Low-temperature fuel cells are critical for mainstream applications such as transportation, cell phones and laptops. Ford, General Motors, the U.S. Environmental Protection Agency and New York State have provided additional support for the Institute.
- With a five-year \$5 million grant from the U.S. Air Force Office of Scientific Research (AFOSR), Cornell established the ***Intelligent Information Systems Institute*** in 2005. The Institute will help foster collaboration among 20 faculty in operations research, applied economics, mathematics, engineering and computer science. They will tackle problems that range from detecting hidden patterns within massive data sets to optimizing the schedules of complex networks. More than 10 scientists were scheduled to visit the Institute during 2006.
- Since 1999, when the mosquito-borne West Nile virus was first discovered in New York City, more than 14,000 people in the United States have been infected and 563 have died. With funding from the Centers for Disease Control and the National Oceanic and Atmospheric Administration, faculty in ***Cornell's Medical Entomology Laboratory*** have conducted research that could help identify mosquito species that carry the highest risk and reduce transmission rates.

Growing cross-campus research collaboration

Although they are 200 miles apart, Cornell University is promoting research that builds on the strengths of scientists on its two major campuses—Weill Cornell in New York City and the Ithaca campus. In 2006—for the second year—the two campuses jointly sponsored \$600,000 in seed grants for research in four areas: 1) biomedical engineering, nanomedicine and systems biology; 2) multidisciplinary approaches to cancer biology; 3) chemical biology and experimental therapeutics; and 4) global health and infectious diseases. The program provides one-year \$50,000 seed grants to 12 projects.

The seed grants are already leading to fruitful collaborations. For example, a Weill Cornell surgeon and a professor of Fiber Science & Apparel Design in Ithaca are collaborating on a project that could create a biodegradable artificial skin for burn victims.

- Due to advances in molecular-level cell biology, genomics, and proteomics, veterinary medicine and human medicine are increasingly converging. While the ***College of Veterinary Medicine*** still emphasizes the clinical and research aspects of

animal health, the College's researchers increasingly collaborate with colleagues in the basic sciences and at Weill Cornell. Their work is helping identify ways to better prevent and treat diseases that affect animals as well as people—including diabetes, heart disease, and cancer. The College is a magnet for externally funded research: federal agencies accounted for about 42 percent of the College's research expenditures during 2005—more than \$13 million.

- In the 1960's Cornell University's School of Operations Research and Industrial Engineering helped the New York City Police Department and New York City Fire Department allocate resources optimally. In December 2005, the School celebrated the opening of a new branch in New York City that will allow the School to build on its history of collaboration with the city and the private sector. The branch, called ***Operations Research-Manhattan (OR-Manhattan)*** has three areas of focus: financial engineering/computational finance, supply chain analysis, and public health and public policy.

One program that has emerged from the public health and public policy focus area is the ***Mass Casualty Response Logistics Program***. The program will use high performance computing to address questions about resource allocation in the event of public health crises, such as how emergency workers and health care providers can best be deployed in the event of a major pandemic, flood or bioterror attack. It was funded in part by a seed grant designed to foster collaboration between Weill Cornell and Cornell-Ithaca researchers (described above).

Beyond textbooks: undergraduate research at Cornell

Research universities' missions go beyond facilitating research by faculty. Increasingly important is training students to pose their own research questions, design methods by which to answer them, and follow through on their own research. This has several benefits. Undergraduates who conduct research are more likely to pursue graduate-level education;²⁰ and undergraduates who do not pursue an advanced degree can use the research skills they have developed to solve problems and manage projects in many other settings.

Here are three examples of research programs available to Cornell undergraduates:

- The ***Hughes Scholars Program*** is open to sophomores and juniors in the biological sciences. The program requires students to spend nine weeks during the summer—and the following fall semester—conducting original research under the supervision of a faculty advisor. Students receive a \$2,500 stipend and present their work in a seminar.

²⁰ Hathaway, Russel S., Nagda, Biren (Ratnesh) A. and Gregerman, Sandra R. 2002. "The Relationship of Undergraduate Research Participation to Graduate and Professional Education Pursuit: An Empirical Study." *Journal of College Student Development*. 43:5. pp. 614-31.

- Students in the *Hunter R. Rawlings III Cornell Presidential Research Scholars* program, established in 1996, work one-on-one with a faculty mentor while pursuing their own research. They receive an \$8,000 research stipend over the course of their Cornell careers and a \$4,000 student loan reduction. In 2005, 200 students from seven colleges were Presidential Research Scholars. In addition to receiving national awards and scholarships as a result of their work, students have published articles in major magazines and journals such as *National Geographic* and *Science*.
- *Bits on Our Minds (BOOM)* is an annual showcase of digital technology and applications developed by students. Recent student projects have included Genetic MusicComposer—a program that automatically generates music snippets and allows listeners to rate them, adopting the highest rated samples into new tunes—and Seamonkey, a robotic submarine.

Summing up: The impact of University research on New York's economy

Impressive both in its scale and its diversity, Cornell's research enterprise contributes in several ways to New York's economic vitality.

- Each year, the university attracts hundreds of millions of dollars in research funds from federal, corporate, and philanthropic sources, generating thousands of jobs in New York.
- In areas ranging from agriculture to the life sciences to nanotechnology, New York companies benefit from collaboration with Cornell researchers.
- The opportunity to work with faculty members on cutting-edge research—and to undertake significant research work of their own—means that Cornell students, both undergraduate and graduate, are especially well-prepared to participate in the growth of an increasingly knowledge-driven economy.
- Finally, basic and applied research activity at Cornell provides a catalyst for the creation of new businesses, new products and new jobs.

Part Four of the report addresses in greater detail the last of these impacts.

Part Four: Technology Transfer & Business Development

In 1844, Ezra Cornell patented a "new and useful machine or implement for laying metallic pipes in the earth." This relatively simple tool was indeed useful and met with considerable commercial success.

Like Ezra Cornell, many of Cornell University's faculty and students are not just scholars but innovators, interested in getting their discoveries to people who will find them useful—in some cases even life saving. From developing hardier and tastier apple varieties to nanoscale devices that can deliver drugs to damaged cells, Cornell University has a long history in the practice of technology transfer—first to farmers, but now also to entrepreneurs and established companies in the life sciences, in information systems and in many other sectors. In addition to supporting the transfer of university technologies to industry, Cornell faculty, students and staff provide a variety of other resources and services that help New York State businesses prosper.

Technology licensing

Cornell's Center for Technology, Enterprise and Commercialization (CCTEC) manages the University's "technology transfer" program: identifying technologies developed at Cornell that might have some commercial application; securing patents; negotiating agreements with commercial ventures for use of Cornell's intellectual property—and in some cases, helping to launch new companies based on research conducted at Cornell.

Table 13 shows how Cornell University performed on several measures of technology transfer activity between 2000 and 2005. During this time, Cornell executed more than 400 licenses and options and spun off 28 companies. The disclosure of new inventions or discoveries by faculty members or other researchers is also an important indicator of a university's potential for future innovation, representing an "innovation pipeline." Recently, the University's invention disclosures have held steady at an average of about 200 per year.

Table 13: Selected Cornell University Technology Transfer Data, 2000-2005

	2000	2001	2002	2003	2004	2005
Gross licensing income (\$M)	\$ 6.30	\$ 12.30	\$ 2.90	\$ 3.30	\$ 7.40	\$ 5.95
Invention disclosures	177	190	213	185	225	200
New first time US patent applications filed	78	87	82	72	91	113
Patents issued	97	102	115	105	109	103
Licenses / options executed	56	72	82	49	80	77
Start-up companies formed	0	1	4	13	6	4

(Source: Cornell University)

Table 14 shows how Cornell's technology transfer performance compared to that of other New York State research universities and Ivy-plus universities between 2000 and 2004, using the annual average of each institution's technology transfer figures over those five years.²¹

Among Ivy-plus institutions Cornell University averaged 6th in inventions disclosed, 3rd in patent applications filed, 6th in licenses/options executed, 8th in licensing income, 2nd in patents issued, and 6th in start-up company formation.

Among New York's research universities, Cornell ranked 3rd in invention disclosures, 1st in patent applications, 1st in licenses/options executed, 5th in licensing income, 1st in patents issued and 2nd in start-up formation (tied with SUNY Research Foundation).

Table 14: Five-Year Annual Average of Technology Transfer Performance, 2000-2004

	<i>Invention disclosures</i>	<i>New patent applications filed</i>	<i>Licenses / options executed</i>	<i>Licensing income (\$M)</i>	<i>Patents issued</i>	<i>Start-up companies formed</i>
Ivy-Plus Group						
Brown University	48	42	8	1.7	17	3
Columbia University (3 years)	203	157	56	141.4	67	7
Cornell	198	326	68	6.4	106	5
Dartmouth University	33	27	12	14.3	10	1
Harvard University	143	134	74	16.2	49	4
MIT	464	342	118	36.1	152	24
Princeton University (2 years)	117	104	26	2.4	28	4
Stanford University	312	315	127	42.8	101	10
University of Pennsylvania (4 years)	306	267	79	13.0	47	9
New York State Group						
Columbia University (3 years)	203	157	56	141.4	67	7
Cornell	198	326	68	6.4	106	5
NYU	68	56	23	58.4	24	4
SUNY Research Foundation	212	130	38	15.2	53	5
University of Rochester	109	98	12	29.1	19	3

(Source: Cornell University, Association of University Technology Managers)

A 2006 Milken Institute report on biotechnology technology transfer and commercialization ranked Cornell University 16th in the U.S. on an index that combined four measures: patents issued, licenses executed, license income and start-up formation.²² Among the New York and Ivy-plus institutions listed, Cornell ranked behind MIT, Stanford, University of Pennsylvania and NYU. The Milken report ranked Cornell fifth in biotechnology patent activity overall. Among the Ivy-plus and New York State universities, Cornell ranked second behind Stanford.

In addition to technology start-ups (described below), New York State businesses that have licensed Cornell University technologies include the following companies:

²¹ In the case of Columbia, Princeton and University of Pennsylvania, one or more years of data were unavailable. In those cases, we averaged the available years.

²² DeVol, Ross and Armen Bedroussian, *Mind to Market: A Global Analysis of University Biotechnology Transfer and Commercialization*, Milken Institute, September 2006.

- **Vybion** (formerly Viral Therapeutics, Inc.) produces recombinant proteins that can be used to diagnose and treat disease. Founded in 1995, Vybion has more than 50 clients worldwide, including major pharmaceutical companies. The company has licensed technology from Cornell and has collaborated on federally funded research with the University. Vybion is based in Ithaca and employs 14 people.
- Since 1979, New City, NY-based **AMEREQ** has produced and sold horticultural products to landscapers. The company licensed its flagship product, CU-Structural Soil, from Cornell University in 1999. Structural soil is designed to support pavement while allowing for tree roots to penetrate and grow, making it ideal for use with street trees in urban areas. The soil has been installed in projects by municipalities and private developers in more than 30 states and Canada. AMEREQ employs 5 people.
- In combination with its own technology, **Primet Precision Materials** (described in detail below) licensed Cornell technology developed by researchers affiliated with the Cornell Center for Materials Research and the Cornell Fuel Cell Institute.

Cornell-related start-up companies

Since the early 1980's, dozens of new companies have been started in New York State that have their roots at Cornell. They include companies that have been created specifically to bring to market new technologies licensed from Cornell (including 28 since 2001), other companies started by Cornell, faculty, staff or students, and companies involved in ongoing research partnerships with Cornell.

Table 15 lists selected New York State start-ups based on technology first developed at Cornell. Together, these 19 companies employ about 400 people. Several of these companies are described below.

- Based on technology that was developed in the Cornell Center for Materials Research (CCMR), **DNANO Systems, LLC** is commercializing nano-barcode technology that will allow for "tagging" living cells and tissues. This technology could have applications in diagnostics, drug delivery systems and biodefense. DNANO (whose name is a contraction of "DNA and nanotechnology") participated in CCMR's Spring 2005 Pre-Seed Workshop and has been accepted into the IDEA Center's "virtual incubator."
- Ithaca-based **Advion Biosciences** provides bioanalytical services and nanoelectrospray products that improve quality of data that can be gathered from mass spectrometry systems. The company's research and development staff continues to work with faculty in Cornell's nanofabrication and biotechnology centers as well as faculty in the College of Veterinary Medicine. Founded in 1993, the company now employs more than 150 people.

Table 15: Selected Cornell University Start-Up Companies Based in New York State

Company	City	Business / Product	Founded
Achronix Semiconductor LLC	Ithaca	High performance field-programmable gate arrays	2004
Advion BioSciences, Inc.	Ithaca	Mass spectrometry technology	1993
Biodiesel Technologies	Paul Smiths	Biodiesel production technology	2000
Bioworks, Inc.	Fairport	Biological pesticides	1993
DNANO Systems, LLC	Ithaca	Nanotechnology identification	2006
Fingerlakes Aquaculture, Inc.	Groton	Indoor seafood production	1996
Gendyne, Inc.	Ithaca	Nanobiotechnology	2003
Hybrid Silica Technologies, Inc.	Ithaca	Nanoparticles for diagnostics and drug discovery	2003
Illuminaria, LLC	Groton	Nanotechnology-based portable biosensing	2004
Innovative Biotechnologies International, Inc.	Grand Island	Technology transfer	1988
Kionix, Inc.	Ithaca	MEMS manufacturing	1993
Marmotech, Inc.	Ithaca	Antiviral pharmaceuticals	1991
Novomer, LLC	Ithaca	Polymers and specialty chemicals	2004
OptiGen, LLC	Ithaca	Veterinary genetic services	1998
CEA Systems	Ithaca	Controlled Environment Agriculture	2000
Re-Markable Paint Company	Ithaca	Removable athletic field paint	2003
Tetragenetics, Inc.	Ithaca	Genetically engineered proteins	2004
Transonic Systems	Ithaca	Blood flowmeter manufacturer	1983
Vet-Aire, Inc.	Ithaca	Equine respiratory support devices	2004

(Source: Cornell University, companies listed)

- **Novomer LLC** was founded in 2004 with technology that can produce biodegradable polymers (plastics) that are produced from renewable sources and require less energy to manufacture than polymers with similar properties. In September 2006, the company received a \$500,000 Small Business Innovation grant from NSF. As the company moves toward larger scale manufacturing, the funds will help increase efficiency in the production process. The company was founded by a Cornell professor and former Ph.D. student based on technology they had developed after attending a Pre-Seed Workshop conducted by the Center for Life Science Enterprise. Novomer is also the first to be located in the IDEA Center's "virtual incubator." The company employs 7 people.

- ***Kionix, Inc.*** was founded by two Cornell graduates in 1993 to commercialize Micro-Electro-Mechanical Systems (MEMS) technology that had been developed at Cornell. In 2004, the company completed a round of funding that raised more than \$28 million. The company was acquired by San Jose-based Calient Networks in 2000, but maintains a strong presence in Tompkins County. The company employs 62 people in its 40,000 square foot office and manufacturing facility in Ithaca.
- ***Transonic Systems Inc.*** sells a product called an ultrasound flowmeter that measures blood flow in a variety of animals. The product was developed by an engineer in the College of Veterinary Medicine at Cornell. The company now employs 100 people in New York State.

Technology-based business development grows local companies

The 2006 report, *Cornell's Research Serves the Region and Beyond: Small Business Development*, tracks 90 small businesses in New York State that rely on Cornell's research and intellectual resources. These are businesses that:

- Were founded by Cornell faculty, staff, students or alumni with a transfer of university technology or knowledge;
- Are based on Cornell technologies;
- Count on local access to Cornell's intellectual resources or facilities; or
- Have acquired companies based on Cornell technology as subsidiaries.

In his book on university spin-off activity, Scott Shane found that businesses that spin-off from university laboratories or rely on university intellectual capital tend to remain close to their partner university for a number of years, adding economic value to the local economy.²³ The evidence at Cornell bears that out: out of the 1,792 workers who are employed by these companies in New York State, more than 85 percent work in Tompkins County and 92 percent work in the Central New York counties.

As noted previously, some companies are linked to Cornell primarily through the role that faculty members or alumni have played in starting and growing them. Several examples are listed below.

- ***The CBORD Group*** provides technology—such as software and cashless dining systems—to the food service industry. The company was founded by Cornell alum John Alexander in 1975. Its Ithaca office is the base for about 430 employees.

²³ Shane, Scott, *Academic Entrepreneurship: University Spinoffs and Wealth Creation*, Edward Elgar: 2004. p. 24.

- ***Ithaca Materials Research & Testing*** was founded by Steve Ruoff in 1997 and is based in Lansing. The firm provides research and development services to companies in industries ranging from chemical processing to defense. About 85 employees work in the firm's New York office.
- James Byrnes recently retired as the CEO of ***Tompkins Trustco***, a holding company that operates three regional banks: Tompkins Trust Company, The Bank of Castile and Mahopac National Bank. The company employs more than 580 people in Central New York across 34 local bank branches.
- Larry Baum founded ***The Computing Center*** in 1978. The Ithaca-based firm provides computer hardware, software and consulting services to Central New York businesses and employs about 25 people.

Supporting new and small businesses

Cornell offers a number of programs aimed at helping New Yorkers start new business ventures, and at helping small businesses grow.

The Johnson Graduate School of Management gives early-stage businesses and entrepreneurs in New York State an opportunity to take advantage of business and legal consultation and even financial capital through a trio of services. Since 2002, the "Triad" has helped more than 120 businesses and entrepreneurs.

- ***Big Red Ventures (BR Ventures)*** is the only student-run venture capital fund in the country. The fund was established in 2000 with a \$500,000 donation from three Cornell alumni and has invested in five companies. The fund gives University students an opportunity to invest in promising companies—some of which are based on Cornell technology. The fund's portfolio companies include NovaSterilis, a start-up based in Lansing, New York that uses carbon dioxide to sterilize biomedical materials. Since inception, BR Venture students have reviewed more than 100 business plans and have achieved a 24 percent rate of return on their investments.
- ***Big Red Incubator (BR Incubator)*** provides consulting services to early-stage companies and entrepreneurs interested in starting companies. Projects range from business plan development to market research to financial modeling and typically last a semester. The Incubator's services are provided by MBA students in the Johnson Graduate School of Management. Since 2002, BR Incubator consultants have consulted with more than 60 clients.
- Cornell University law students affiliated with ***Big Red Legal (BR Legal)*** advise start-up companies on legal questions that arise—from intellectual property to regulatory issues. The BR Legal program is also a great way for law students to work with prospective employers. Several major law firms—including Buchanan Ingersoll

and Underberg & Kessler—work with BR Legal students to provide pro bono services to its clients. Since 2002, BR Legal has provided counsel to more than 85 start-ups and entrepreneurs.

The Cornell Center for Life Science Enterprise—funded in part by New York State’s Centers for Advanced Technology program—provides several types of assistance to young life science ventures, including assistance in:

- Business planning;
- Helping Cornell faculty and students in the earliest stages of starting a technology business through “pre-seed” funding workshops;
- Preparation of proposals for funding through the federal government’s Small Business Innovation research (SBIR) program;
- Sponsorship and placement of student interns with New York State biotechnology companies; and
- Liaison with CCTEC.

As part of NSF’s Materials Research Science and Engineering Centers program, the ***Cornell Center for Materials Research (CCMR)*** provides industrial outreach services to New York State technology companies. For example, CCMR’s JumpStart program encourages university-industry research partnerships by providing \$1 in matching funds for every \$2 participating companies commit to developing a joint research project, up to \$15,000. Wakonda Technologies, a Fairport, NY-based photovoltaic technology firm, leveraged \$5,000 in JumpStart support into more than \$200,000 in federal funds during 2006. Other industry programs include its Polymer Outreach Program and access to the Center’s shared experimental facilities. More than 200 companies in New York State have taken advantage of CCMR’s small business programs.

Cornell University is also the state’s U.S. Department of Commerce-designated ***Economic Development Administration (EDA) University Center***, providing resources to businesses and entrepreneurs throughout the State. For example, the Center’s Onondaga County: Syracuse Tech Link Project connects university technology research with existing businesses in economically depressed communities in Onondaga County within the hamlet of Mattydale, Town of Salina, and the Village of East Syracuse.

Support for existing New York State businesses

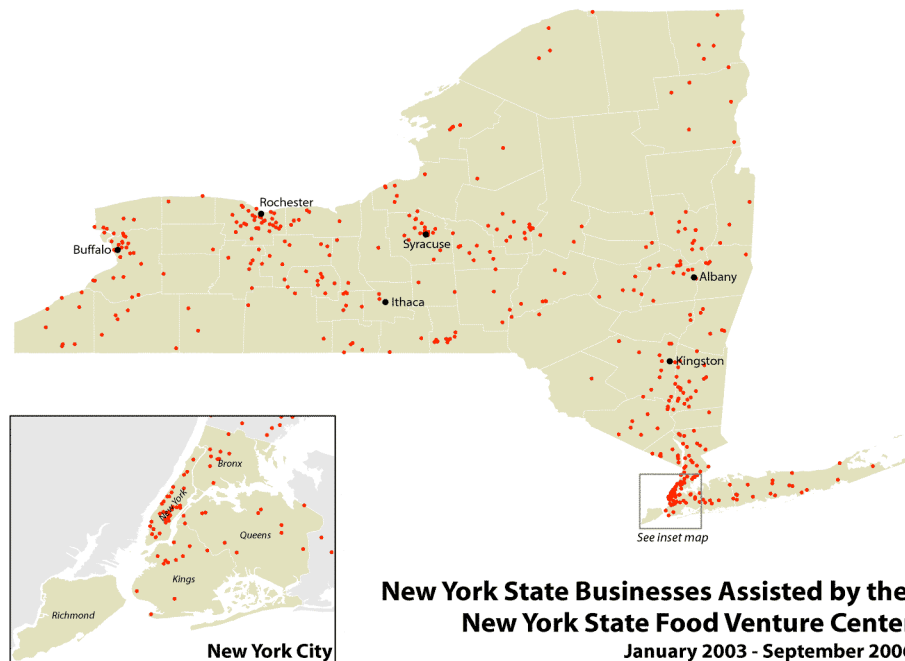
Cornell’s support for the ongoing development of New York State businesses is not limited to new ventures. Through a wide range of research, technical assistance and training programs that are offered throughout the University, Cornell helps companies large and small develop new products, explore new markets, solve production problems, and improve productivity and profitability.

The ***Center for Hospitality Research*** at Cornell's School of Hotel Administration conducts research that can help major hotel chains improve operations in their Manhattan hotels while also supporting boutique hotels and bed & breakfasts around the state. The Center makes its research reports available at no cost. For example the 2006 report, "A Comprehensive Guide to Merchandising Bed and Breakfast Inns," provides usable marketing strategies and advice to the increasing number of farm-based B&Bs in upstate New York.

The ***New York State Food Venture Center***, operated by Cornell University at the New York State Agricultural Experiment Station in Geneva, provides support to New York State food businesses in every corner of the state. Assistance includes everything from improvements in packaging that can lead to a longer shelf life to adjusting recipes to correct problems with acidity.

During 2005 alone, the Food Venture Center assisted 164 businesses across New York State. Figure 24 shows the locations of more than 450 New York State businesses that received support from the Food Venture Center between 2003 and 2006.

Figure 24: Map of New York State Businesses Assisted by the Food Venture Center, 2003 - 2006



(Source: Cornell University)

Research centers such as the ***Cornell Center for Materials Research***, the ***Cornell Theory Center*** and the ***Cornell Nanobiotechnology Center*** and others have a range of industrial partnership programs in which New York State businesses can leverage Cornell's facilities and expertise in research and development. For example, Eastman Kodak, General Electric and Corning have entered into research partnerships with the Center for Materials Research. Eastman Kodak has worked with researchers at the Cornell Theory

Center to improve the efficiency of digital imaging techniques and researchers at the Cornell Nanobiotechnology Center have worked with their counterparts at IBM.

Attracting companies (and investment) to New York State

Cornell University's presence helps to make Central New York attractive to companies looking for a location to grow a business. Whether it's access to the university's nanofabrication facilities, the know-how of the university's life sciences faculty, the well-equipped space available in the university's technology parks, or access to a diverse and talented student body—Cornell University offers the facilities, faculty, students and alumni emerging companies need to be successful.

Here are several examples of companies that set up R&D or manufacturing operations in Central New York:

- ***International Food Network*** (IFN) is a UK-based firm that contracts with food and beverage companies to develop and prototype new products. IFN leases 10,000 square feet of laboratory space in Cornell's Business and Technology Park and is an affiliate of the Cornell Institute of Food Science and the Cornell Center for Advanced Technology in Biotechnology. The firm uses Cornell's pilot processing plant to supplement its own facilities. This partnership was instrumental in the company's work with Häagen Dazs to develop the *Dulce de Leche* flavor of ice cream. The company now employs 32 people in Ithaca—many of whom are Cornell graduates.
- ***KensaGroup*** was founded by a Cornell University professor and Ph.D. student in 2000 to take promising technologies out of university laboratories and develop companies to commercialize them. Since then, four start-up companies (all of them with some operations in New York State) have spun-out of or licensed technologies from the KensaGroup. A significant part of KensaGroup's technology portfolio has been licensed from Cornell, but the company also licenses technologies from universities outside the state. The result is that its portfolio companies tend to be anchored in New York, regardless of the university that supplied the technology. For example, ***NovaSterilis's*** tissue sterilization process is based on technology KensaGroup licensed from MIT, but the company is headquartered in Lansing, New York. The company's technology can be used to sterilize biomedical materials and could be critical in the transplant of bone and musculoskeletal tissues where existing sterilization techniques are ineffective. NovaSterilis now employs six people in New York State.
- ***Primet Precision Materials*** manufactures nanoscale materials for use in a variety of applications from solar devices to fuel cells. Although the company was founded in Maryland, its president was looking to relocate to a place where the company could gain access to nanotechnology researchers and research facilities. In 2003, the company relocated to Ithaca to be near Cornell's nanotechnology faculty and graduates. The benefit goes both ways: Cornell's nanotechnology researchers

accelerate their own research by purchasing finished nanomaterials from Primet, which employs 9 people in New York State—several of whom are Cornell University alumni.

Room to Grow and Expand: Technology Parks

Cornell has also supported the development of new businesses in Central New York through strategic investments in real estate.

The ***Cornell Business and Technology Park*** is a 300-acre complex located near Ithaca – Tompkins County Airport in Lansing, just a few miles from Cornell's Ithaca campus. Launched in 1988, the Park encompasses 24 buildings with a total of more than 700,000 square feet. As of 2004, 80 companies employing more than 1,600 workers were based in the Park. Many of them are Cornell spin-offs, technology licensees or engaged in collaborative research with Cornell faculty.

Companies of all sizes are located in the Park. For example, Hybrid Silica Technologies' single employee has access to Langmuir Lab, the Park's incubator facility while Cornell spin-off Advion Biosciences is constructing an additional building in the Park as it expands beyond its 140 employees. Advion's building is expected to open in 2007.

During its first 10 years in operation, the Park contributed about \$4.8 million in property taxes to Tompkins County and Park operators expect the Park will contribute another \$11 million during the next decade.

Cornell's ***Agriculture and Food Technology Park*** in Geneva, New York—known as "The Technology Farm"—offers food and agriculture-based start-up companies access to Cornell researchers and equipment. The first phase of the development of the 72-acre Park was financed with a combination of federal, state and private funds totaling more than \$8 million. The Park's first tenants will include four start-up companies (including CherryPharm, discussed below) and a USDA-funded Grape Genetics Research Center. The Grape Genetics Research Center will operate in a 59,000 square foot facility and employ up to 20 researchers and support staff and further establish Cornell University as the East Coast leader in grape research.

- ***CherryPharm*** is one of the latest companies to set up an office near Cornell. The company is commercializing a drink that uses natural properties of tart cherries to aid in muscle recovery after strenuous exercise. Researchers in Cornell's Food Venture Center were instrumental in conducting the research—together with the Nicholas Institute of Sports Medicine and Athletic Trauma and the University of Vermont's Human Performance Lab—that confirmed the restorative properties of tart cherries. The company also used Cornell's Fruit and Vegetable Pilot Processing Plant in Geneva to refine its recipe.

Cornell's work with CherryPharm impacts the New York State economy beyond the single firm: the company purchases its cherries from Pro-Fac Cooperative Inc., a growers' cooperative outside Rochester; and the New York Rangers hockey team was one of CherryPharm's first customers.

- ***Cayuga Venture Fund*** is an Ithaca-based venture capital firm that invests in high-growth technology companies. The firm's management team and advisors are all current or former Cornell faculty and alumni. Companies that have received funding include Kionix, a company that develops MEMS switches for telecommunications applications; BinOptics, a company that develops optical ring lasers; and Primet Precision Materials (described above). The fund has invested more than \$32 million in Cornell start-ups and other companies that have utilized Cornell's intellectual property. The Fund has helped attract subsequent investments from major firms, such as Draper Fisher Jurvetson. As reported in the *Central New York Business Journal*, Ithaca-area companies received \$20 million in venture capital funding in 2005.²⁴

²⁴ Acton, Ryann, "Central New York Venture Capital Blues," *Central NY Business Journal*. Available online: http://www.cnybj.com/fullstory.cfm?article_id=4148&return=frontpage.cfm

Part Five: The Economic Impact of Cornell-Ithaca

As significant as its statewide economic impact may be, Cornell University's impact as a major enterprise in its own right is even more evident when viewed from the perspective of Ithaca and Tompkins County, and the surrounding Central New York region.

A large and growing employer

As Table 16 shows, Cornell is one of Central New York's largest employers. In the spring of 2005, Cornell's Ithaca-based colleges employed a total of 13,037 people, including:

- 12,142 people at the Ithaca campus (excluding students);
- 322 at the Agricultural Experiment Station in Geneva;
- 371 people at other locations in New York State; and
- 202 people outside New York State.

Table 16: Largest Central New York Employers, by Number of Full-Time Employees, 2005²⁵

<i>Employer</i>	<i>City</i>	<i>Full-Time Employment</i>
University of Rochester / Strong Health	Rochester	16,565
Eastman Kodak	Rochester	16,300
Wegmans Food Markets, Inc.	Rochester	14,897
Cornell University	Ithaca	10,336
Xerox Corp.	Rochester	8,325
ViaHealth	Rochester	6,565
SUNY Upstate Medical University	Syracuse	6,305
Unity Health System	Rochester	4,716
Syracuse University	Syracuse	4,329
Lockheed Martin Systems Int.-Owego	Owego	3,600

(Source: *Central New York Business Journal: Book of Lists 2006*, *Rochester Business Journal: The Lists 2006*, Cornell University)

Of the 13,037 people employed by Cornell-Ithaca in 2005, 85 percent were regular, long-term employees, and 15 percent temporary or "casual" employees. About 82 percent worked full-time and 18 percent part-time.

²⁵ Sources: Central New York Business Journal, *Book of Lists 2006*, Rochester Business Journal, *The Lists 2006*, Cornell University.

In addition to its regular full- and part-time employees, Cornell-Ithaca in 2005 also employed 8,039 students. This total included 2,738 graduate assistants, and 5,301 students who worked in a wide variety of part-time, on-campus jobs.

Table 17: Cornell-Ithaca Employment, by Campus, 2005

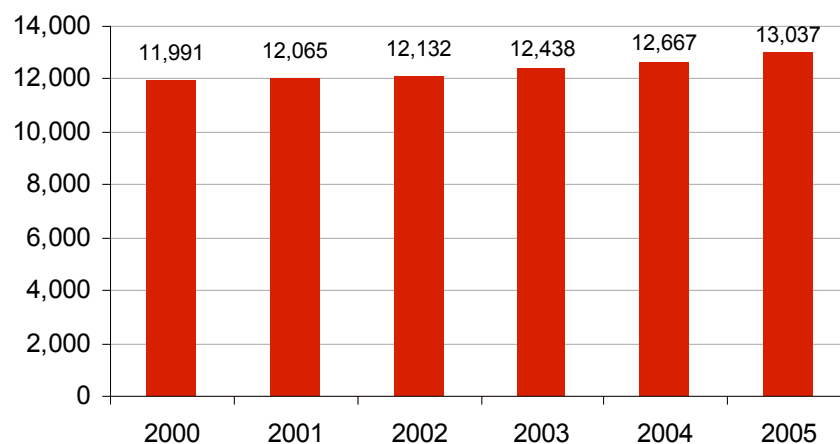
<i>Location</i>	<i>FT</i>	<i>PT</i>	<i>Total</i>
Ithaca	10,067	2,075	12,142
Geneva	269	53	322
New York City (non-Weill)	112	110	222
Other NYS locations	60	89	149
<i>SUBTOTAL NEW YORK STATE</i>	<i>10,508</i>	<i>2,327</i>	<i>12,835</i>
Non-NYS locations	186	16	202
<i>SUBTOTAL CORNELL-ITHACA</i>	<i>10,694</i>	<i>2,343</i>	<i>13,037</i>
Students employed by Cornell-Ithaca	-	-	8,039
GRAND TOTAL	10,694	2,343	21,076

(Source: Cornell University)

The University's annual payroll for its Cornell-Ithaca employees in 2005 totaled \$635.9 million.

Cornell is not just one of Central New York's, largest employers, but one of the fastest-growing as well. As Figure 25 shows, between 2000 and 2005, employment at the Ithaca campus grew by 1,135—an increase of 10.3 percent in just five years.

Figure 25: Cornell-Ithaca Employment, 2000-2005



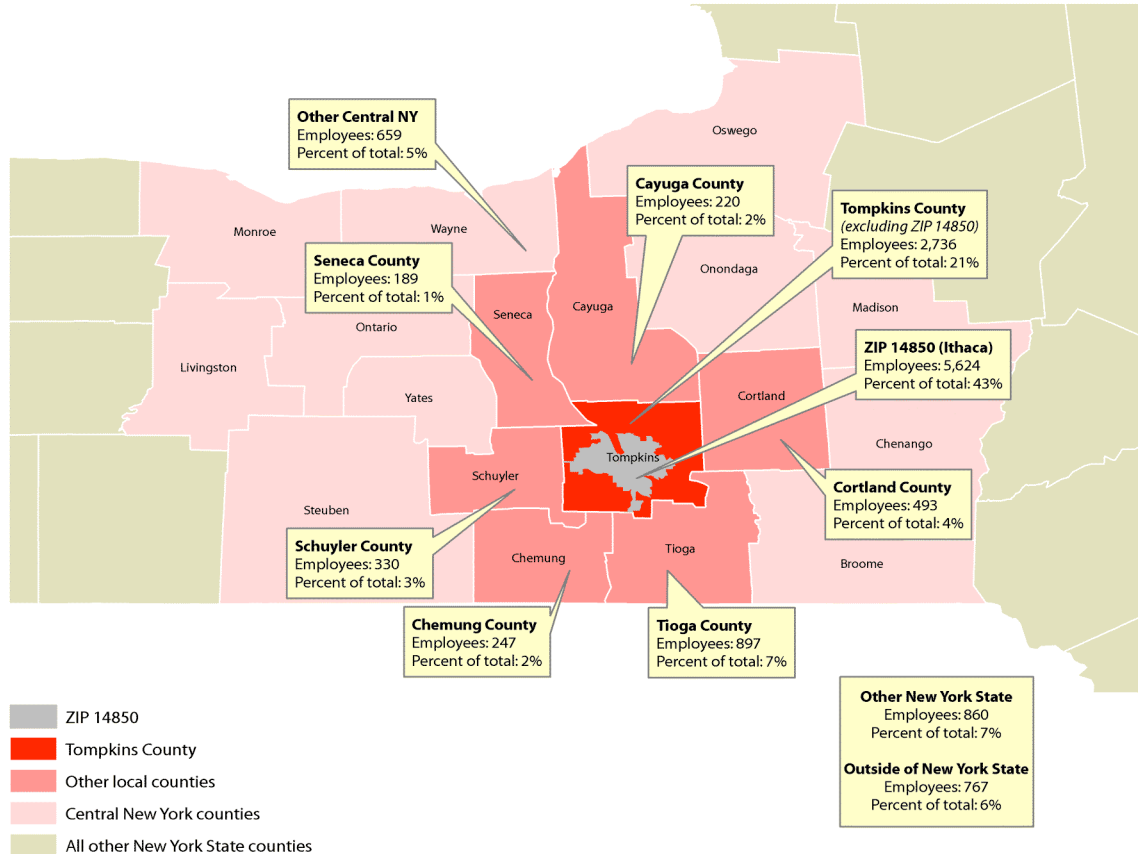
(Source: Cornell University)

Where Cornell-Ithaca employees live

Not surprisingly, most Cornell-Ithaca employees live in Ithaca, or elsewhere in Tompkins County, or in the six counties that border Tompkins. In 2005, as Figure 26 shows:

- More than 5,600 University employees—43 percent of the total—lived in ZIP Code 14850, which includes most of the City of Ithaca as well as some neighboring communities.
- Another 2,736 (21 percent) lived elsewhere in Tompkins County;
- 2,376 (18 percent) lived in one of the six counties that border Tompkins.
- Of the remainder, 5 percent lived elsewhere in Central New York and 7 percent elsewhere in New York State. Six percent of all Cornell-Ithaca employees lived outside New York.

Figure 26: Cornell-Ithaca Employees, 2005, by Place of Residence



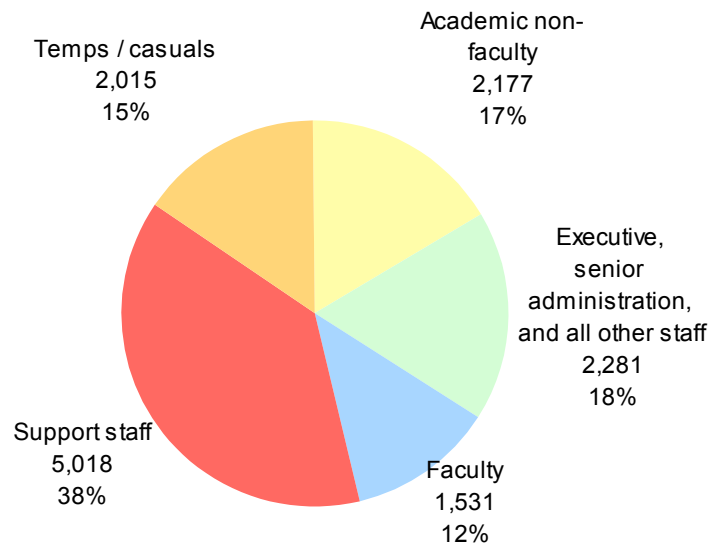
(Source: Cornell University)

Diversity and quality of jobs

Cornell-Ithaca is notable not only for the number of people it employs, but for the diversity and quality of the jobs it offers. Excluding temporary and student employees, as Figure 27 shows:

- Tenured and tenure-track faculty members accounted for 12 percent of all Cornell-Ithaca employees in 2005;
- Other academic employees (consisting primarily of non-tenure-track instructors, researchers who do not have faculty status and librarians) accounted for 17 percent;
- Management and administrative staff accounted for 18 percent; and
- Various categories of support staff accounted for 38 percent.

Figure 27: Cornell-Ithaca Employment, by Job Category, 2005



(Source: Cornell University)

Salaries and wages at Cornell-Ithaca are highly competitive, especially in the context of the Central New York labor market. Table 18 shows median wage and salary earnings for various categories of Cornell-Ithaca employees in 2005.

Table 18: Median Wage and Salary Earnings by Job Category, 2005

Job category	Median wage and salary earnings
Tenured and tenure-track faculty	\$115,392
Other academic employees (instructors, researchers, librarians)	\$64,189
Administrative staff	\$58,536
Support staff	\$33,885

(Source: Cornell University)

Taking all these categories into account, the median earnings for all full-time employees at Cornell-Ithaca in 2005 were \$41,412. By way of comparison, the median earnings for all full-year, full-time employees in the Rochester metropolitan area in 2004 were \$36,991.

Salaries and wages are, of course, not the only measure of job quality. The University also provides health, retirement and other benefits; and like many other universities, offers its employees a variety of educational opportunities.

- Both academic and non-academic employees may with their supervisor's approval enroll tuition-free in academic courses at Cornell (up to four credit-hours per semester). In 2004-05, 576 Cornell-Ithaca employees took courses under this program.
- After a year of full-time employment, both academic and non-academic employees can apply for admission to undergraduate or graduate degree programs through Cornell's Employee Degree Program. In 2004-05, 168 Cornell-Ithaca employees participated in the program.
- After a year of full-time or three years of part-time work, employees may be eligible for assistance in paying tuition for job-related courses at other institutions. In 2004-05, Cornell-Ithaca provided tuition assistance for 253 employees.
- The University also provides college tuition assistance to the children of employees under the Cornell Children's Tuition Scholarship program. (Eligibility and benefit levels vary, depending on how long the employee has worked at Cornell.) In 2004-05, the University provided more than \$7.9 million in scholarships to more than 2,400 children of Cornell-Ithaca employees.

Cornell's direct spending on employee benefits in fiscal year 2005 totaled nearly \$258 million; in addition, the cost of state-funded benefits for contract college employees in fiscal year 2005 totaled nearly \$88 million.

Purchasing goods and services

In addition to the people it employs directly, Cornell University generates jobs through its purchases of goods and services from companies in Tompkins County, in Central New York and throughout the state.

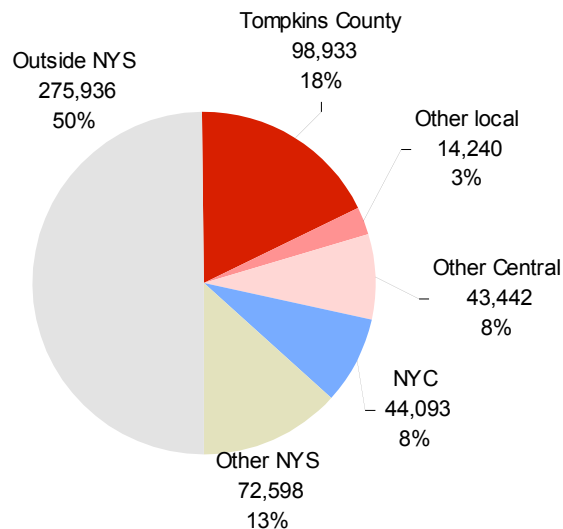
In 2005, Cornell-Ithaca spent more than \$549 million on purchases of goods and services (excluding construction). Nearly half of the total—\$273 million—was paid to vendors in New York State:

- \$98.9 million was paid to businesses in Ithaca and elsewhere in Tompkins County;
- \$57.7 million was paid to businesses in the other counties of Central New York; and
- \$116.7 million went to companies located elsewhere in New York State (including \$44 million paid to New York City companies)

Cornell seeks whenever possible to buy from vendors located in Central New York or elsewhere in New York State. Nevertheless, the University sometimes buys goods and services from companies in other states—for example, when it is buying sophisticated scientific or medical equipment that is only available from non-New York vendors, or when out-of-state vendors are the low bidders.

Figure 28: Cornell-Ithaca Purchasing, by Location of Vendor, 2005 (in \$ thousands)

Total: \$549 million



(Source: Cornell University)

The range of local businesses from which Cornell-Ithaca buys goods and services is quite diverse. Table 19 lists 15 commodities and services on which the University spent at least \$2 million from Tompkins County companies in 2005.

Industries elsewhere in Central New York from which the University bought at least \$2 million in goods and services in 2005 included furniture, electrical and computer equipment, printing equipment, building services and food services.

Cornell-Ithaca's spending on goods and services, as noted above, included more than \$44 million in payments to companies based in New York City. The leading types of goods and services bought from New York City firms include books and other publications, architectural and engineering services, property rentals, hotel services, insurance and financial services.

Table 19: Purchases Greater Than \$2 Million from Tompkins County Businesses, 2005

<i>Commodity or service</i>	<i>2005 Spending (\$ thousands)</i>
Utilities	\$ 12,532
Restaurants and catering	10,365
Office supplies	5,932
Scientific research services	4,029
Food products	3,696
Printing	3,689
Civic, social and professional organizations	3,621
Wholesale trade	3,319
Printing machinery	2,933
Miscellaneous professional and technical services	2,879
Computer equipment, software and services	2,701
Miscellaneous retail	2,600
Plumbing	2,326
Telecommunications	2,288
Facility support services	2,063

(Source: Cornell University, Appleseed)

Overall, we estimate that in 2005 Cornell-Ithaca's purchases of goods and services directly supported:

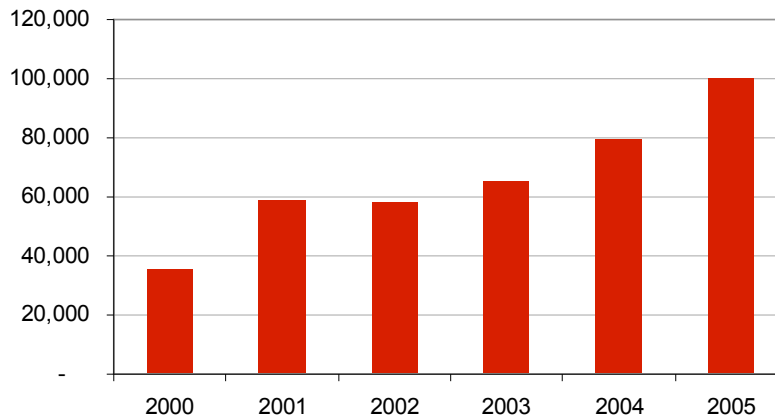
- 800 full-time-equivalent jobs in Tompkins County;
- 375 FTE jobs in the six counties immediately surrounding Tompkins;
- 145 FTE jobs elsewhere in Central New York; and
- 805 FTE jobs elsewhere in New York State.

Construction at Cornell-Ithaca

Like its spending on goods and services, Cornell's spending on University construction projects translates into business opportunities and jobs for New Yorkers. In 2005, Cornell spent just under \$100 million on construction projects on its Ithaca campus.

As Figure 29 shows, Cornell's investment in construction in Ithaca has risen sharply during the past five years—from \$35.58 million in 2000 to \$99.95 million in 2005.

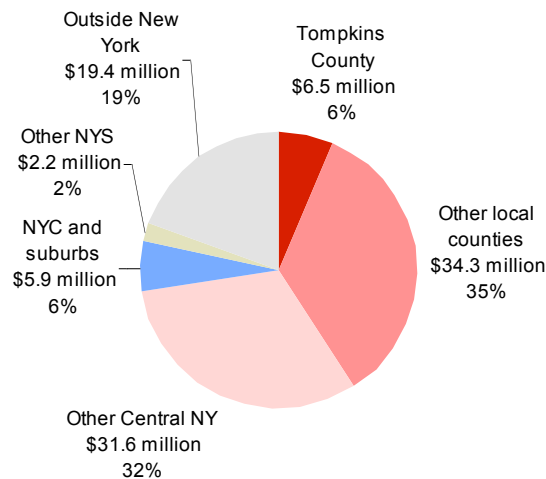
Figure 29: Cornell-Ithaca Construction Spending, 2000-2005 (\$ thousands)



(Source: Cornell University)

Most of this work—about 72 percent of the total dollar value of all prime contracts—went to contractors based in Central New York. Figure 30 shows how spending on construction was distributed among contractors from various parts of the state.

Figure 30: Cornell-Ithaca Construction Spending, by Location of Prime Contractor, 2005



(Source: Cornell University)

Major projects completed or under way on Cornell's Ithaca campus during the past five years have included:

- ***Duffield Hall*** – a \$58.5 million, 151,000 square-foot building designed to support Cornell's fast-growing program of research and education in nanotechnology, completed in the fall of 2004.
- ***The Life Sciences Technology Building*** – a \$163 million, 271,000 square-foot facility that will support an expanding program of research in genomics, neuroscience, biomedical engineering and related areas, to be completed in 2008.
- ***The East Campus Research Facility*** – a \$55 million, 80,000 square-foot life science research facility, to be completed in 2008.
- ***The North Campus Residential Initiative*** – a \$65 million project that has allowed Cornell to house all first-year undergraduate students on campus, and to improve the quality of first-year students experience. The project, completed in 2001, included construction of two new residence halls housing a total of 558 students, improvements to existing residence halls, and a new student center that includes dining facilities and a fitness center.
- ***The West Campus Residential Initiative*** – a \$226 million expansion of on-campus housing for undergraduates. Based on the tradition of "residential colleges" at universities such as Oxford and Cambridge, the West Campus is designed to enhance the quality of student life and increase opportunities for interaction with faculty members. Each "house" on the West Campus is designed to accommodate 375 students, and also includes a dining hall, a community room, seminar and music rooms, a computer lab and faculty offices.

Alice Cook House and Carl Becker House were completed in 2004 and 2005, respectively, and a third, Hans Bethe House, is scheduled to be completed by 2007. Two additional houses and a recreational center will be completed by 2009.

- ***Renovation and expansion of the Mann Library*** – renovating a building first constructed in 1952, and doubling its size to 150,000 square feet. The expansion will provide additional library space and a state-of-the-art facility for the Bailey Hortorium. The project, which is funded in part by the State University Construction Fund, will be completed in 2007.

University construction is a significant source of high-wage jobs, especially for residents of Tompkins County and surrounding areas. We estimate that in 2005, construction spending on the Ithaca campus generated a total of 835 FTE jobs in construction and related industries. The growth of Cornell-Ithaca's construction program, moreover, has also been a factor in the growth of University's own payroll; in 2005, approximately 200 Cornell employees were engaged in planning, managing or supporting construction on the Ithaca campus.

In the long run, of course, the real value of University construction goes well beyond the business and job opportunities it generates. Construction expenditures also represent an investment in the University's capacity to support its mission. The continued growth of Cornell's research enterprise—and in particular, its ability to compete for talent and funding in emerging fields such as nanotechnology—depends in part on having available an adequate supply of suitable research space. Similarly, by improving the environment for living and learning on its campus, Cornell is enhancing the quality of the educational experience it offers, ensuring that it can continue to attract talented students from communities throughout New York, the U.S. and around the world.

The impact of Cornell-Ithaca: measuring the multiplier

As discussed above, Cornell in fiscal year 2005 employed 12,142 people on its Ithaca campus, with total payroll of approximately \$611 million. Of all those who worked on the Ithaca campus, 8,630 were Tompkins County residents to whom the University paid a total of \$462 million in wages and salaries. The Ithaca-based colleges also spent \$105 million on purchases of goods and services from Tompkins County businesses (including construction contractors).

Using the IMPLAN input-output modeling system²⁶, we estimate that:

- Spending on goods and services and construction directly supported 880 jobs with Tompkins County companies in 2005.
- Household spending by University employees living in Tompkins County and local spending by the University's vendors and contractors generated \$385 million in economic activity and 2,710 jobs at other businesses within the county.

The same calculation can be repeated at various geographic levels. In the seven-county local area surrounding the Ithaca campus:

- Cornell's payments of \$154 million to vendors and contractors in the seven-county area directly supported 1,840 jobs.
- Cornell-Ithaca paid \$611 million in wages and salaries to 12,142 University employees who worked on the Ithaca campus. We estimate that household spending by these employees, and spending by local vendors and contractors and *their* employees, generated \$480 million in output in 2005, and 3,575 full-time-equivalent jobs in other businesses throughout the seven counties.

In the eighteen-county Central New York area (which, in addition to the Ithaca campus, includes the Agricultural Experiment Station in Geneva):²⁷

²⁶ See Appendix A for details about the IMPLAN modeling system

²⁷ Includes Cayuga, Chemung, Cortland, Schuyler, Seneca, Tioga, Tompkins, Broome, Chenango, Livingston, Madison, Monroe, Onondaga, Ontario, Oswego, Steuben, Wayne, and Yates Counties.

- University payments of \$229 million to suppliers and contractors located in Central New York directly accounted for 2,315 jobs;
- Cornell paid \$625 million in salaries and wages to 12,464 employees who worked on the Ithaca campus or in Geneva. Their household spending, and spending by contractors, vendors and their employees within the region, generated \$565 million in output in 2005, and 4,325 full-time-equivalent jobs in businesses throughout the region.

Table 20: Summary of Cornell-Ithaca Economic Impact

	Direct University spending		Indirect and induced impact of spending by employers, vendors and contractors		Total impact
	<i>Payroll</i>	<i>Purchasing/ construction</i>	<i>Induced Impact of employee spending</i>	<i>Indirect Impact of vendor and contractor spending</i>	
Tompkins County	\$611 m	\$105 m	\$385 m	\$30 m	\$ 1,131 m
	12,142 jobs	880 FTE	2,710 FTE	310 FTE	16,042 FTE
Local Counties	\$611 m	\$154 m	\$480 m	\$70 m	\$1,315 m
	12,142 jobs	1,840 FTE	3,575 FTE	750 FTE	18,307 FTE
Central New York	\$625 m	\$229 m	\$565 m	\$160 m	\$1,579 m
	12,464 jobs	2,315 FTE	4,325 FTE	1,495 FTE	20,599 FTE

(Source: Cornell University, Appleseed)

Impact on State and local revenues

Like other non-profit colleges and universities, Cornell is not required to pay real property taxes on properties that it uses to fulfill its mission of education, research and service to the community; nor is the University required to pay sales taxes on the goods and services that are needed to support its mission. Despite its tax-exempt status, however, Cornell generates a significant amount of revenue for both state and local governments.

At the state level, Cornell's most direct impact on state government revenues is through the personal income taxes paid on the wages and salaries paid to its employees. In fiscal year 2005, Cornell's Ithaca-based colleges paid to the state a total of \$33 million in income taxes withheld from the wages and salaries of University employees.

Cornell-Ithaca's spending on payroll, purchasing and construction also contributes to state revenues in several other ways; for example:

- Through state sales taxes paid by Cornell-Ithaca employees;

- State taxes paid by vendors and contractors with which the University does business; and
- Tax revenues derived from the additional economic activity that is generated through the multiplier effect.

Taking all of these factors into account, we estimate that in 2005, Cornell-Ithaca's spending on payroll, purchasing and construction directly or indirectly accounted for approximately \$60.5 million in state tax revenues. These impacts are summarized in Table 21.

Table 21: Summary of Cornell-Ithaca Tax Impacts on New York State

Type of Tax	Amount
Taxes paid by or on behalf of University employees	
• Personal income taxes	\$ 33.3 m
• Sales and use taxes	\$ 6.8 m
Taxes paid by vendors, contractors and their employees	\$ 7.7 m
Taxes generated through the multiplier effect	\$ 12.7 m
Total State tax revenues	\$ 60.5 m

(Source: Cornell University, Appleseed)

Cornell-Ithaca also contributes to the financing of local government. It does so in several ways.

- Cornell pays the full range of real property taxes—city or village, town, county and school taxes—on property it owns that is used for purposes that are not tax-exempt—East Hill Plaza, for example. In fiscal year 2005, these payments totaled \$1,642,854.
- The University also pays a variety of other special taxes, assessments and fees for water, sewer and solid waste service, fire protection, building permits, etc. In 2005, these payments totaled \$648,889.

Table 22 provides additional detail on the distribution of these taxes and fees.

Table 22: Taxes and Fees Paid by Cornell-Ithaca, 2005

	Property tax	Other taxes and fees	Permits, agency and inspection fees	Total
Town of Dryden	3,014	74,333	-	77,347
City of Ithaca	136,646	18,565	269,933	425,144
Village of Cayuga Heights	13,834	3,759	2,952	20,545
Town of Ithaca	21,799	130,060	34,467	186,326
Town of Lansing	41,762	338	-	42,100
Village of Lansing	38,213	72,060	8,932	119,205
Town of Ulysses	572	385	-	958
Ithaca School District	559,373	-	-	559,373
Lansing Central School District	436,871	-	-	436,871
Dryden Central School District	6,328	-	-	6,328
Tompkins County	384,442	-	9,970	394,412
Other	-	-	23,135	23,135
TOTAL	1,642,854	299,500	349,389	2,291,742

(Source: Cornell University)

Cornell also provides direct cash contributions on a voluntary basis to a variety of local government and quasi-public agencies in Tompkins County. In fiscal year 2005, these payments totaled nearly \$5 million. Additional detail is provided below in Table 23.

Cornell University partners with Tompkins Consolidated Area Transit (TCAT) to provide eligible members of the University community with discounted rides on TCAT's buses. In total, Cornell paid about \$3 million to the Tompkins Consolidated Area Transit system through its \$750,000 partnership share, a \$50,000 capital match and a one dollar payment for each ride taken by eligible members of the Cornell community.

Table 23: Cornell-Ithaca Voluntary Cash Contributions, 2005

Recipient of contribution	Contribution amount
Tompkins Consolidated Area Transit	\$ 3,000,000
City of Ithaca – municipal services	1,000,000
Ithaca City School District	425,000
City of Ithaca – economic development	250,000
Tompkins County Airport	44,060
T.C. Day Care and Child Development	37,000
Tompkins County Area Development	25,000
Family and Children's Services of Ithaca	25,000
Other	137,779
Total	\$4,943,839

(Source: Cornell University)

In addition to Cornell-Ithaca's contributions to local governments, University spending on payroll and purchasing generates local government revenues in several other ways. We estimate that in 2005:

- Cornell-Ithaca employees living in Tompkins County paid approximately \$17.8 million in local property taxes and \$4.7 million in local sales taxes.
- Payments to local vendors and contractors generated \$5.9 million in local taxes.
- The indirect and induced economic activity that Cornell generates through the multiplier effect generated \$2.1 million in local property and sales taxes.

These impacts are summarized below in Table 24.

Table 24: Summary of Cornell-Ithaca tax impacts on local governments in Tompkins County

Type of Tax	\$ (000s)
Taxes paid by University employees	
• Property taxes	\$ 17,800
• Sales and use taxes	\$ 4,700
Taxes paid by vendors, contractors and their employees	\$ 5,900
Taxes generated through the multiplier effect	\$ 2,100
Total local tax revenues	\$ 30,500

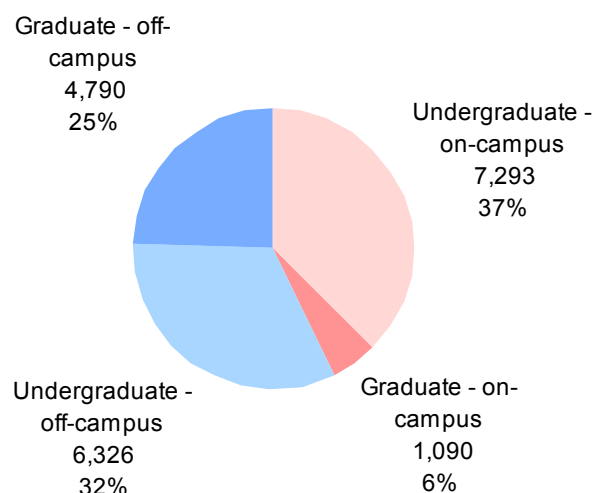
(Source: Cornell University, Appleseed, New York State Controller)

The impact of student and visitor spending

In addition to the economic activity that the University itself generates through its spending on payroll, purchasing and construction, Cornell-Ithaca also contributes to the local economy through off-campus spending by students, and by visitors to Ithaca.

In the fall of 2004, a total of 19,499 students were enrolled at Cornell-Ithaca. As shown in Figure 31, about 43 percent (8,383 students) lived on-campus, while the rest (11,116 students) lived elsewhere—primarily in and around Ithaca.

Figure 31: Number of Undergraduate and Grad/Professional Students Living On-/Off-Campus, Fall 2004



(Source: Cornell University)

Using estimates of living costs provided by Cornell's financial aid office (Table 25) we estimate that in fiscal year 2005, off-campus spending by Cornell-Ithaca students—on rent, food, personal items, transportation, entertainment, etc.—totaled approximately \$137 million.

Table 25: Estimated Living Costs for Cornell-Ithaca Students, 2005

Type of student	On-campus	Off-campus
Undergraduate	\$2,060	\$12,360
Graduate and professional	\$2,680	\$16,095

(Source: Cornell University)

Before calculating the impact of student spending on the local economy, however, we need to adjust our estimate of total spending to take into account the fact that some of it is financed out of wages the University pays to student workers. (We have already included spending on students' wages in our estimate of the impact of University spending. Including that same stream of income in our analysis of the impact of student spending would in effect be counting the same impact twice.) After adjusting for students' earnings, we estimate that net off-campus spending in 2005 totaled \$74 million.

Using IMPLAN, we estimate that student spending directly supported approximately 1,000 full-time equivalent jobs in businesses within Tompkins County. Through the multiplier effect, we estimate that students' off-campus spending indirectly generated an additional \$25 million in economic output and 250 additional jobs within the county.

Each year, thousands of visitors come to Ithaca for reasons related to the University. They include, for example:

- Scientists, scholars and practitioners who come to Cornell for academic meetings and conferences;
- Representatives of suppliers and contractors who come to Ithaca in the course of doing business with the University;
- Commencement guests;
- People attending (or participating in) athletic or cultural events at Cornell; and
- Prospective students and their parents.

Like other universities, Cornell does not systematically track the number of people who visit its Ithaca campus for various purposes—the nature of their visits, where they are coming from, how long they stay in Ithaca, etc. Information that is available on some categories of visitors, however, provides a basis for at least a rough (although incomplete) estimate of visitor spending. Table 26 presents information on the number of people who for various reasons visited Cornell-Ithaca in 2005.

Table 26: Estimated Number of Visitors to Cornell-Ithaca During 2005

<i>Type of Visitor</i>	<i>Number of Visitors</i>
Prospective students	24,575
Commencement	34,000
Summer visitors	23,130
Athletic events	57,640
Summer campers	13,715
Camper's parents pickup / drop-off	7,780
Conference attendees and other visitors	11,460
TOTAL	172,300

(Source: Cornell University, Appleseed)

We estimate that in 2005, off-campus spending on lodging, food, transportation, shopping, entertainment and other services by the types of visitors listed above totaled approximately \$38 million. We further estimate that visitor spending directly supported 790 FTE jobs in Tompkins County—and through the multiplier effect, generated an additional \$14 million in economic output and 145 FTE jobs.

Connecting with the Community

Through the services it provides to the local community, the resources it makes available and its participation in local community development initiatives, Cornell helps make Ithaca and Tompkins County more attractive places to live and work. This in turn enhances these communities' ability to attract and retain the highly skilled workers and entrepreneurs on whom the region's prosperity ultimately depends.

The Cornell University Public Service Center

The Cornell University Public Service Center (PSC) was founded in 1991. The Center provides grants, facilities and other resources to faculty and students who want to develop their own community outreach programs. The Center estimates that nearly 4,000 students each year contribute 200,000 volunteer hours to local agencies. Thousands of additional hours are contributed by other student organizations, fraternities and sororities and athletic teams.

Here is a sampling of programs that are offered by the Public Service Center:

- The Public Service Center is the coordinating host for a number of K-12 outreach programs, including:
 - ***Raising Education Attainment Challenge*** (REACH), a program that provides academic support to pre-K through 9th grade students in schools and after-school locations. Sites include the Belle Sherman Elementary School, Beverly J. Martin Enrichment Program Incorporated, Academic Plus Program, Community Nursery School of Cayuga Heights, the Advantage After-School Program at DeWitt Middle School, the Fall Creek Elementary School, Greater Ithaca Activities Center, Ithaca's Downtown Daycare Center, Parkside Gardens, Southside Community Center and West Village Community Center. In total, Cornell University student volunteers work with more than 230 children on a daily basis.
 - Cornell graduate students design and implement mini-courses for K-12 teachers in the community as part of the ***Graduate Student School Outreach Project***. Students developed more than 50 courses during Spring 2005. Recent mini-courses have included "Crystals, Slime and Nanofabrication: Size and Shape in Chemistry and Biology" and "Acting Up: Slavery and Social Activism in New York and Beyond."
 - ***Encouraging Young Engineering Students*** (EYES) was founded by an undergraduate engineering student at Cornell University in 1997. Since then, it has grown into a national service organization that helps to develop elementary, middle and high school students' math and science skills. In the program, undergraduate engineering majors work in teams to design innovative lessons for math and science teachers. In the spring of 2006, students developed five projects, including a three-day program for middle and high school students in which they

extracted DNA from an onion via a series of chemical reactions, learning about DNA and bioengineering in the process.

- Through the ***Faculty Fellows-in-Service (FFIS)*** program, the Public Service Center encourages Cornell faculty to develop service-learning courses and civic projects. Each year, the FFIS program awards an average of 15 grants up to \$2,000 to interested faculty members with a project that could have community impact—either in Tompkins County, elsewhere in the state or outside the state.
- Tompkins County-based public agencies and not-for-profits that provide human services are eligible to access many of Cornell University's information technology resources—including Internet, email, and library services—for only \$5 per month. The ***Community Internet Connection Program*** is jointly sponsored by the Public Service Center and Cornell Information Technologies. More than 20 agencies and non-profits use the service.
- Emerging community leaders who reside in Broome, Cayuga, Chemung, Cortland, Seneca, Schuyler, Tioga or Tompkins County have an opportunity to apply for ***Civic Leaders Fellowship***. The program awards two \$5,000 stipends each year to community members who have demonstrated leadership in the past and want to address topics of community value. Past fellows have undertaken projects that:
 - Investigated providing transitional housing to Rochester residents with mental or physical disabilities and those in drug or alcohol recovery programs; and
 - Engaged young men in Ithaca High School in topics ranging from drug and alcohol use to racism to family problems.

The program is sponsored by PSC, the Department of City and Regional Planning, the Community and Rural Development Institute, and the Cornell Participatory Action Research Network.

- Ithaca's ***Sciencenter***, a hands-on science museum, got a boost from two Cornell engineering students and the Cornell Public Service Center. The students received a grant from PSC to work with the Sciencenter's exhibits team to design, prototype and build a five-hole putting green for preschool-aged children as part of the science-themed Galaxy Golf attraction. The expanded putting green opened in May 2006. The students estimate they spent 600 hours working on the project.
- Each year, Cornell students can apply for community partnership grants worth up to \$2,000 to fund service projects they jointly develop with one or more community agencies. The ***Community Partnership Board***, a student-run organization, awards the grants. Since 1991, the Community Partnership Board has awarded more than \$100,000 to fund innovative student-community service projects.

Enhancing Ithaca's quality of life

Increasingly, knowledge workers are looking for more than a great job—they are seeking out places that offer stimulating intellectual and cultural activities. Cornell University organizes, sponsors, and attracts participants in major cultural events—lectures, theatrical and musical performances, art exhibits, and more.

Here is a short sampling of amenities Cornell offers to the community:

- More than 100,000 people visit ***Cornell Plantations*** every year. Its 3,500 acres include natural areas, a 150-acre arboretum, and 14 botanical garden collections. Visitors can attend special events or simply amble through miles of pathways.
- Cornell's ***Lab of Ornithology*** is a leading North American bird research facility. The Lab's staff conduct research that involves people around the world who photograph, record and annotate birds. The Macaulay Library of Natural Sounds collects thousands of animal sounds and video and makes them available to the public.
- Cornell's ***Herbert F. Johnson Museum of Art*** is home to 30,000 works of art. The museum houses noteworthy collections of American and Asian art, drawings and photography; and regularly stages exhibitions of both classical and contemporary art.
- Students in Cornell's Department of Theatre, Film and Dance put on six main stage theatre and dance performances each year in the Schwartz Center for the Performing Arts' largest auditorium, the Kiplinger Theatre.
- Cornell offers Ithaca-area residents a number of opportunities to see performances of live music. The University's musical ensembles range from large groups such as the 100-member Cornell University Chorale and 90-member Cornell Symphony Orchestra to a range of smaller jazz ensembles and student-led music groups. The largest performance space on campus, Bailey Hall, seats about 1,350.

Community development

Cornell, its faculty and staff also work closely with public agencies and community organizations to strengthen the local economy. For example:

- Cornell University has partnered with the Ithaca-Tompkins County Airport to ensure continuous, competitive air services to the region. This is critical in maintaining Ithaca's link to New York City, Philadelphia and beyond.

- Cornell's investment in Seneca Place—a major mixed-used development that opened in 2005—has contributed to the vitality of downtown Ithaca. The 175,000 square foot development includes a 104-room hotel and about 30,000 square feet of retail space. When fully occupied, more than 500 people will work in the development, including 300 Cornell University employees.

A force for growth

In an era when upstate New York has faced some serious challenges, Cornell-Ithaca has been a force for growth. It ranks among Central New York's largest employers—one that has added more than 1,000 jobs since 2000. Its purchases of goods and services, its investments in new facilities, and spending by students and visitors support thousands of additional jobs in Tompkins County and elsewhere in Central New York.

As noted elsewhere in this report, Cornell-Ithaca is also a leading provider of the new ideas and talented workers so essential to the vitality of New York's economy; and a seedbed for the creation and growth of new businesses. In the years ahead, the University's Ithaca-based colleges will continue to be an important source of growth, especially for Central New York.

The next part of this report focuses on the University's other major campus—that of Weill Cornell—and its impact on New York City's economy.

Part Six: The Impact of Weill Cornell

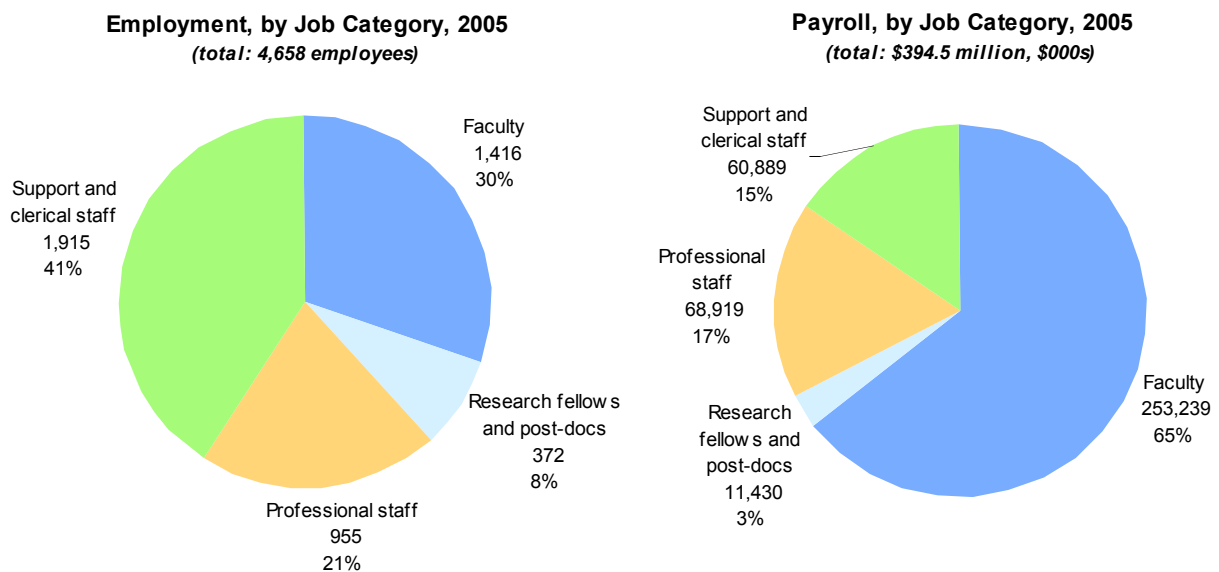
Like Cornell University as a whole, Weill Cornell Medical College and the Weill Cornell Graduate School of Medicine contribute to the vitality of New York's economy in two broad ways:

- As an enterprise that employs thousands of workers, spends hundreds of millions each year in purchases of goods and services from New York State and New York City vendors and on construction of facilities, and generates state and city taxes and fees.
- As an institution that educates future physicians and biomedical researchers, conducts basic and translational research in the life sciences, develops new technologies—including diagnostics, pharmaceuticals, and devices that can develop into New York State businesses—and provides health care services to New Yorkers.

Weill Cornell as an employer

In the spring of 2005, Weill Cornell had 4,658 permanent, non-student employees—of whom 94 percent worked full-time—and 304 temporary employees. As Figure 32 shows, 30 percent of all permanent non-student employees were faculty members—8 percent were research and post-doctoral fellows, 21 percent were other professional and administrative staff, and 41 percent were clerical and support staff.

Figure 32: Weill Cornell Permanent Employment and Payroll, by Job Category, 2005



(Source: Cornell University)

In addition to these regular employees, 441 students also worked at Weill Cornell in the spring of 2005.

In 2005, Weill Cornell paid wages and salaries totaling \$394.5 million to its permanent non-student employees, and more than \$13 million to student workers and other temporary employees. Excluded from this analysis is another \$58.3 million in compensation paid to faculty and support staff at the New York Presbyterian Hospital and compensation paid to faculty and staff based in Qatar.

Nearly 72 percent of Weill Cornell employees in 2005 lived in New York City. About 14 percent lived in New York's suburban counties or elsewhere in New York State, and 14 percent lived in other states (primarily New Jersey and Connecticut).

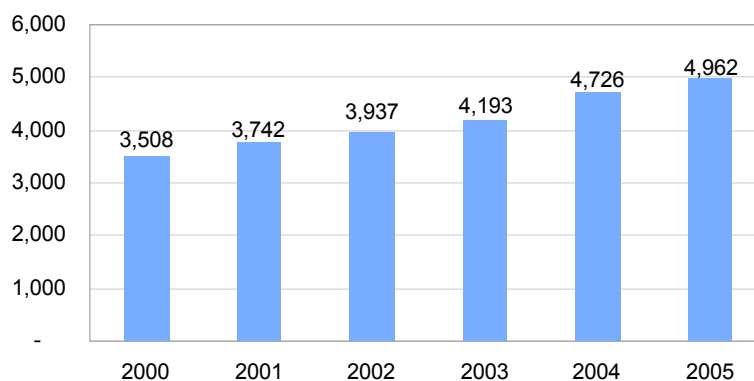
Table 27: Weill Cornell Permanent Full- and Part-Time Employees, by Employee Residence, 2005

<i>Location</i>	<i>FT</i>	<i>PT</i>	<i>Total</i>	<i>Percent</i>
New York City	3,146	190	3,336	71.6 %
NYC Suburban Counties ²⁸	562	52	614	13.2 %
Rest of New York State	56	4	60	1.3 %
New York State Subtotal	3,764	246	4,010	86.1 %
Outside New York State	622	26	648	13.9 %
Total	4,386	272	4,658	100.0 %

(Source: Cornell University)

Since 2000, Weill Cornell has been among the fastest growing of New York City's major employers, adding more than 1,700 jobs. Total employment at Weill Cornell grew by more than 41 percent between 2000 and 2005 (see Figure 33).

Figure 33: Weill Cornell Total Employment, 2000-2005



(Source: Cornell University)

²⁸ For the purpose of this analysis, we consider Nassau, Suffolk, Westchester, Putnam, and Rockland Counties as the NYC suburban counties. We exclude counties in New Jersey and Connecticut.

Weill Cornell purchasing

As Figure 34 shows, Weill Cornell spent about \$318.9 million on purchases of goods and services. Of this total, \$118.3 million (37 percent) was paid to New York City vendors; and about \$34 million (11 percent) to vendors located elsewhere in New York State.

Figure 34: Weill Cornell Purchasing, by Location of Vendor, 2005

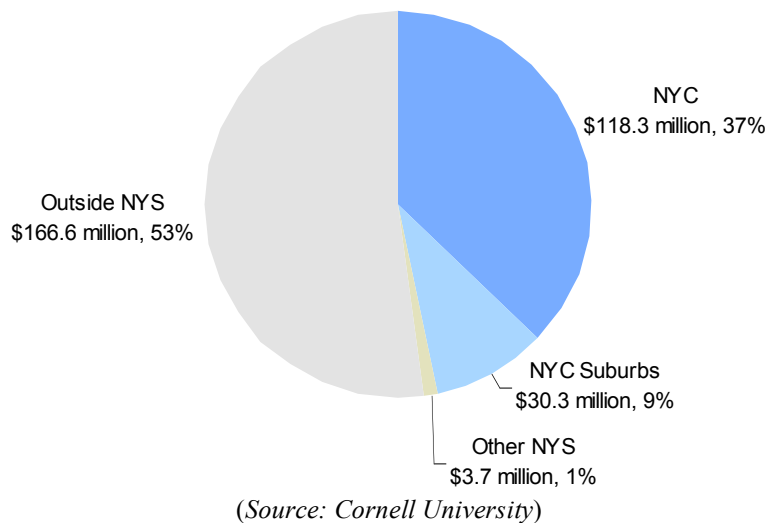


Table 28 lists the top categories of goods and services purchased from New York City vendors during 2005.

Table 28: Major Categories of Goods and Services Purchased from New York City Vendors, 2005

<i>Purchasing Category</i>	<i>Amount (\$)</i>
Rent	23,738,358
Misc. professional services	18,329,192
Insurance	15,247,130
Business support services	11,348,883
Laboratory supplies and equipment	9,448,604
Employment services	9,215,187
Facilities support services	7,786,599
Veterinary services	5,143,993
Travel arrangements	4,330,562
Computer-related services	2,518,502
Office supplies	2,505,668
Power generation and supply	2,442,773
Scientific R&D services	2,012,857
Telecommunications	1,255,496

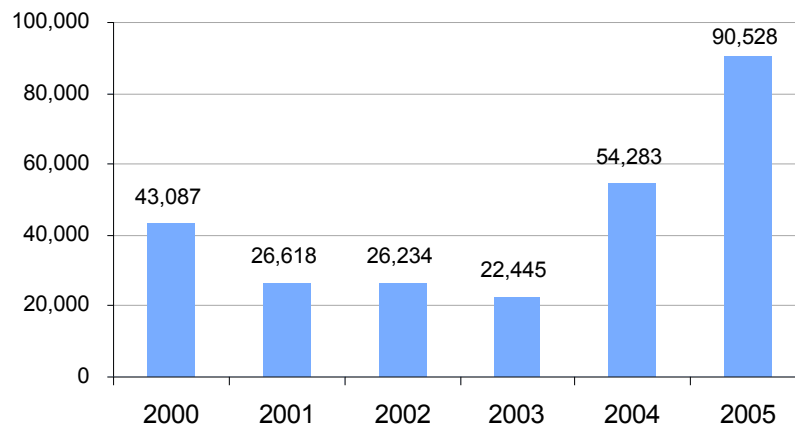
(Source: Cornell University, Appleseed)

We estimate that in 2005 spending by Weill Cornell on purchases of goods and services from New York City vendors directly supported 849 full-time-equivalent jobs within New York City. Purchases from New York State businesses (including those in New York City) directly supported 1,092 FTE jobs throughout the state.

Construction at Weill Cornell

During fiscal year 2005, Weill Cornell spent \$90.5 million on construction and renovation of facilities. Virtually all of that was paid to contractors based in New York City and its suburbs. As Figure 35 shows, construction spending has more than doubled since 2000.

Figure 35: Weill Cornell Construction Spending, 2000-2005



(Source: Cornell University)

In 2005, we estimate that construction spending at Weill Cornell directly supported 631 full-time-equivalent jobs in New York City in construction and related industries, and 914 in construction and related industries statewide (including the city).

Major construction projects recently completed or under way are highlighted below:

- The largest project at Weill Cornell is the ***Ambulatory Care and Medical Education Building***. This 338,000 square foot building will give the Medical College room to expand its clinical services. The 12-story building is expected to cost \$125 million and will be complete in 2007.
- Renovations on the 9,000-square foot ***Greenberg Molecular Cardiology Lab*** were completed in December 2005. The renovation added two new wet laboratories, a computer lab, and tissue culture rooms.

- **Lasdon House**, a 250,000-square foot residence hall for medical and graduate students and postdoctoral researchers, underwent a major interior renovation starting in 2004. The project was completed in 2006.

Weill Cornell is preparing to make even larger investments in physical capital during the next five years. Future construction projects include:

- A three-floor, 14,000 square foot addition to the **E Building**. The project will create new office and laboratory space at the Medical College, helping to expand neurology, animal laboratory facilities, pharmacology, pediatrics and dermatology. The project is expected to be completed in 2007.

Table 29 shows Weill Cornell's projected spending on construction through 2010.

Table 29: Projected Construction Spending, by Weill Cornell, 2006-2010

FY	\$ (millions)
2006	48,000
2007	214,621
2008	186,428
2009	184,476
2010	294,894

(Source: Cornell University)

Affordable Housing for Medical Students, Researchers and their Families

In New York City, affordable living space can be hard to find—particularly for medical students, graduate students and post-doctoral researchers. Weill Cornell, together with its medical partners, Memorial Sloan-Kettering and Rockefeller University, has leased space in several buildings being developed in the Southtown section of Roosevelt Island.

The most recent building to open is **Riverwalk Place**. The residential building features 88 units—primarily studios and one-bedrooms with a handful of two-bedroom apartments. The complex allows medical students and their families to live within 15 to 20 minutes of the hospital complex at relatively affordable rates.

Measuring the multiplier effect

As with Cornell's Ithaca-based colleges, the economic impact of Weill Cornell's spending on payroll, purchasing and construction is not limited to direct employment by the University itself, its vendors and construction contractors. It also includes the impact of spending within New York City and elsewhere in New York State by Weill Cornell employees and by its vendors and contractors.

As discussed above, Weill Cornell employed 4,962 people (excluding students) in New York City in fiscal year 2005, with total payroll of approximately \$408 million. Of all those who worked at Weill Cornell, 3,567 were New York City residents, to whom the University paid a total of \$264 million in wages and salaries. An additional 1,395 lived elsewhere in New York State, with wages and salaries totaling \$144 million.

In 2005 Weill Cornell also spent \$208 million on purchases of goods and services from New York City businesses (including construction contractors), and an additional \$35 million on purchases from suppliers and contractors located elsewhere in New York State. Using the IMPLAN input-output modeling system, we estimate that in 2005 Weill Cornell's spending on goods and services and construction directly supported 1,480 full-time-equivalent jobs with New York City companies, and 2,005 jobs with companies throughout New York State (including New York City).

Household spending by Weill Cornell employees living in New York City accounted for \$230 million in economic activity and 1,245 jobs in the city; Statewide, spending by Weill Cornell employees living in New York State generated \$340 million in economic activity and 2,170 jobs.

Similarly, spending within New York City by Weill Cornell's vendors and contractors (and their employees) generated \$120 million in economic activity and 860 FTE jobs. Spending within New York State by Weill Cornell vendors and contractors generated \$190 million in statewide economic activity and 1,475 FTE jobs.

Table 30: Summary of Weill Cornell Economic Impact

	<i>Direct University spending</i>		<i>Indirect and induced impact of spending by employers, vendors and contractors</i>		<i>Total impact</i>
	<i>Payroll</i>	<i>Purchasing/Construction</i>	<i>Impact of employee spending</i>	<i>Impact of vendor and contractor spending</i>	
New York City	\$408 m	\$208 m	\$230 m	\$120 m	\$966 m
	4,962 jobs	1,480 FTE	1,245 FTE	860 FTE	8,547 FTE
New York State (includes NYC)	\$408 m	\$243 m	\$340 m	\$190 m	\$1,181 m
	4,962 jobs	2,005 FTE	2,170 FTE	1,475 FTE	10,612 FTE

(Source: Cornell University, Appleseed)

State and City taxes

Despite Weill Cornell's tax-exempt status, the College's operations generate substantial tax revenues for state and city governments, both directly and indirectly.

During 2005, Weill Cornell withheld \$20 million in state income taxes. Taking into account state sales taxes and other taxes paid by its employees, taxes paid by Weill Cornell's vendors and contractors, and taxes derived from the additional economic activity generated by Weill Cornell's spending through the multiplier effect, we estimate that Weill Cornell indirectly accounted for an additional \$18 million in state tax revenues.

These tax impacts are summarized below in Table 31.

Table 31: Weill Cornell Payments to New York State

Type of Tax	\$ (000s)
Taxes paid by or on behalf of University employees	
• Personal income taxes	\$ 20,089
• Sales and use taxes	\$ 3,642
Taxes paid by vendors, contractors and their employees	\$ 6,381
Taxes generated through the multiplier effect	\$ 7,734
Total State tax revenues	\$ 37,846

(Source: Cornell University, Appleseed)

At the local level, Weill Cornell withheld on behalf of its employees a total of \$9.3 million in city income taxes. Weill Cornell also paid about \$185,400 in direct taxes on property that is used for non-exempt purposes, and \$141,500 on the property tax portion of rents paid on property that it leases during 2005. In addition, Weill Cornell paid about \$335,500 to the New York City Water Board for water and sewer services during 2005.

Table 32 summarizes Weill Cornell's payments of fees and taxes to New York City.

Table 32: Weill Cornell Payments to New York City Government, 2005

Type of Payment	Payment
Income tax withholding	\$ 9,286,994
Real property taxes	\$ 326,877
Water and sewer fees	\$ 335,503
Total direct payments	\$ 9,949,374

(Source: Cornell University)

In addition to the income taxes withheld from their salaries, employees of Weill Cornell pay other New York City taxes and fees, including sales and real property taxes, and water and sewer fees. New York City-based businesses from which Weill Cornell buys goods and services (including construction), as well as their employees, pay city taxes; and the economic activity that Weill Cornell generates in New York City through the multiplier effect also generates local taxes. We estimate that in 2005, Weill Cornell's operations indirectly generated \$32.7 million in City revenues.

Table 33: New York City revenues indirectly attributable to Weill Cornell

Type of Tax or Fee	\$ (000s)
Taxes paid by University employees	
• Property taxes	\$9,400
• Sales and use taxes	\$3,975
• Water and sewer fees	\$1,975
Taxes paid by vendors, contractors and their employees	\$5,405
Taxes generated through the multiplier effect	\$11,970
Total City tax revenues	\$32,725

(Source: Cornell University, Appleseed)

Contributing to New York's health – and its communities

Along with education and research (discussed in Parts Two and Three of the report), patient care is the third major element of Weill Cornell's three-part mission. Clinical services at Weill Cornell are delivered primarily through Weill Cornell Physicians—an organization comprised of approximately 700 members of the College's clinical faculty, who are also attending physicians at New York- Presbyterian Hospital.

Weill Cornell Physicians include both primary care physicians and specialists in virtually every field of medicine. Areas of notable strength include reproductive health and fertility, geriatric medicine, and treatment of HIV/AIDS. In 2005, Weill Cornell physicians saw nearly 270,000 patients, and generated nearly \$341 million in revenues.

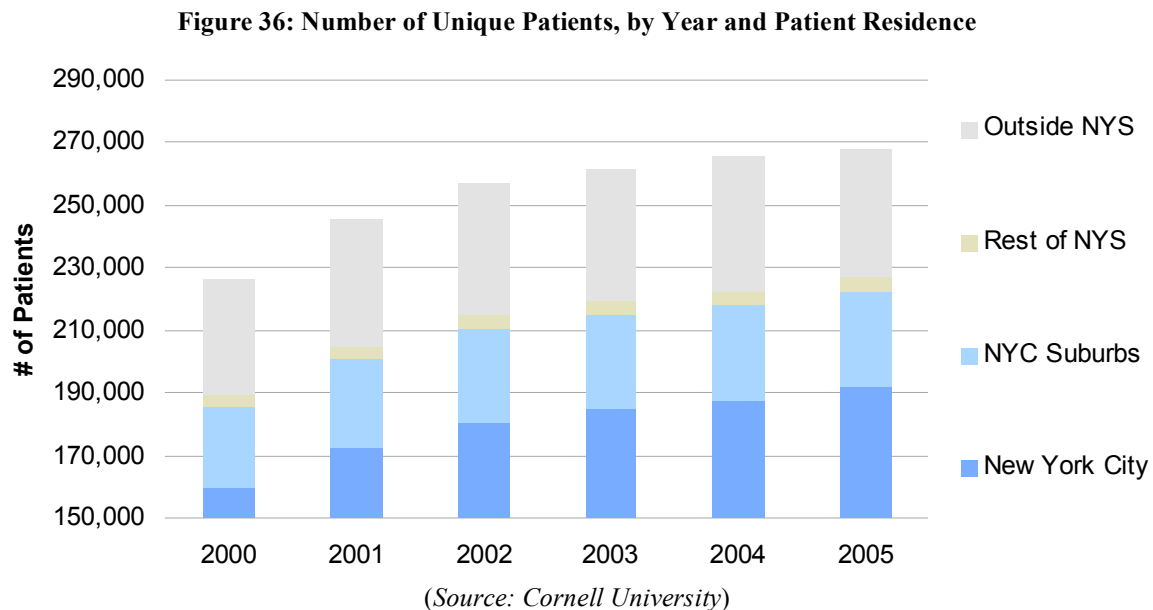
Partners in clinical care, medical training and research

Weill Cornell actively participates in collaborative programs with its neighboring institutions. The “Four Corner” cohort relationship with The New York-Presbyterian Hospital (NYPH), Memorial-Sloan Kettering Cancer Center, Rockefeller University and The Hospital for Special Surgery fosters internationally recognized joint programs in graduate and medical education, biomedical research and clinical care.

The primary clinical affiliation with NYPH significantly extends the scope of economic influence exerted by Weill Cornell. Weill Cornell faculty play a major role in attracting patients to the main medical center and to satellite facilities distributed throughout the metropolitan area. In addition, Weill Cornell faculty administer the hospital residency programs that act as a magnet for recruiting the most promising new physicians to the area. The most recent ranking of hospitals by *US News & World Report* lists NYPH first in New York State and sixth in the nation.

NYPH, including its extended network, represents a multi-site collection of facilities with more than 2,300 beds and more than one million outpatient visits per year. The hospital generated revenue of \$2.6 billion in 2005. The NYPH workforce includes more than 15,000 employees, with aggregate 2005 earnings of more than \$1.1 billion.

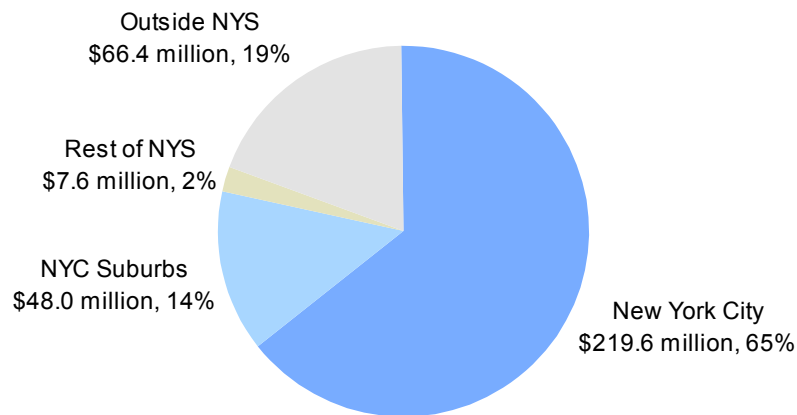
As Figure 36 shows, the number of patients served by Weill Cornell Physicians grew by 17 percent between 2000 and 2005.



While most of the Weill Cornell Physicians' patient care revenues (65 percent) are derived from services to New York City residents, Weill Cornell also brings in patients

from the surrounding suburbs and from other states as well. In 2005, 16 percent of all patient revenues came to Weill Cornell from elsewhere in New York State, and 19 percent from outside New York State.

Figure 37: Patient Revenues by Patient Residence, 2005
(total: \$341.67 million)



(Source: Cornell University)

The \$122 million in patient revenues that Weill Cornell derives from services to non-New York City residents highlights the fact that—while health care is still primarily a local service—some more specialized types of care are “traded” over a much wider area. From New York City’s perspective, Weill Cornell’s clinical services are simultaneously:

- A high-quality local service—one that makes New York City an attractive place to live and work; and
- Part of the City’s health care “export” sector—generating jobs and income for New Yorkers by providing specialized services to people who come to Weill Cornell from elsewhere in the region and the nation (and in some cases from other countries).

Weill Cornell is active in collaborative programs elsewhere in the United States. In 2004, Weill Cornell and The New York-Presbyterian Hospital established a partnership with the Methodist Hospital in Houston that has resulted in collaborative administration of clinical residency programs.

As an academic health center in a major urban area, Weill Cornell offers a number of outreach programs to city residents and others. Some are designed to increase education opportunity while others help to improve the health of the city's residents. We list just a few of these programs and activities below.

- Weill Cornell offers several programs that are designed to encourage underrepresented minority and disadvantaged students to consider careers in science and medicine. These include the *Travelers Summer Research Fellowship Program*,

a summer program in which 25 underrepresented minority premedical students experience medical school life through laboratory or clinical research experience, classroom lectures and seminars, and observations of patient care.

The *Gateways to the Laboratory* summer program is for college freshmen and sophomores who are considering MD-PhD training. The program is jointly offered by Weill Cornell, Memorial Sloan-Kettering, and Rockefeller University. Each summer about twelve students participate in the program.

Weill Cornell in Qatar: “Exporting” American Medical Education

Like many other industries once viewed as being primarily local in nature, both higher education and health care are becoming global businesses. Weill Cornell set a new standard in this regard in 2004, with the opening of Weill Cornell in Qatar.

Located in Doha, the capital of the Persian Gulf emirate, Weill-Qatar is the first full-scale “branch campus” of an American medical school to be established outside the U.S. Its facilities were built by, and are managed by, the Qatar Foundation, but its academic program operates as an integral part of Weill Cornell, and like all Cornell programs, is ultimately controlled by the University’s board of trustees. Weill-Qatar’s program includes a two-year pre-med sequence and a complete four-year MD program. All courses are taught by Cornell faculty, and the Doha MD program’s academic content and standards are the same as Weill Cornell’s in New York.

Like that of Weill Cornell in New York, Weill-Qatar’s mission encompasses education, research and patient care. The Qatar Foundation is currently building a 350-bed specialty teaching hospital on a site near the Medical College; it will function as Weill-Qatar’s principal teaching hospital.

Weill Cornell in Qatar is providing young people in the Middle East with a unique opportunity to pursue a world-class education in science and medicine within their own region. At the same time, it has created an opportunity for New Yorkers to build close working relationships with a growing country in one of the world’s most important regions. And it is providing an innovative example of how an American educational institution can, in effect, increase the return it realizes on its intellectual and human capital.

- Weill Cornell students provide a range of services at homeless shelters, churches and other organizations. For example, twice each week, five Weill Cornell students visit the Neighborhood Coalition for Shelter homeless shelter in Manhattan. They provide physical exams and, if necessary, referrals to residents of the shelter. They also provide health care information and advice ranging from hygiene and nutrition to practicing safe sex.

Weill Cornell's faculty and students participate in health fairs on the Upper East Side, including the Lenox Hill Neighborhood House's Annual Health Fair, as well as health fairs in Long Island City and Western Queens. Each fair serves several hundred people per day.

- The ***Irving Wright Center for Aging*** offers a number of programs to elderly City residents, including the *House Calls* program, in which Weill Cornell students and faculty visit home bound elderly to provide health care services.
- The ***Iris Cantor Women's Health Center***, a comprehensive medical facility dedicated to women's health issues, offers seminars and presentations on various health and wellness topics relevant to women through its health education and resource center.

A healthy economy

Weill Cornell's growth during the past five years has helped to reinforce New York City's role as a world leader in biomedical research and education, and in the delivery of high-quality health services. In doing so, it has enhanced both the health of the city's residents, and the health of its economy.

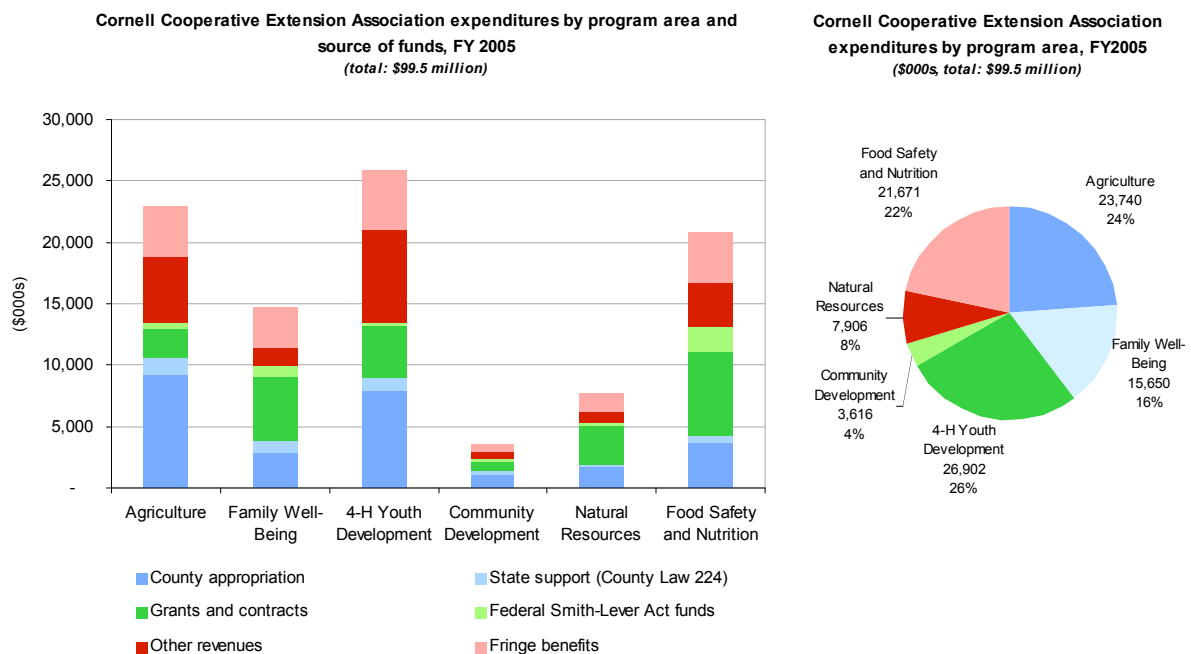
Part Seven: Cornell Cooperative Extension

As New York's land grant university, Cornell has a particular responsibility not only for the creation of useful knowledge, but for helping communities, families and individuals throughout New York State use that knowledge effectively. The principal vehicle through which the University fulfills this aspect of its mission is ***Cornell Cooperative Extension***.

Cornell Cooperative Extension's history dates back to 1914, when the federal government established a network of Cooperative Extension programs throughout the country to help connect the research conducted at land grant universities with each state's farmers. Although the mission of Cornell Cooperative Extension (CCE) remains the same as was in 1914—to apply university knowledge and resources to address community need—the needs of New York's communities have changed. Cornell Cooperative Extension's 55 county associations and its New York City offices each connect university research to the diverse needs of their local communities.

Cornell Cooperative Extension's programs are funded from a variety of sources, including federal (and other) grants, state aid, county aid, Cornell University, and program fees. Of total revenues of about \$78 million in 2005, \$12 million came from non-state and non-county grants and contracts—including the federal government and foundations. Another \$10.3 million came from the programs themselves in the form of fees and other service charges.

Figure 38: Cornell Cooperative Extension Association Expenditures by Program Area and Source of Funds, 2005



(Source: Cornell University)

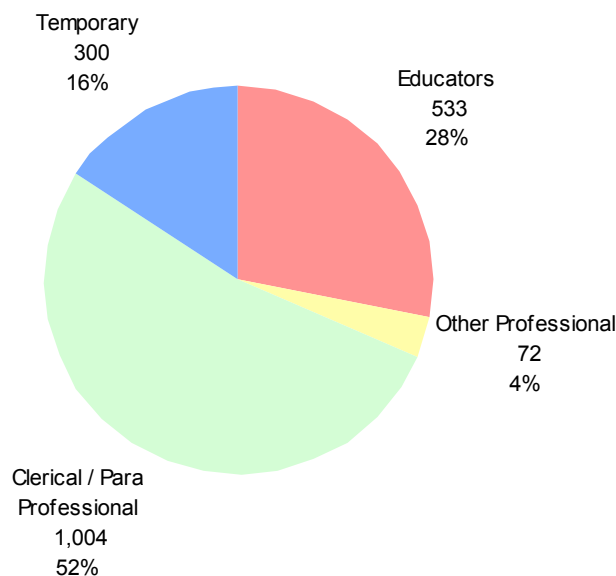
The amount of support provided at the local level varies widely from county to county. During 2005, for example, county government provided only 10 percent of all revenues received by Cornell Cooperative Extension of Chemung County, while Orange County covered about 72 percent of its local extension association's costs. Figure 38 shows the Cornell Cooperative Extension Association expenditures by program area along with the source of funds.

Statewide Impact of CCE Employment and Purchasing

Like Cornell University's Ithaca-based programs and Weill Cornell, Cornell Cooperative Extension has an impact on New York State as an enterprise in its own right, employing more than 1,900 workers (1,498 full-time equivalents) throughout the state in 2005.²⁹

Cornell Cooperative Extension employees in 2005 included 533 educators who delivered training and other services, 72 other professional and administrative staff, more than 1,000 clerical and para-professional staff who provide support services, and 300 temporary employees. The distribution of jobs across these categories is shown in Figure 39 and Table 34.

Figure 39: Cornell Cooperative Extension Association Employees, by Job Category, 2005



(Source: Cornell University)

²⁹ This includes the 69 employees (58 FTEs) in the New York City office, but not the 51 employees in Ithaca who provide administrative support to all county Associations or the 94 program employees around the State that includes SeaGrant, integrated pest management, and other area specialists. The New York City- and Ithaca-based employees have already been counted in the Cornell-Ithaca economic impact.

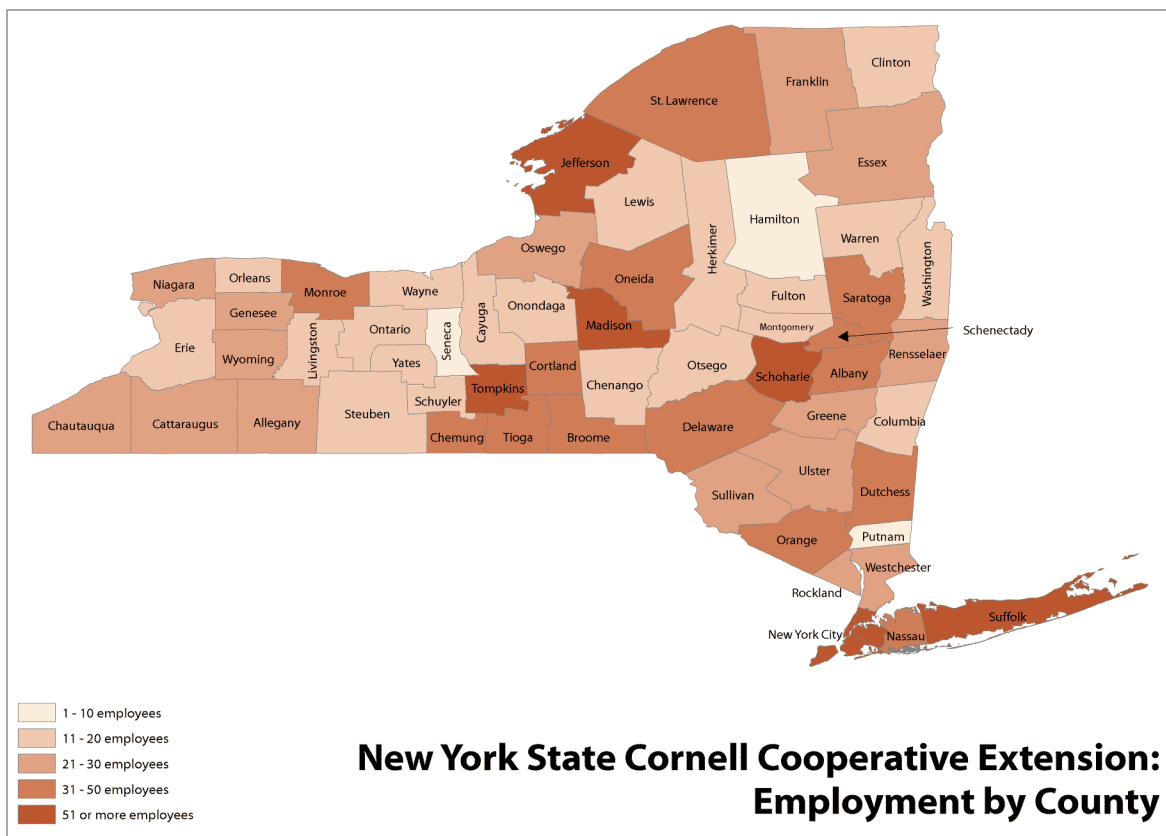
Table 34: CCE Employment, Payroll, and Earnings per FTE Employee, by Job Category, 2005

Job category	Employees	Total payroll (\$000s)	Average earnings per FTE
Educators	533	\$ 19,419	\$ 39,811
Other professionals	72	2,364	36,189
Clerical/paraprofessional and camp staff	1,004	16,950	21,758
Temporary staff	300	1,757	16,289
Total	1,909	40,490	

(Source: Cornell University, Appleseed)

Cornell Cooperative Extension Associations provide resources to every New York State county as well as New York City. Figure 40 shows a map of the distribution of Cornell Cooperative Extension employment around the state.

Figure 40: Map of Cornell Cooperative Extension Association Employment, 2005



(Source: Cornell University)

The Cornell Cooperative Extension Associations are also purchasers of goods and services from New York State vendors. During 2005, all Cooperative Extension Associations spent about \$31.9 million on purchases of goods and services from New

York State businesses. These purchases included everything from the lease of buildings to educational materials, office supplies, and meeting space for conferences and workshops.

Economic impact of Cornell Cooperative Extension on New York State

As discussed above Cornell Cooperative Extension employed more than 1,900 people in New York State (1,440 full-time equivalents) in 2005, with a total payroll of \$40.5 million.

CCE Associations spent about \$31.9 million on purchases of goods and services from New York State businesses, accounting for 312 FTE jobs at those businesses. We estimate that spending by *those* businesses and their employees accounted for an additional 168 FTE jobs in the state and \$22.3 million of economic activity.

We estimate that CCE employees spent about \$32.7 million on purchases of goods and services—housing, food, utilities, transportation, etc.—from businesses in New York State, and that this spending directly supported 196 FTE jobs. We further estimate that spending by these businesses and their employees generated an additional 113 FTE jobs and \$15.2 million in economic activity in the state.

In total, taking into account CCE's employment, purchasing and employee spending—and the employment and spending of the New York State businesses with which CCE and its employees do business—we estimate that CCE directly and indirectly accounted for 2,229 FTE jobs in New York State and \$143 million in economic activity.

Table 35 summarizes Cornell Cooperative Extension's economic impact on New York State in 2005.³⁰

Table 35: Economic Impact of Cornell Cooperative Extension on New York State, 2005

<i>Direct spending</i>		<i>Indirect and induced impact of spending by employers, vendors and contractors</i>		<i>Total impact</i>
<i>Payroll</i>	<i>Purchasing</i>	<i>Impact of employee spending</i>	<i>Impact of vendor and contractor spending</i>	
\$41 M	\$32 M	\$48 M	\$22 M	\$143 M
1,440 FTE	312 FTE	309 FTE	168 FTE	2,229 FTE

(Source: Cornell University)

Measuring Cornell Cooperative Extension's value in terms of in-state spending and job creation underestimates the value of CCE to New York State in the education of children and adults, promoting the health and well-being of families and individuals, developing

³⁰ The New York State-level economic impact statement does not include the impact of New York City's Extension Association. It was already included in the analysis completed in Part One.

economically and environmentally sustainable agricultural practices, and developing communities that are attractive places to live and work. The rest of this section provides examples of the impacts of a sampling of CCE's programs around the state.

Cornell Cooperative Extension program areas

Cornell Cooperative Extension provides services in six broad program areas:

- Agriculture and horticulture;
- Family well-being;
- 4-H youth development;
- Community and economic vitality;
- Environment and natural resources; and
- Nutrition, food safety and health

Because they are tailored to local needs, the program and service offerings of Cornell Cooperative Extension Associations vary widely from county to county. To illustrate the breadth and variety of local extension programs, we describe below some examples of local activities in each of the major program areas. Table 36 then presents a sampling of Cornell Cooperative Extension programs "by the numbers."

Agriculture and Horticulture

- In Orange and Ulster Counties, Extension educators held ***Dairy Herd Health Management*** workshops and seminars for more than 115 dairy farmers in 2005. The workshops helped dairy farmers improve calving procedures as well as monitor, prevent and manage disease in their cattle. Since the workshops, several of the participants have documented an increase in milk production between 3 and 4 pounds per cow per day. (Extension officials estimate that this amounts to an increase in revenue per herd of \$80-240 per day, depending on herd size).
- While Hudson Valley farmers have long been able to take advantage of the New York City market with its green markets, restaurants and specialty stores, farmers from other parts of the state have not had the same opportunities. In 2002, Jen Small and Mike Yezzi of Flying Pigs Farm in Washington County contacted Washington County Cornell Cooperative Extension about setting up a program that would help them and other local farmers access the New York City market.

The collaboration led to a grant proposal to the New York State Department of Agriculture and Markets that in turn led to a \$52,214 Food and Agriculture Industry Development grant in 2004 to create a new program called ***Farm to Chef Express***. Since 2004, more than 30 farmers in Washington, Saratoga, and Rensselaer Counties, and 20 restaurants in Manhattan and Brooklyn (and one each in Saratoga, NY and Williamstown, MA) have signed up for the Farm to Chef Express program, resulting

in the sale of more than \$240,000 worth of farm products. Chefs order produce by Monday of each week, the farmers deliver the products to a local farmer by Tuesday evening, and the products are delivered to each restaurant on Wednesday.

- 36 farmers participated in the six-county ***So You Bought the Farm...Now What?*** program, providing useful advice to new farmers in Chenango, Fulton, Herkimer, Montgomery, Otsego, and Schoharie counties. The course includes a general session on business, finance and marketing as well as sessions that address each farmer's area of interest:
 - Livestock, including beef, sheep, goat, poultry, deer, equine, and feeding/forages;
 - Fruits and vegetables;
 - Greenhouse and nursery, including bedding plants, vegetable seedlings, annuals/perennials, and trees/shrubs; and
 - Agroforestry.
- The ***Dairy & Field Crops Teams*** throughout the state help dairy farmers produce high quality forage for the healthy development of dairy cattle and develop training programs that provide dairy producers with best practices in herd management and nutrition. For example, the Central New York Team is comprised of extension specialists from Chenango, Fulton, Herkimer, Montgomery, Otsego and Schoharie Counties. With 1,000 dairy farms and more than 80,000 cows producing 1.4 billion pounds of milk annually, the six counties account for 11 percent of New York's dairy industry. The South Central New York Team serves Broome, Cortland, Tioga and Tompkins Counties. During 2005, the Farm Business Management Specialist for Tompkins County helped complete 4 dairy farm business summaries, 10 business plans and 13 economic analyses for Tompkins County farmers and entrepreneurs—work for which a private consultant could charge as much as \$3,000.

Family Well-Being

- The wars in Afghanistan and Iraq have been hard on the spouses and children of active duty soldiers. CCE of Jefferson County has been instrumental in providing support and services to families of active duty soldiers serving overseas through a variety of programs. During 2005, more than 46,600 individuals participated in Fort Drum programs administered by CCE of Jefferson County.

The ***Family Member Employment Assistance Program*** helps military family members develop job skills and find jobs in the local community. The program offered 29 career-related workshops during 2005. More than 560 people saw program staff during appointments or walk-ins and about 150 attended the program's annual Career Fair.

With support from the Sears American Dream Campaign and the National Military Family Association, CCE of Jefferson County's 4-H Camp Wabasso hosted

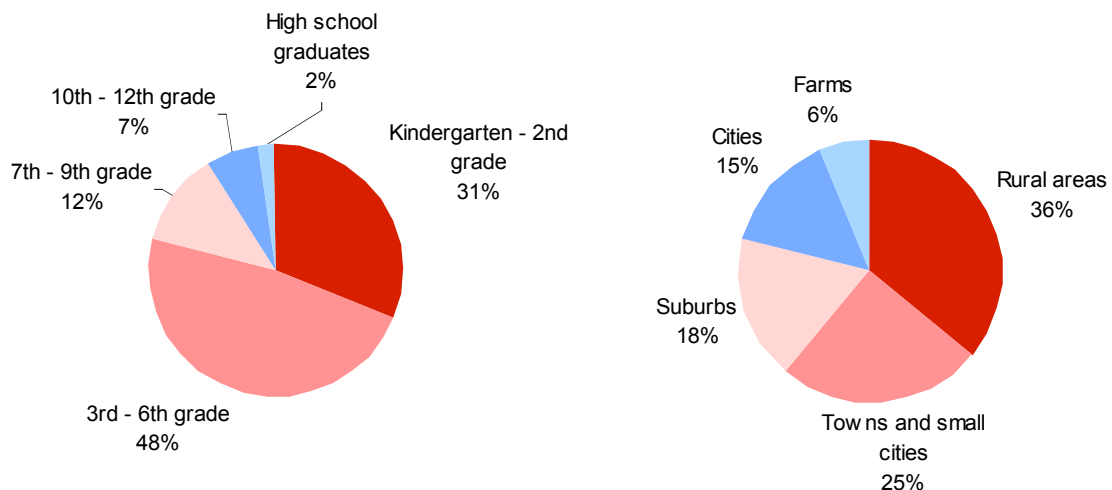
Operation: Purple, two free, week-long summer camps for children of military parents. During each of the two weeks, 100 campers took part in camp activities such as swimming, making arts and crafts, and telling stories around the campfire while learning how to deal with the unique stresses of having an active duty parent. This program is especially important to hundreds of New York State children of National Guard and Army Reserve parents who have been deployed to Iraq or Afghanistan.

- In an effort to break the cycle of poverty, the **Even Start Family Literacy** program is designed to provide literacy education to families in order to ensure children are ready to start school with support from their parents. In Herkimer County during 2005, 44 families with 80 children enrolled in the Even Start program. Among the Association's Even Start accomplishments that year:
 - 6 parents earned a high school diploma;
 - 6 parents met their goal of entering post-secondary education or job training;
 - 12 parents made gains in their literacy level; and
 - 21 children who had initially been reading at a level below their peers made significant gains.

4-H Youth Development

In 2005, New York ranked third among the 50 states in terms of enrollment in the 4-H program, with a total of 316,000 youth participating. Figure 41 presents some information on the demographics of New York's 4-H program.

Figure 41: New York State 4-H Members, by Age and Size of Community



(Source: Cornell University)

- The ***Youth-to-Youth Literacy Project*** brings Cornell students to New York City as summer interns to work with city youth on creative projects such as video production, creative writing, and producing art while emphasizing literacy training and leadership development. During 2005, 16 Cornell students and one high school student were hired. Since the program was established in 1990, hundreds of New York City youth have participated.
- Through 4-H, Cornell Cooperative Extension offers a number of after-school programs to children of working parents. CCE of Genesee County has offered several science education-themed programs. For example, 500 children and 25 teachers learned how to grow vegetables and flowers using hydroponics in one program. In another, 350 children learned how to use global positioning system devices in applications ranging from emergency response to community agriculture.

In partnership with the Spencer-Van Etten School District, CCE of Chemung County's ***Crossroads Advantage*** after-school program is available to children and youth in grades 2 through 8. Students can get help with their homework, take computer classes, or participate in a number of other recreational and social activities.

Community & Economic Vitality

- Together with Cornell Cooperative Extension Associations around the state, the ***Community and Rural Development Institute*** (CaRDI) in Ithaca has been a resource for communities looking to develop local economic development strategies, improve the vitality of their main streets, and improve the quality of life for residents.

In partnership with CaRDI, Extension educators in Erie and Ontario counties worked with residents of and officials in the Village of Hamburg, Town of Victor, and the City of Canandaigua to help identify opportunities for main street revitalization.

- As demand for trained nursing home workers has grown during the past five years, it has become difficult for Capital Region nursing homes to retain certified nurse assistants (CNAs) and other support staff. CCE of Albany County is working with seven nursing homes to help employees address issues such as childcare, finances, transportation, and housing relocation. By tackling these issues early, the Extension Association is saving the nursing homes (as well as taxpayers and residents) money: the average cost to recruit and train a CNA is estimated at \$4,000.
- CCE of Columbia and Ontario counties collaborated with the Food Venture Center in Geneva to help Clinton, NY-based Currant Company develop a black currant-based drink. The Associations and the Food Venture Center assisted in producing small batches of the drink to fine tune its flavor and also assisted the company in developing a marketing plan. The drink was released in May 2005 and by November 2005 was sold in more than 2,000 stores in 20 states.

Environment & Natural Resources

- Together with the Watershed Agricultural Council and Cornell's Department of Natural Resources, CCE of Greene County created a ***Trained Logger Certification*** program. The program provides timber harvesters with information on how to improve productivity while also managing sensitive forest resources. In the fall of 2005, the Association offered nine workshops for 84 participants.
- Shellfish levels in Long Island's bays are much lower than they have been historically. The Marine Program of CCE of Suffolk County has created the ***Southold Project in Aquaculture Training*** (SPAT) to train community volunteers to raise shellfish in captivity and then release them in local creeks and bays. Over 400 volunteers have taken part in the program, logging more than 11,000 hours in 2005. The program is a critical part of the effort to restore bay scallops to the Peconic Bay.
- The agriculture staff at CCE of Dutchess County is growing three native crops that can be used to produce ethanol: willows, rapeseed, and switchgrass. The crops are used in research conducted on the Ithaca campus to evaluate the efficiency of the crops as a potential supplement to (and possibly a replacement for) petroleum-based fuel. The crops are also incorporated into youth education programs. Local students harvest the crops, process the oils into biodiesel using several techniques, and compare their efficiencies in a "Biofuel Duel."

Agroforestry in Greene County

More than 80 percent of Greene County is covered in forest, making so-called "understory crops"—those that can grow in heavy shade beneath the tree canopy, such as mushrooms and ginseng—particularly valuable. CCE of Greene County has been working with residents who are interested in getting started growing these crops.

CCE of Greene County held a two-day conference on ginseng cultivation in 2005 that brought in 300 people. CCE was also instrumental in reversing a U.S. Fish & Wildlife Service rule that would have significantly reduced the number of American ginseng plants that could be harvested each year.

CCE of Greene County also supports a community-supported forestry program that promotes joint ownership of forest land; it provides 10-12 families with firewood and recreation opportunities.

The 150-acre tree farm at the Greene County association office is used for research, and for youth programs, including the "young naturalist" program.

- The CCE South Central New York Agriculture Team, which includes Cortland, Tioga, and Tompkins counties, has been working with landowners to develop forest crop practices that protect natural habitats while maintaining profitable production. Since 2002, the program has helped more than 100 area residents develop trial American ginseng plots, and has helped about 50 novice mushroom growers learn how to produce and market gourmet mushrooms. The Team also produced a 45-page forest crop marketing guide to help growers plant, harvest and market their crops.

Nutrition, Food Safety & Health

- ***Eat Smart New York!*** (ESNY) is a nutrition program designed to provide low-income families with resources that help them choose healthier foods, store them safely, prepare nutritional and economical meals, and better manage their food budgets. During 2005, 17,647 adults and 17,128 children and youth participated in the ESNY nutrition education programs. Evaluation of the program's participants has found that:
 - 82 percent of participants made healthier food choices;
 - 57 percent improved their food safety practices, such as storing foods properly;
 - 75 percent reported improving their ability to plan and budget meals and compare prices; and
 - 23 percent reported getting more exercise or being more physically active.
- Through two different initiatives, Cornell Cooperative Extension of Jefferson County has helped low-income residents access fresh vegetables. Due to the costs of storage and spoilage, most community food pantries do not stock fresh vegetables. Together with local agencies, educators at Cornell Cooperative Extension of Jefferson County built three gardens adjacent to food pantries and three handicap-accessible gardens on the grounds of low-income senior housing developments. As a result:
 - Food pantry clients had access to more than 250 pounds of fresh produce during the growing season as well as information on how they could grow their vegetables in their own gardens.
 - In addition to improving their nutrition, the senior housing residents cared for the gardens themselves, opening up new opportunities for social interaction and physical activity.
- Under CCE of Erie County's ***Eat Well Play Hard*** program, the Association received funding from the Buffalo Bills Association to design an educational program called ***"First and Fit."*** The program has helped encourage more than 1,200 students in nine Buffalo-area schools to eat more fruits and vegetables and become more physically active.

Table 36: Cornell Cooperative Extension by the Numbers, 2005

Description	Number
Agriculture & Horticulture	
Number of people who completed education programs to increase crop productivity.	14,766
Number of farmers in Saratoga, Washington and Rensselaer Counties that sold \$250,000 worth of products to New York City restaurants as a result of the Farm to Chef Express program.	30
Number of farmers that participated in pesticide training workshops in Cayuga and Onondaga counties. By saving money on pesticide applications, farmers in the counties could save up to \$172,000 during the year.	220
Number of grape growers and grape industry personnel who attended 28 "Coffee Pot" meetings and Integrated Pest Management discussions in Chautauqua County.	276
Number of people from Clinton, Essex, Franklin, Jefferson and Lewis counties who attended one-day or eight-week workshops called Building Your Small Farm Dream that help small farmers develop economically sustainable – and personally rewarding – farms.	34
Number of Columbia County growers and farm workers who learned apple and peach tree pruning techniques that can help to increase fruit yields. Also, as part of the Fruit Farmer Support program, 70 farm workers received training on the safe application of pesticides in order to reduce costs and comply with NYS DEC regulations.	90
Number of Fulton and Montgomery County dairy farmers who participated in hands-on workshops to improve the care of calves and of adult cows' hooves. The program has a direct impact on the quantity of milk that can be produced.	More than 30
Family Well-Being	
Number of individuals who participated in Jefferson County's Fort Drum programs, including Operation READY , a program that provides resources to families of deployed and returning soldiers.	46,663
Number of families that participated in Orange County's Relatives as Parents program, which provides training and resources to grandparents, aunts and uncles who are raising relatives' children.	240 families
Number of parents/caregivers and children who learned how to apply everyday math at home in the Second Annual Hamilton School Math Night, a service of Schenectady County's Parents Involved in Education program.	150
Number of visitors (adults and children) to the Family Resource Centers in Endicott, Hillcrest and Deposit in Broome County. The Centers offer everything from education courses for parents to "story times" and tutoring for children.	7,692
Number of low-income individuals and households in Cortland County whose income taxes were prepared and filed as part of the Volunteer Income Tax Assistance program.	53
Number of 19-21 year olds who gained employment in 2005 after taking workforce preparation as part of the WORKplus program in Broome and Tioga counties	72

Description	Number
4-H Youth Development	
Number of New York State youth, 5 to 19 years old, enrolled in 4-H in 2005. (New York State has the third highest 4-H enrollment in the U.S.)	316,000
Number of children and youth who participated in an after school science program on hydroponics sponsored by CCE of Genesee County.	500
Number of students in 27 Nassau County schools who received instruction designed to help meet New York math and science standards via two courses: Machines are simply terrific and Let's look at electricity .	3,065 students
Number of adults in Herkimer, Madison and Oneida counties who received training as part of Connecting With Kids , a program that gives youth workers resources to talk to kids about issues such as grief, divorce, drugs and gangs.	400
Number of Genesee, Monroe and Wayne County youth who gained life and career skills as part of a new tri-county 4-H Youth Development program.	15,958
Community & Economic Vitality	
Number of people around New York State who completed Cornell Cooperative Extension's community leadership development education programs.	17,913
Number of people in low-income households across the state who attended 334 Save Energy, Save Dollars and Making Ends Meet workshops to learn about ways to reduce energy costs and better manage finances.	3,072
Number of agencies and individuals that participated in professional development programs sponsored by the Delaware County Rural Healthcare Alliance , learning about charting, documentation and program evaluation.	75
Environment & Natural Resources	
Number of people who completed education programs to help protect the quality of surface and ground water supplies	32,295
Number of people who completed education programs on agricultural "best practices" designed to conserve the State's soil resources.	14,078
Number of volunteers who have received training to help monitor more than 75 miles of shoreline on the Skaneateles, Oneida, Owasco, Cayuga, Seneca and Onondaga Lakes for invasive aquatic plants as part of the Weeds Watch Out! program. Monitoring has led to the identification of three previously unknown infestations in Cayuga County.	790
Number of participants in more than 70 workshops sponsored by the Greene County Agroforestry Resource Center that help land owners, policy makers and wood products businesses learn how to manage forested land in ways that are environmentally and economically sustainable.	1,500
Nutrition, Food Safety & Health	
Number of adults and children in New York State who completed the Expanded Food and Nutrition Education Program and Eat Smart New York! nutrition education programs.	59,217

Description	Number
Number of families in Allegany & Cattaraugus counties that completed a series of lessons on nutrition, food safety and meal planning through the Healthy, Wealthy, and Wise program.	1,531 families

(Source: Cornell University)

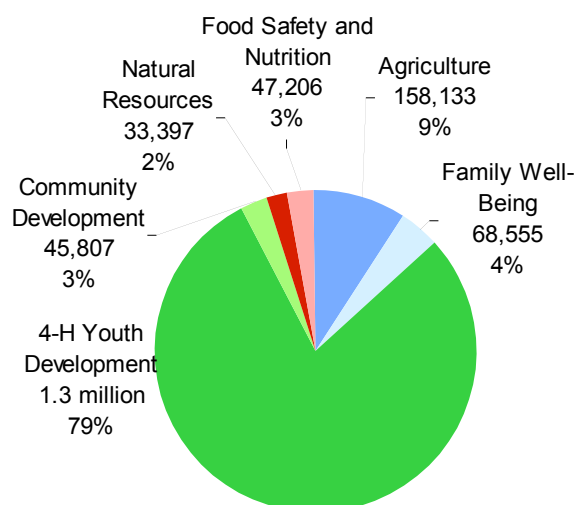
Volunteers extend Cooperative Extension's reach

In addition to its employees, more than 40,000 New Yorkers volunteered to help Cornell Cooperative Extension deliver services in communities throughout the State during 2005, contributing more than 1.7 million hours of service. Volunteer participation is especially critical to the success of some CCE programs. For example, key volunteer roles include:

- Monitoring lakes and streams for invasive species that force out native plants as part of the **Weeds Watch Out!** program;
- Educating and mentoring children and youth as part of the **4-H Youth Development** program;
- Seeding bays and streams with native shellfish raised in captivity as part of the **Southold Project in Aquaculture Training**; and
- Teaching community members how to plant and maintain their own vegetable and flower gardens as part of the **Master Gardener** program.

For the purposes of this analysis, if we assume that volunteers' time is valued at \$15 per hour, volunteers provided more than \$25 million in services to New York State residents and communities through Cornell Cooperative Extension programs.

Figure 42: Cornell Cooperative Extension Volunteer Hours by Program Area, 2005



(Source: Cornell University)

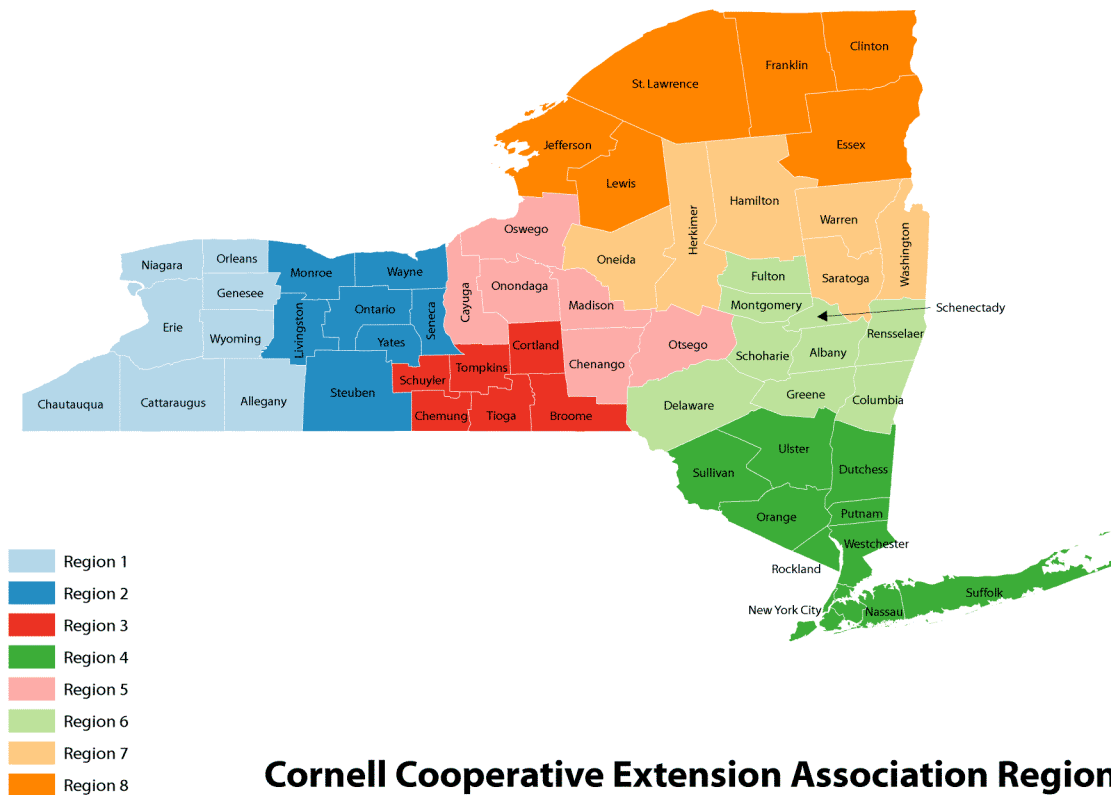
Spending on payroll and purchases of goods and services by the Cornell Cooperative Extension Associations also has a regional economic impact. Table 37 summarizes the regional economic impact of the Associations on regions throughout the State. The region definitions are shown in the map in Figure 43.

Table 37: Regional impact of Cornell Cooperative Extension Associations

EMPLOYMENT / PAYROLL					PURCHASING				TOTAL				
Jobs (FTE)		Output (\$000s)			Jobs (FTE)		Output (\$000s)		Jobs (FTE)		Output (\$000s)		
Region	Payroll	Indirect /		Direct	Indirect /		Indirect /		Indirect /		Indirect /		
		induced			induced		induced		induced				
Region 1	4,209	160	13	3,367	1,370	36	32	4,484	3,434	196	45	7,851	4,804
Region 2	3,204	105	10	2,563	986	21	25	3,446	2,684	126	35	6,009	3,670
Region 3	4,517	190	11	3,614	992	28	24	4,449	2,476	218	35	8,063	3,468
Region 4	13,709	425	33	10,712	4,139	71	84	14,172	11,854	496	117	24,884	15,994
Region 5	3,416	143	11	2,733	1,068	20	23	3,432	2,448	163	34	6,165	3,516
Region 6	5,911	211	16	4,729	1,669	34	38	6,305	4,624	245	54	11,034	6,294
Region 7	3,284	110	8	2,627	795	18	14	2,656	1,441	128	22	5,283	2,236
Region 8	3,857	154	7	3,086	666	21	18	3,814	1,821	175	25	6,900	2,487

(Source: Cornell University, Appleseed)

Figure 43: Map of Cornell Cooperative Extension Association Regions



Cornell Cooperative Extension Association Regions

(Source: Cornell University)

Building communities

If viewed as a single statewide enterprise, Cornell Cooperative Extension itself has a significant economic impact, directly and indirectly accounting for \$143 million in economic activity in 2005, and more than 2,200 full-time-equivalent jobs. Even more important than its impact as an enterprise, however, are the services it provides—helping farmers understand how to control pests more effectively while reducing what they spend on pesticides; helping property-owners in the Catskills manage their forest land more productively while also protecting the New York City watershed; helping low-income inner-city families stretch their budgets while at the same time improving the quality of the food they buy. The economic value of such services is not easy to quantify, but it is real.

Finally, beyond the value of the specific services it provides, CCE can be seen as an organization that builds “social capital,” the web of informal relationships that bind communities together. Through programs such as 4-H, Weeds Watch Out! and Operation Ready and through activities such as helping neighborhood groups develop community gardens, local extension associations are doing more than just serving individuals and families. They are helping to reinforce the sense of community and the habits of cooperative action that are essential to continued economic growth. In spirit rather than in bricks and mortar, CCE builds communities.

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Appendix A: Multiplier Effects and the IMPLAN Model

Cornell's spending on payroll; purchasing and construction – and the jobs associated with that spending – provide a direct measure of the University's impact on the economy of Tompkins County and neighboring communities, the Central New York region, New York City and New York State. The University's local, regional and statewide impacts, however, go beyond these direct measures. Each dollar the University spends produces what economists sometimes call indirect and induced effects – the “multiplier effect.”

Cornell's *indirect impact* is a product of spending by the local, regional or New York State companies from which the University buys goods and services. Construction contractors, utility companies, temp services, caterers and other firms use the payments they receive from Cornell to pay their employees, rent space, buy equipment, supplies and telephone services – and all of these expenditures have an impact on the economy. The University's *induced impact* represents the impact of routine household spending by its own employees – for rent, food, clothing, transportation and child care – and by the employees of its suppliers.

While economists generally agree that these “multiplier effects” exist, they are difficult to measure. Patterns of spending and employment among supplier firms and employee households can vary over time and from one region to another. Within any given industry, the extent to which their inputs are bought locally can vary greatly from one firm to another.

There are nevertheless several quantitative economic models that can provide an approximate measure of indirect and induced effects. Using one of these models – IMPLAN – we have calculated the impact of spending by Cornell University on total economic output, wages and employment in Tompkins County, other local counties, the Central New York region and the state. We used the same modeling system to estimate the impact of Weill-Cornell on New York City and New York State.

Like other input-output models, IMPLAN calculates the flow of payments for goods and services across different industry sectors, and between households and industries. It can be envisioned simply as a table with hundreds of rows and columns, with all industries (plus households) listed down the side as producers; and the same industries (and households) listed across the top as consumers. Spending by any consumer industry – in this case, the University – is allocated across all of the producing industries and the household sector. Each of these producer industries in turn purchases its own distinct set of inputs from other industries and households in order to produce the output it sells to Cornell.

Just as the University spends some of its resources within Tompkins County (for example) and some elsewhere, Cornell's local suppliers spend part of *their* revenues within the County, and some is paid to businesses elsewhere in New York, in other states or overseas. Through each successive round of spending, the money that was originally spent within the County is eventually diffused throughout the broader economy.

IMPLAN thus allows us to trace the impact of each dollar of University spending as it ripples through other industry sectors in Tompkins County, and to translate the allocation of spending across industries into estimates of employment and wages. And it allows us to repeat that calculation for the surrounding counties – for the Central New York region – and for New York State. The model similarly allows us to trace the impact of Weill Cornell’s spending in New York City and New York State.