September 28, 2009

ANDERSON ECONOMIC GROUP

Empowering Michigan

Third Annual Economic Impact Report of Michigan's University Research Corridor

Commissioned by Michigan's University Research Corridor

Michigan State University
University of Michigan
Wayne State University

Prepared by:

Anderson Economic Group, LLC
Caroline M. Sallee
Patrick L. Anderson

Anderson Economic Group, LLC
1555 Watertower Place, Suite 100
East Lansing, Michigan 48823
Tel: (517) 333-6984
Fax: (517) 333-7058
East Lansing | Chicago

www.AndersonEconomicGroup.com

Summary of Findings

The University Research Corridor (URC) is an alliance of Michigan's three largest academic institutions: Michigan State University, the University of Michigan, and Wayne State University. In 2007 the URC universities asked Anderson Economic Group to undertake the first comprehensive study that benchmarks the economic impact of the URC's activities on Michigan's economy. This 2009 report is the third in a series of annual reports. While many benchmarks will likely not show large changes from year to year, over time these reports will reveal trends. We present the key findings of our analysis in this section.

KEY BENCHMARKS

This report presents benchmarks using the most recent data available. We present key benchmarks in Table 1 below. We used fiscal year 2008 (July 1, 2007 to June 30, 2008) financial data to estimate the economic impact of the URC's operations on Michigan's economy in 2008. In three years, the URC's economic impact on the state's economy has grown $1.6 billion. The rankings of tech transfer activities are based on the average of the annual data for the previous five years from the date of the report. For example, the ranking for start-up companies is based on the average number of start-up companies the URC helped start between 2004-2008. A ranking of "1" indicates the university cluster with the highest tech transfer activity for that indicator. The URC performed the best in number of patent grants awarded, ranking third in this year's report—an improvement of two spots since 2007.

TABLE 1. Key Benchmarks of the URC

	2007 Report Benchmark Year (2006 data)	2008 Report (2007 data)	2009 Report (2008 data)	Change Since Benchmark Year of 2007
Operational Expenditures	$6.5 billion	$6.7 billion	$7.3 billion	+ $800 million
Fall Enrollment	133,331	135,697	133,469	+ 138 students
Net Economic Impact	$12.9 billion	$13.3 billion	$14.5 billion	+ $1.6 billion
Fiscal Impact on MI	$351.5 million	$372.0 million	$414.2 million	+ $62.7 million
Total R&D Expenditures[a]	$1.369 billion	$1.379 billion	$1.405 billion	+ $36 million
Rank Among 7 Peer University Clusters: (Rank of 1 is Best)				
No. of Start-up Companies Cultivated	5	5	4	+1 Improvement
Patent Grants Issued	5	4	3	+2 Improvement
Technology Licenses Issued	6	5	4	+2 Improvements

Analysis: Anderson Economic Group, LLC.
See remainder of report body for detailed sources and calculations.

a. Total R&D expenditures lag one year behind the rest of the data. This year's report includes 2007 expenditures by the URC universities.

URC STUDENTS

The URC had 133,469 students enrolled in the fall of 2008. The students at the URC universities are drawn from throughout Michigan and around the world. Students from the state of Michigan accounted for 77% of total enrollment in the fall of 2007, while 15% came from elsewhere in the U.S. and the remaining 8% came from

other countries or territories. The URC has students from every county in Michigan, every state, and more than 150 countries. See "URC Students and Alumni" on page 3 for our complete analysis.

SCALE OF THE URC

The URC universities collectively spent $7.3 billion on operations in FY 2008. The $7.3 billion was used to pay the salaries of 48,786 full-time-equivalent staff and faculty, purchase supplies and equipment, and maintain the physical plant. This figure—$7.3 billion—is about 2.4% of all economic activity in the state, as measured by Michigan's Gross State Product.

In 2008, there were 572,123 known alums of a URC university living in Michigan, making up 7.5% of Michigan's population over the age of 18 years. These alums earned an estimated $26.6 billion in salary and wages in 2008, or 14.2% of all wage and salary income in Michigan. See Table 2 below for the scale of the URC.

TABLE 2. Scale of the URC, FY 2008

Category	Impact
Operational Expenditures (e.g. supplies, payroll, equipment)	$7.3 billion
Full-Time-Equivalent Employees	48,786
Enrolled Students	132,826
Known Alumni Living in Michigan	572,123
Wage and Salary Earnings of URC Alumni in Michigan	$26.6 billion

Data Sources: National Center for Education Statistics, IPEDS; URC Universities
Analysis: Anderson Economic Group, LLC

ECONOMIC IMPACT

We define *net economic impact* as the additional earnings to state residents caused by the operations of these institutions. In estimating the net economic impact, we follow a careful methodology that counts expenditures only once, takes into account substitution of one activity within the state by another, and uses very conservative multipliers for indirectly-caused activity. Among other conservative assumptions, we assume most URC students would attend college even if these research institutions were not located in Michigan, and that many employees of the URC would find other jobs in Michigan even if the URC institutions left Michigan. We detail our methodology for the economic impact of the operational expenditures by URC universities in "Operational Expenditures Methodology" in Appendix B.

In FY 2008, Michigan's residents were $14.5 billion richer due to the operations of the URC universities. These new earnings to Michigan residents stem from expenditures by the URC universities on non-payroll items (such as supplies and equipment) and by employees, students, and alumni. See Table 3 on page iii.

In addition to new earnings, 69,800 jobs in Michigan were directly and indirectly supported by the URC's operations in the state in FY 2008. This jobs figure includes 10,363 faculty members and 38,423 staff directly employed by the URC universities, and 21,014 indirectly generated jobs in other industries in the state due to the expenditures by the URC universities and their faculty, staff, and students. Our complete analysis is in "Impact on Jobs and Income" on page 21.

TABLE 3. Net Economic Impact of URC, FY 2008

Impact Category	New Earnings in Michigan (millions)
Non-payroll Operating Expenditures	$2,163.3
University of Michigan Hospital Non-payroll Operating	$746.8
Faculty & Staff Wages and Benefits	$4,331.0
URC Student Expenditures	$2,051.4
Subtotal: Impact of Operations	$9,292.5
Incremental Alumni Earnings[a]	$5,195.1
TOTAL ECONOMIC IMPACT	**$14,487.6**

Source: Anderson Economic Group, LLC

a. We estimate that $4.4 billion of earnings by URC alumni living in Michigan in 2008 were additional earnings directly caused by the education they received at a URC university. See "Wage Earnings of URC Alumni Living in Michigan" on page 25.

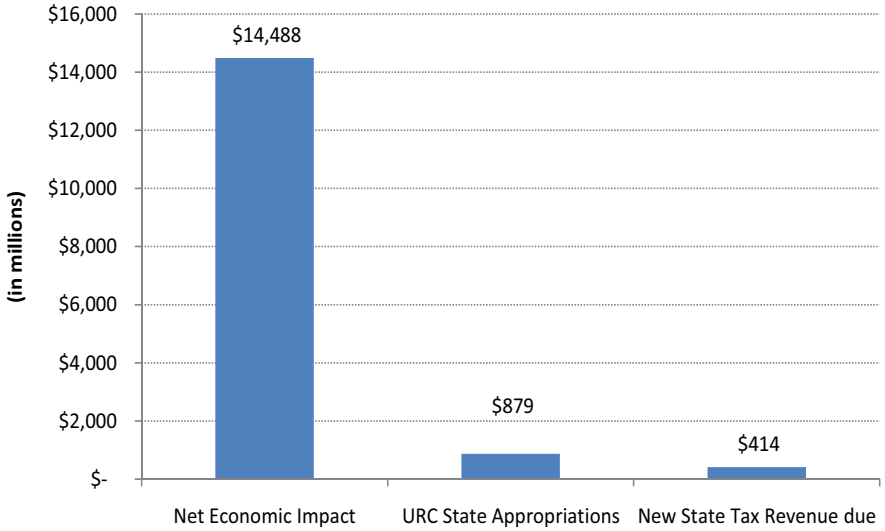
NEW STATE TAX REVENUE DUE TO URC

In 2008, we estimate that $2.6 billion in wages of URC employees and $4.4 billion of the $26.6 billion in URC alumni earnings in Michigan were caused by the URC. We estimate that the tax revenue the state received because of these earnings, that otherwise would not exist in the state, is $414.2 million, up from our estimate of $372 million in last year's report. This includes new tax revenue the state receives from personal income, sales and use, property, and gasoline taxes. Our complete analysis can be found in "Impact on State Revenue" on page 27.

COMPARISON OF ECONOMIC IMPACT WITH STATE APPROPRIATIONS

Comparing the URC's net economic impact on the state to the State of Michigan's funding of the URC universities illustrates how much greater the benefits of the URC are compared to the state's cost. The $14.5 billion in net economic impact is over 16 times greater than the state's funding for URC universities, as shown in Figure 1, "URC Net Economic Impact and New State Tax Revenue vs. State Appropriations," on page iv. Additionally, the State of Michigan receives $414.2 million in tax revenue from URC employees and alumni that it would otherwise not have received if the URC universities were not located in Michigan.

FIGURE 1. URC Net Economic Impact and New State Tax Revenue vs. State Appropriations



Sources: AEG Estimates; House Fiscal Agency
Analysis: Anderson Economic Group, LLC

COMPARISON WITH PEER UNIVERSITY CLUSTERS

To benchmark the URC against other university clusters in the nation, we selected six of the best-known groups of universities in California (North and South), Illinois, Massachusetts, North Carolina, and Pennsylvania. All of these clusters have three universities from the same state and are well known for their research and development activities. For example, the Northern California cluster includes UC San Francisco, UC Berkeley, and Stanford University; the North Carolina cluster includes Duke University, University of North Carolina at Chapel Hill, and North Carolina State; and the Massachusetts cluster includes MIT, Harvard, and Tufts. See "Peer University Clusters" on page 1 for a complete list of the comparison university clusters. We benchmark the URC to these peer university clusters on student enrollment and degree completions, research and development expenditures, and technology transfer activities.

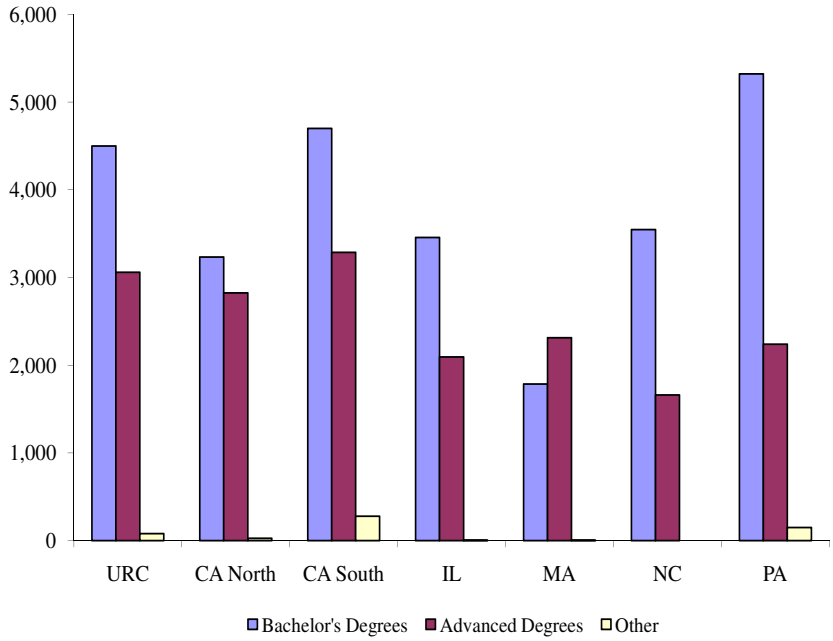
Student Enrollment and Completions. The URC's 135,697 students in the fall of 2007 (the most recent year for which we have data for all university clusters) make it the largest research university cluster, in terms of enrollment, in our analysis. The next largest is the Pennsylvania cluster (University of Pittsburgh, Pennsylvania State University, and Carnegie Mellon University) with just over 127,000 students enrolled in the fall of 2007.

The URC universities award a variety of degrees each academic year. In terms of number of degrees granted, the URC ranks #1 in total number of degrees (undergraduate and graduate) conferred in *Physical Science, Agriculture and Natural Resources;* and *Medicine and Biological Sciences*. The URC is in the top three in total number of degrees awarded in *Engineering, Mathematics and Computer Science*; *Business, Management, and Law; and Liberal Arts.*

Michigan has a vibrant high-tech industry, and the URC universities graduate a large number of students with degrees that prepare them for jobs in this industry.

We define "high tech" degrees to include degrees in biological and biomedical sciences, physical sciences, computer sciences, architecture, engineering, mathematics and statistics, and some agricultural degrees. As shown in Figure 2 below, the URC awarded the third largest number of high tech degrees (7,638) of our university clusters. Southern California (8,266) and Pennsylvania (7,713) university clusters awarded more high-tech degrees than the URC.

FIGURE 2. Completion High of Tech Degrees, 2006-2007



Base Data Source: National Center for Education Statistics, IPEDS
High-Tech Definition: Anderson Economic Group, LLC
See "Academic Program Definitions" on page 9 for a definition of "high tech" degrees.

The URC is preparing students for jobs in Michigan's high-tech industries. Our high-tech industry includes many life sciences jobs—an area that has seen employment growth since 2000 when other industries shed a significant numbers of jobs in Michigan.[1] The URC grants the most degrees of any university cluster in medicine and biological sciences, and physical sciences. These degrees prepare students for high-tech life sciences jobs in medical laboratories, research laboratories, and pharmaceutical manufacturing.

R&D Expenditures. Total R&D expenditures by the seven university clusters were approximately $11.1 billion in 2007, which made up over 20% of total R&D expenditures by all U.S. universities. Academic institutions in the state of Michigan spent $1.5 billion on research and development, with the URC universities spending 93% of this amount, or $1.4 billion. Approximately 61% of funding for these R&D expenditures came from federal sources. In other words, the URC

1. See Caroline M. Sallee, Hilary A. Doe, and Patrick L. Anderson, *Life Sciences Industry in Michigan the University Research Corridor* (May 2009).

universities brought $862 million in federal dollars into the state of Michigan for research. See Table 4 and "Comparison Peer University Clusters" on page 15.

TABLE 4. Total Research and Development Expenditures, 2007

University Cluster	Total Expenditures (in millions)	Federally Funded Expenditures	Federal Share of Total Expenditures	Institutional Share of Total Expenditures
Michigan's URC	**$1,405**	**$862**	**61%**	**25%**
Northern California	$2,083	$1,253	60%	17%
Southern California	$2,130	$1,320	62%	18%
Illinois	$1,240	$765	62%	25%
Massachusetts	$1,196	$960	80%	2%
North Carolina	$1,591	$937	59%	16%
Pennsylvania	$1,408	$981	70%	14%
All U.S. Universities	*$49,431*	*$30,441*	*62%*	*20%*

Source: National Science Foundation, Integrated Science and Engineering Resources Data System
Analysis: Anderson Economic Group, LLC

Tech Transfers. An important indicator of the success of university R&D is its effectiveness at transferring technology to the private sector. In terms of volume, the URC ranks third in average annual number of patents, and fourth in number of licenses granted. In terms of effectiveness of R&D expenditures, as measured by licensing revenue per expenditure, the URC ranks fourth. This means that a higher percentage of URC expenditures result in a product that is licensed and sold than three of the other comparison clusters. In the past five years, the URC has helped cultivate 20 new start-up companies each year on average. See Table 5, below.

TABLE 5. Average Annual Patent and Licensing Activity, 2004-2008

	Start-up Companies Cultivated	*Rank*	Patent Grants	*Rank*	Licensing Revenue (in millions)	*Rank*	Revenues per Expenditures	*Rank*
Michigan's URC	**20**	***4***	**129**	***3***	**$37.1**	***4***	**2.6%**	***4***
Northern California	21	*3*	191	*2*	$183.9	*2*	8.8%	*2*
Southern California	27	*2*	124	*4*	$47.6	*3*	2.2%	*5*
Illinois	14	*6*	117	*5*	$193.7	*1*	15.6%	*1*
Massachusetts	31	*1*	193	*1*	$71.9	*5*	6.0%	*3*
North Carolina	13	*7*	81	*7*	$10.4	*7*	0.7%	*7*
Pennsylvania	19	*5*	100	*6*	$16.0	*6*	1.1%	*6*

Data Source: Universities' websites, technology transfer offices, Association of Technology Managers (AUTM) Surveys
Analysis: Anderson Economic Group, LLC
Note: See "Average Annual Patent and Licensing Activity, 2004-2008" on page 18 for complete source notes and methodology.

ABOUT ANDERSON ECONOMIC GROUP

Anderson Economic Group, LLC is a consulting firm that specializes in economics, public policy, financial valuation, market research, and land use economics. Anderson Economic Group has completed economic and fiscal impact studies for a variety of public and private sector clients. See "Appendix C: About the Authors" for more information.

I. Introduction

WHAT IS MICHIGAN'S UNIVERSITY RESEARCH CORRIDOR?

The University Research Corridor (URC) is an alliance of Michigan's three largest academic institutions: Michigan State University, the University of Michigan, and Wayne State University. The purpose of this alliance is to accelerate economic development in Michigan by educating students, attracting talented workers to Michigan, supporting innovation, and encouraging the transfer of technology to the private sector. The URC universities have main campuses in East Lansing, Ann Arbor, Flint, Dearborn, and Detroit, but the URC's reach extends to all areas of the state. Each URC university has research, teaching locations, and partner hospitals located throughout the state, as shown on page 2.

REPORT PURPOSE & METHODOLOGY

Michigan's University Research Corridor universities asked Anderson Economic Group to undertake a comprehensive study that quantifies the economic impact of the URC's activities on the state of Michigan's economy. This report is the third in a series of annual reports intended to measure and benchmark the contributions of the URC universities to Michigan. The information in this report allows readers to understand how the URC universities spend their time and money and to track the URC's performance year-to-year.

In order to quantify the economic impact of the URC's activities, we asked ourselves the following question: What would the loss be to the state if the URC universities left Michigan? We then studied the loss in terms of jobs, earnings, tax revenue, and research. The following four chapters of this report provide quantitative measures of how the URC is performing in those areas.

PEER UNIVERSITY CLUSTERS

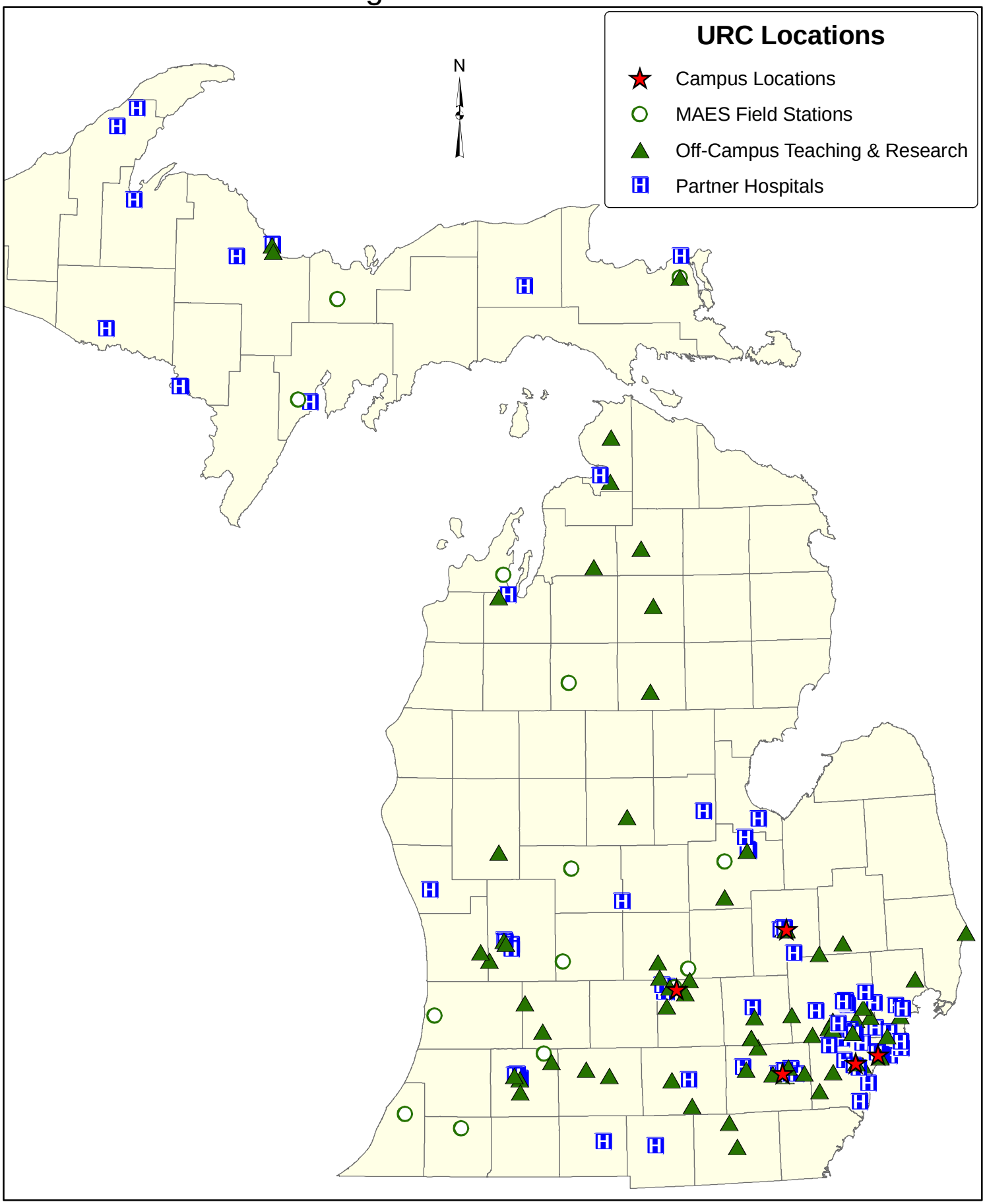
In addition to tracking the URC's performance year-to-year, we compare the URC to six peer university clusters in five states. We compare Michigan's URC with some of the best universities (public and private) in each of these states, as shown in Table 6 below, on a number of research and tech transfer measures.

TABLE 6. Comparison Peer University Clusters

Michigan's URC	Michigan State University	University of Michigan	Wayne State University
Northern California	University of California, San Francisco	University of California, Berkeley	Stanford University
Southern California	University of California, Los Angeles	University of California, San Diego	University of Southern California
Illinois	University of Chicago	University of Illinois at Urbana-Champaign	Northwestern University
Massachusetts	Harvard University	Massachusetts Institute of Technology (MIT)	Tufts University
North Carolina	Duke University	University of North Carolina (Chapel Hill)	North Carolina State University
Pennsylvania	Penn State University (all campuses)	University of Pittsburgh (all campuses)	Carnegie Mellon University

Source: Anderson Economic Group, LLC

URC's Presence in Michigan



Created By: Anderson Economic Group, LLC
Data Source: ESRI; Michigan Sate University, University of Michigan, Wayne State University
September 2007

II. URC Students and Alumni

URC STUDENT ENROLLMENT

The University Research Corridor had 133,469 students enrolled in the fall of 2008. This represents a 2% decline in enrollment from the fall of 2007 when total URC enrollment was over 135,000. The number of graduate students enrolled at URC universities declined 8%. Enrollment at URC universities was slightly higher in 2008 than it was four years earlier. See Table 7 below.

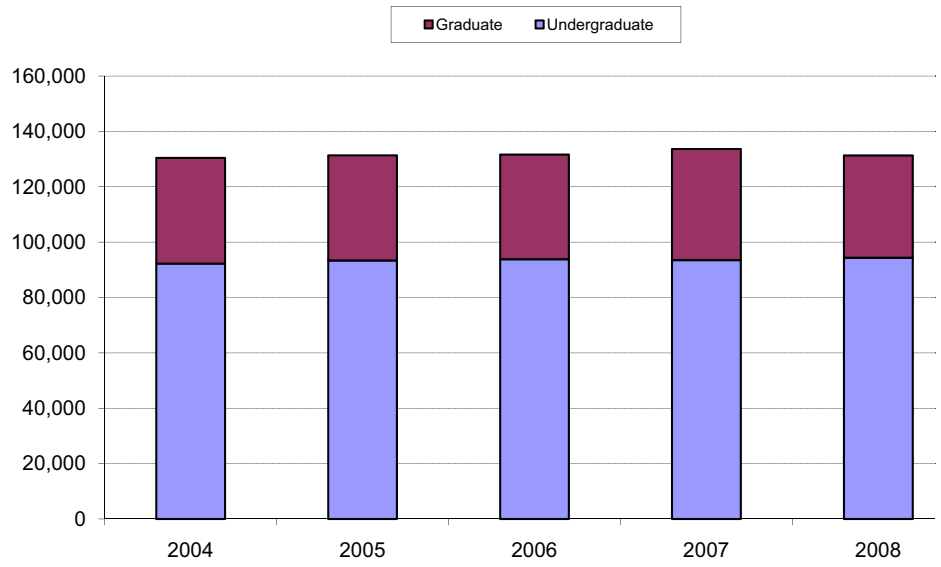
TABLE 7. URC Enrollment, Fall 2004-2008

	2004	2005	2006	2007	2008	Change 2007-08
Undergraduate	92,283	93,397	93,821	93,519	94,382	0.9%
Graduate	38,167	37,969	37,814	40,126	36,947	-7.9%
Other	2,052	1,965	1,985	2,052	2,140	4.3%
TOTAL	132,502	133,331	133,620	135,697	133,469	-1.6%

Data Source: IPEDS fall enrollment numbers for 2004-2007.
Analysis: Anderson Economic Group, LLC

As shown in Figure 3, the ratio of undergraduate to graduate students increased slightly from 2004 to 2008 as undergraduate enrollment increased and graduate enrollment decreased. In 2008, 71% of total enrollment was comprised of undergraduate students, 28% graduate students (including doctoral and professional), and 2% enrolled in some other program, such as certificate programs.

FIGURE 3. URC Enrollment, Fall 2004-2008



Data Source: Offices of the Registrar at the URC Universities
Analysis: Anderson Economic Group, LLC

Students who attend URC universities are drawn from throughout Michigan, across the United States, and around the world. Students from the state of Michigan accounted for 77% of total enrollment in Fall 2008, while 15% came from elsewhere in the United States, and the remaining 8% came from other countries or territories. In all, the URC has students from every county in Michigan, every state, and more than 150 different countries. The majority of international students come from China, South Korea, India, and Canada while others come from South Africa, Russia, Iran, Finland, and Uruguay.

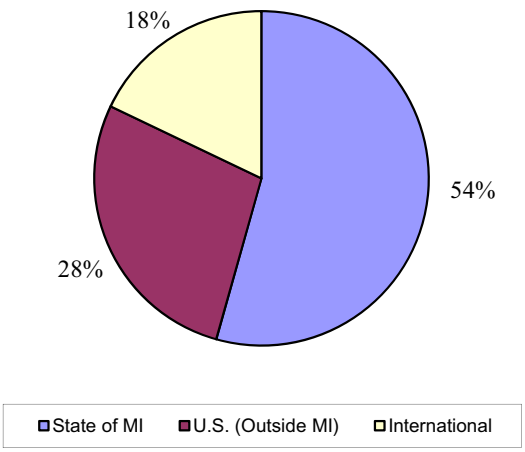
TABLE 8. Origin of URC Students, Fall 2008

Origin	2008	Percent of Total
State of Michigan	102,567	*77%*
Other States	19,704	*15%*
International and other (including territories)	11,198	*8%*
TOTAL ENROLLMENT	133,469	*100%*

Source: Offices of the Registrar at the URC universities.

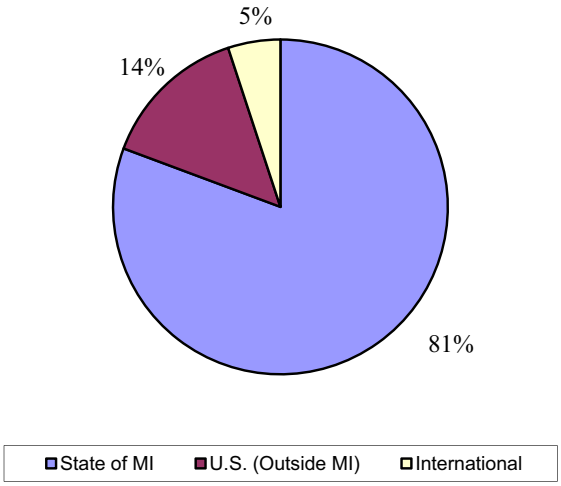
A greater share of the URC's graduate students come from outside the state than the undergraduate student population. As shown in Figure 4 below and Figure 5 on page 5, almost half of the URC's graduate students come from outside Michigan, while a fifth of the URC's undergraduate student are from outside Michigan.The URC draws talented students to Michigan, many of whom spend their working careers in Michigan.

FIGURE 4. Origin of URC Graduate Students, Fall 2008



Data Source: Offices of the Registrar at the URC Universities
Analysis: Anderson Economic Group, LLC

FIGURE 5. Origin of URC Undergraduate Students, Fall 2008



Data Source: Offices of the Registrar at the URC Universities
Analysis: Anderson Economic Group, LLC

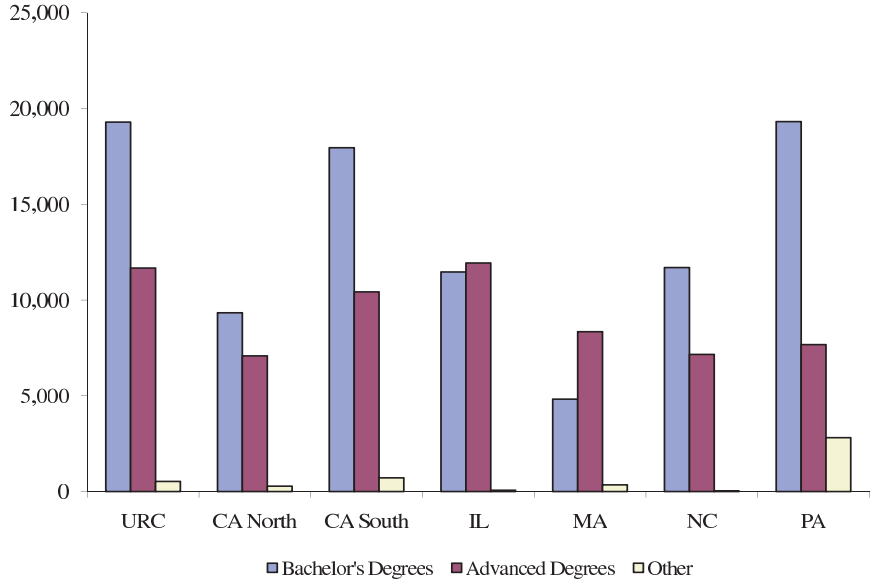
DEGREES GRANTED IN URC AND COMPARISON CLUSTERS

We compare the URC's enrollment and degrees granted with other peer university clusters in five states: California, Illinois, Massachusetts, North Carolina, and Pennsylvania. We present the list of peer university clusters in Table 6 on page 1.

The URC's fall 2007 enrollment of 135,697 students make it the largest research university cluster, in terms of enrollment, of those in our analysis. The next largest is the Pennsylvania cluster, with just over 127,000 students enrolled in fall 2007. Total enrollment (undergraduate and graduate) at these university clusters has grown slightly from 2004 to 2007. The average annual growth rate for the URC was approximately 1% during this time period, and most of our comparison university clusters experienced annual growth that was similar to the URC. See Table A-1, "Total Enrollment, Fall 2004-2007," on page A-1 for the enrollment growth rates by university cluster.

As shown in Figure 6 on page 6, the URC awarded more bachelor's degrees (19,284) than any of the comparison clusters besides Pennsylvania (19,306), and were second only to the Illinois cluster in terms of advanced degrees awarded (11,668 versus 11,929).

FIGURE 6. Completions by Type of Degree, 2006-07 academic year



Data Source: National Center for Education Statistics, IPEDS Enrollment
Analysis: Anderson Economic Group, LLC

During the 2006-2007 academic year, The URC ranks first among the university clusters in our study for total number of degrees (undergraduate and graduate) conferred in *Physical Science, Agriculture and Natural Resources*, as well as in *Medicine and Biological Science*. The URC is in the top three in number of *Engineering, Math and Computer Science*; *Liberal Arts*; and *Business Management and Law* degrees awarded.[2] While the URC confers more degrees in medicine, the physical sciences, and business than most of our comparison university clusters, this is partially a result of the URC teaching thousands more students each year overall than these comparison schools.

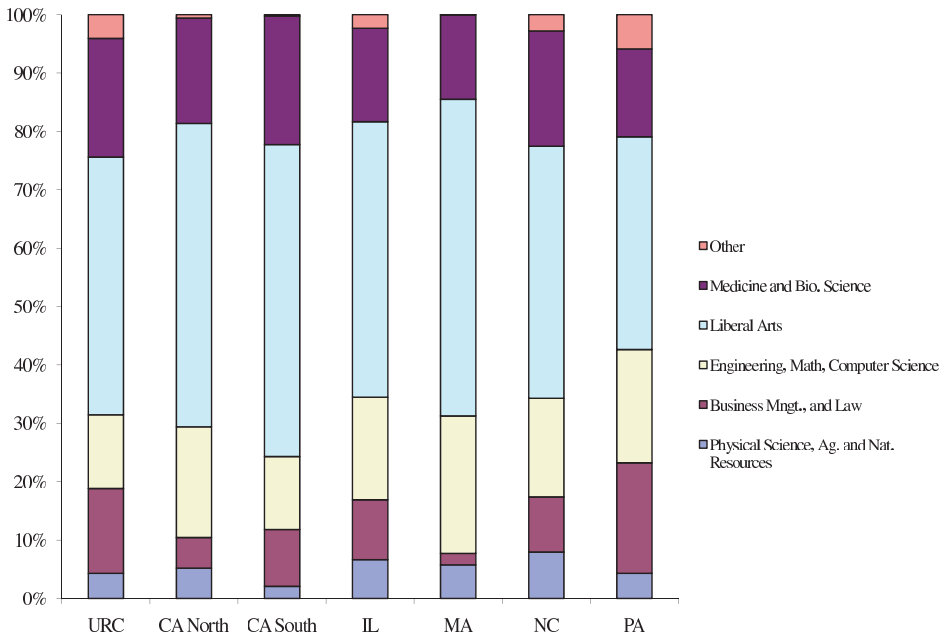
To put the number of degrees awarded into context, Figure 7, "Undergraduate Degrees Conferred by Area, 2006-2007," and Figure 8, "Graduate Degrees Conferred by Area, 2006-2007," illustrate the concentration of type of degree conferred, as measured by the total numbers of degrees awarded during the 2006-07 academic year.

After accounting for total number of undergraduate degrees conferred, the URC ranks #5 in *Physical Science, Agriculture, and Natural Resources* degrees conferred, #2 in *Business Management and Law*, #6 in *Engineering, Math, Computer Science*, and #2 in *Medicine and Biological Science.* The Southern California uni-

2. See the academic program definitions at the end of this section for information on the composition of each academic program area.

versity cluster (UCLA, UCSD, USC) ranks first in medical and physical science undergraduate degree share, while Massachusetts (Harvard, MIT, Tufts) is the most concentrated in granting engineering degrees.

FIGURE 7. Undergraduate Degrees Conferred by Area, 2006-2007



Data Source: National Center for Education Statistics, IPEDS
Analysis: Anderson Economic Group, LLC

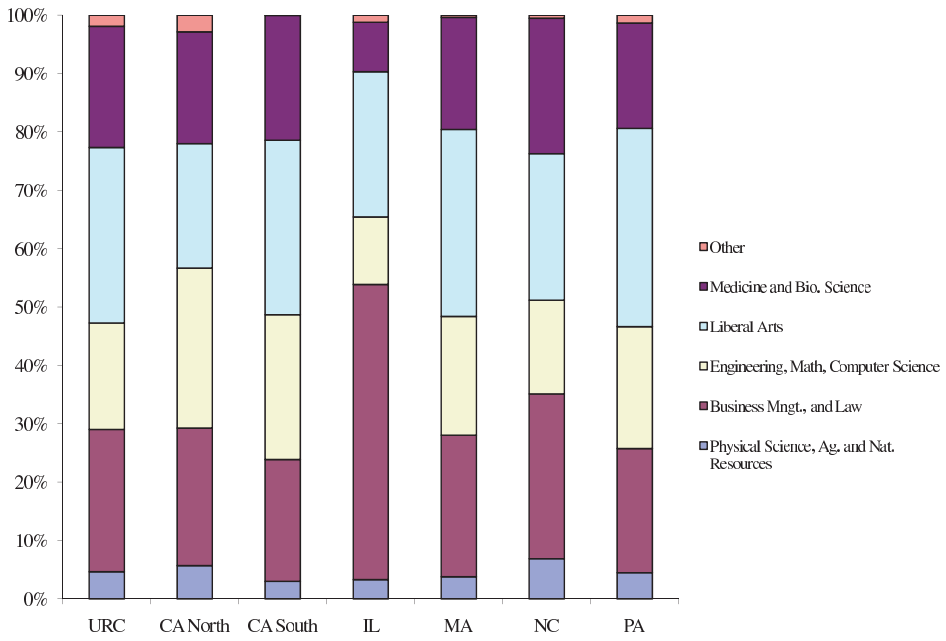
As a share of total graduate degrees conferred, the URC ranks #3 in *Physical Science, Agriculture, and Natural Resources*, #3 in *Business Management and Law*, #5 in *Engineering, Math, Computer Science*, and #3 in *Medicine and Biological Science.* Graduate degrees in the liberal arts make up the largest share of total graduate degrees conferred in the URC.

Michigan has a vibrant high-tech industry, and the URC universities graduate a large number of students with degrees that prepare them for jobs in this industry. AEG's definition of high-tech jobs (one that we use regularly to assess Michigan's high-tech industry in Southeast Michigan) includes many life sciences jobs.[3] The number of life sciences jobs in Michigan has grown since 2000 when other industries shed a significant numbers of jobs.[4] The URC grants the most degrees of any

3. See Scott D. Watkins, Cameron Van Wyngarden, and Lauren Hathaway, *Driving Southeast Michigan Forward*, prepared for Automation Alley (November 2008).
4. See Caroline M. Sallee, Hilary A. Doe, and Patrick L. Anderson, *Life Sciences Industry in Michigan the University Research Corridor* (May 2009).

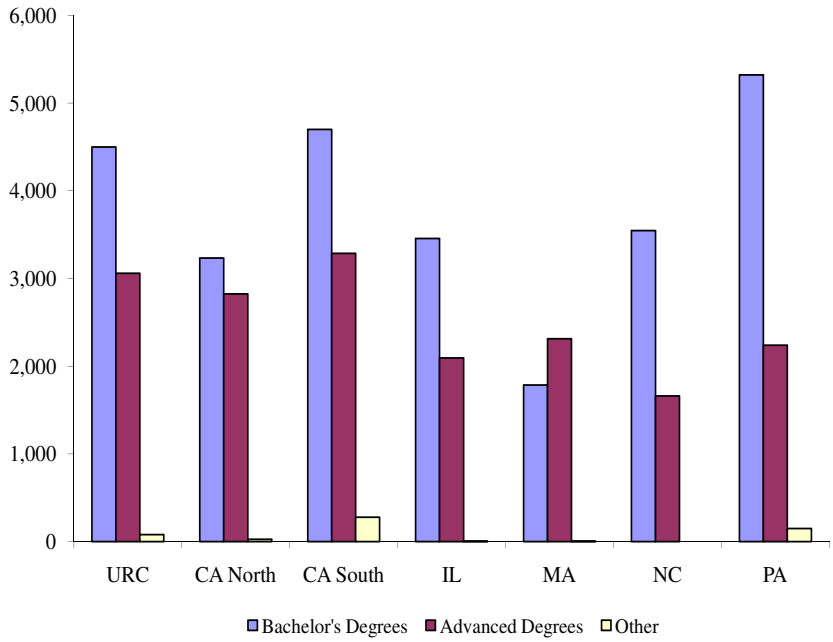
university cluster in medicine and biological sciences, and physical sciences. These degrees prepares students for life sciences jobs in medical laboratories, research laboratories, and pharmaceutical manufacturing. As shown in Figure 9 on page 9, the URC awarded the third largest number of high tech degrees (7,638). Southern California (8,266) and Pennsylvania (7,713) university clusters awarded more degrees than the URC.

FIGURE 8. Graduate Degrees Conferred by Area, 2006-2007



Data Source: National Center for Education Statistics, IPEDS
Analysis: Anderson Economic Group, LLC

FIGURE 9. Completion of High Tech Degrees, 2006-2007



Base Data Source: National Center for Education Statistics, IPEDS
High-Tech Definition: Anderson Economic Group, LLC

Academic Program Definitions

The academic program areas used in this section are based on the National Center for Education Statistics (NCES) Classification of Instructional Programs (CIP) codes for 2000. The composition of each program area follows.

The *Physical Science, Agriculture, and Natural Resources* academic program area includes the following fields of study: agriculture, agriculture operations, and related sciences; natural resources and conservation, and physical sciences.

The *Business, Management, and Law* academic program area includes the following fields of study: legal professions and studies, and business, management, marketing, and related support services.

The *Engineering, Mathematics, and Computer Science* academic program area includes the following fields of study: architecture and related services, computer and information sciences and support services, engineering, and mathematics and statistics.

The *Liberal Arts* academic program area includes the following fields of study: area, ethnic, cultural, and gender studies, communication, journalism, and related programs, education, foreign languages, literatures, and linguistics, family and consumer sciences/human sciences, English language and literature/letters, liberal arts and sciences, general studies and humanities, library science, multi/interdisciplinary

studies, philosophy and religious studies, theology and religious vocations, public administration and social service professions, social sciences, visual and performing arts, and history.

The *Medicine and Biological Science* academic program area includes the following fields of study: biological and biomedical sciences, psychology, and health professions and related clinical sciences.

The *Other* academic program area includes the following fields of study: personal and culinary services, parks, recreation, leisure, and fitness studies, security and protective services, construction trades, mechanic and repair technologies/technicians, precision production, transportation and materials moving, undesignated field of study, communications technologies/technicians and support services, engineering technologies/technicians, military technologies, and science technologies/technicians.

High Tech Degrees include: agriculture, agriculture operations, and related sciences (we include only 10% of this field of study as most agriculture is not high-tech), architecture and related services, biological and biomedical sciences, communications technologies/technicians and support services, computer and information sciences and support services, engineering technologies/technicians, engineering, mathematics and statistics, and physical sciences.

MEDICAL EDUCATION IN THE URC

Medical Schools. The URC sponsors the only medical schools in the state of Michigan that provide Doctor of Medicine (M.D.) and Doctor of Osteopathic Medicine (D.O.) degrees. Michigan's URC has four medical schools. All three Research Corridor universities have allopathic (M.D.) medical schools and Michigan State also has an osteopathic (D.O.) medical school.

These medical schools train students through a combination of classes taught on campus and in clinical settings. Students typically spend the first two years of their medical education in a classroom on campus and the next two years in clerkships at hospitals located throughout Michigan. For example, Michigan State's College of Human Medicine has students at six community campuses, five of which are located outside East Lansing. MSU's College of Osteopathic Medicine has 13 partner hospitals in which they place third- and fourth-year medical students. University of Michigan trains students primarily in its own hospital and health centers and in other locations in Southeast Michigan. Wayne State University trains many students in hospitals close to its medical school in Detroit.

In 2007, Michigan's URC graduated 647 students from its medical schools, growing 5.2% since 2006. As shown in "Completions and Awards by Academic Program Area, 2006-07 academic year" on page A-2, URC institutions graduate the most

students in medicine and biological science compared to the other university clusters in this report.[5]

TABLE 9. URC Medical School Graduates, 2000-2007

University	Degree Granted	2000	2006	2007	% Change 2006-2007
Michigan State University	M.D.	102	101	120	*18.8%*
Michigan State University	D.O.	107	104	138	*32.7%*
University of Michigan	M.D.	160	169	165	*-2.4%*
Wayne State University	M.D.	243	241	224	*-7.1%*
TOTAL		612	615	647	*5.2%*

Source: National Center for Education Statistics, IPEDS
Analysis: Anderson Economic Group, LLC

Dentistry Program. The University of Michigan School of Dentistry offers students a Doctor of Dental Surgery (DDS) program and a dental hygiene program.[6] In addition, the school teaches all specialty programs (endodontics, oral and maxillofacial surgery, orthodontics, oral diagnosis, oral pathology, pediatric dentistry, and periodontics) and continuing education programs for practicing dentists.

In 2006 and 2007, the University of Michigan School of Dentistry program graduated a total of 210 students with a DDS degree. During the same two year time period, 66 students graduated with a dental hygienist degree. See Table 10 below.

TABLE 10. Graduates from the University of Michigan School of Dentistry

Program	2000	2006	2007	Total 2006 & 2007	Change 2006-2007
Dentistry (DDS)	95	99	111	210	*12*
Dental Hygiene (Bachelor's and Master's Degree)	28	36	30	66	*-6*
TOTAL	123	135	141	276	*6*

Source: National Center for Education Statistics, IPEDS
Analysis: Anderson Economic Group, LLC

Veterinary Medicine. Michigan State University hosts the only school of veterinary medicine in the state and one of only 28 veterinary schools in the country.[7] Its Col-

5. The *Medicine and Biological Science* academic program area includes the following fields of study: Biological and biomedical sciences; psychology; health professions and related clinical sciences.

6. The DDS (Doctor of Dental Surgery) and DMD (Doctor of Dental Medicine) are the same degree. The majority of dental schools award the DDS degree; however, some award a DMD degree. The amount of education required for the degrees and the essence of the degrees are the same.

lege of Veterinary Medicine offers a four-year Doctor of Veterinary Medicine (DVM) degree requiring five semesters of classroom training and four semesters of clinical work. Third- and fourth-year veterinary students spend three weeks in equine and food-animal practices throughout Michigan to experience the daily routine of large-animal practice.[8]

As seen in Table 11 below, the college issued a total of 204 students a Doctorate in Veterinary Medicine in 2006 and 2007. The college also operates the Veterinary Teaching Hospital (VTH), the only tertiary referral center for veterinary medicine in the state of Michigan. Every year, the VTH sees more than 24,000 animals from all parts of the state.

TABLE 11. Graduates from Michigan State's College of Veterinary Medicine

Program	2000	2006	2007	Total 2006 & 2007	Change 2006-2007
Veterinary Medicine (DVM)	106	100	104	204	4
Veterinary Biomedical and Clinical Sciences - Master's Degree	0	4	2	6	-2
Veterinary Biomedical and Clinical Sciences - Doctor's Degree	0	1	5	6	4
Total Degrees Granted	106	105	111	216	6

Source: National Center for Education Statistics, IPEDS
Analysis: Anderson Economic Group, LLC

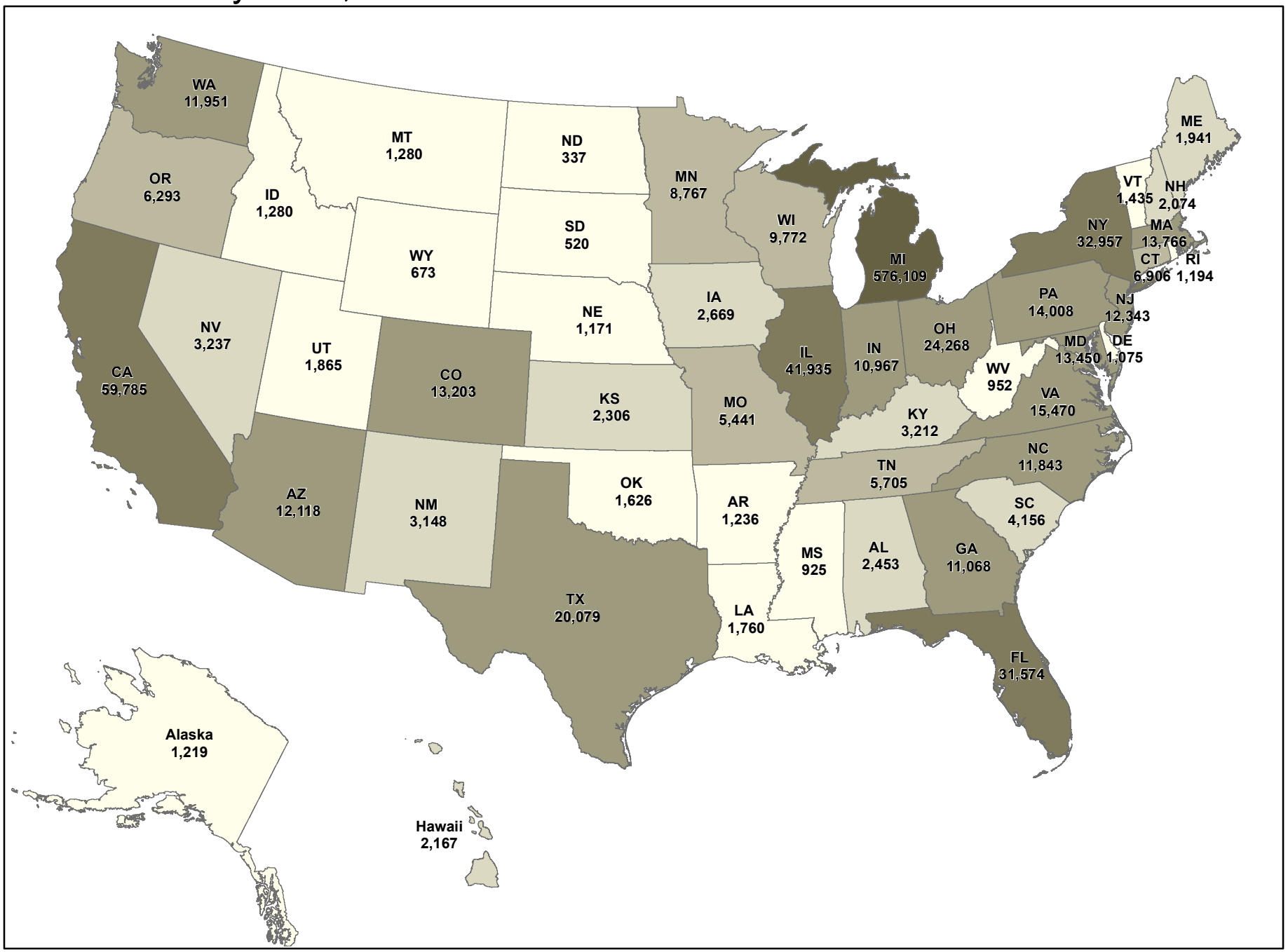
The college houses over 15 research centers and facilities, through which it provides research and service programs. In particular, the college's Diagnostic Center for Population and Animal Health runs over 1.5 million tests a year to provide an early warning system for impending epidemics; to identify infectious animal disease, contaminants, and regulatory diseases; and to diagnose nutritional diseases. The Veterinary Extension within the college focuses on solving and preventing animal health management problems to ensure its safety for human consumption. The program is currently researching Johnes Disease, Avian Influenza, and Mad Cow Disease.[9]

NUMBER OF URC ALUMNI

As of the academic year ending in May 2008, there were 572,123 URC alumni living in Michigan, making up 7.5% of Michigan's population over the age of 18 years.[10] URC universities currently have alumni in every state in the U.S. (see "URC Alumni by State, 2008" on page 13), and in every county in Michigan (see "URC Alumni in Michigan by Zipcode, 2008" on page 14.

7. Information provided by MSU's College of Veterinary Medicine.
8. Ibid.
9. Ibid.
10. According to the U.S. Census Bureau, Michigan had 7,613,224 residents over the age of 18 years on July 1, 2008.

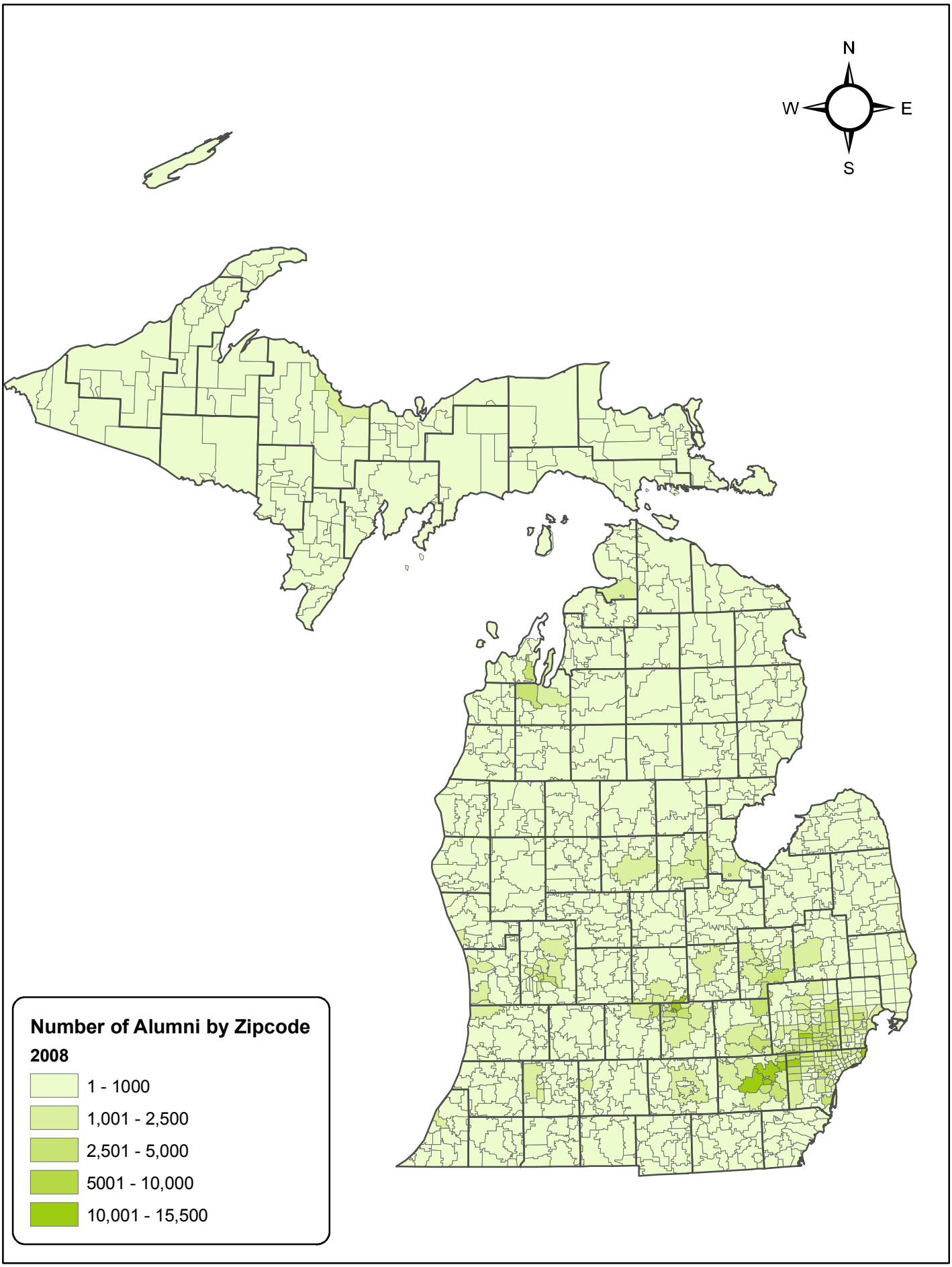
URC Alumni by State, 2008



Data Source: ESRI; University Alumni Associations
August 2009

Miles 0 500 1,000 2,000

URC Alumni by Zipcode, 2008



Data Source: ESRI; University Alumni Associations August 2009
Analysis: Anderson Economic Group, LLC

Miles
0 25 50 100

III. Comparison with Peer University Clusters

COMPARISON PEER UNIVERSITY CLUSTERS

To judge how the URC compares with other university clusters in the nation, we selected six of the best-known groups of universities in California (North and South), Illinois, Massachusetts, North Carolina, and Pennsylvania. Each of these clusters has three universities from the same state that are well known for their research and development activities. We present the list of peer university clusters in Table 12 below.

TABLE 12. Comparison Research University Clusters

Michigan's URC	Michigan State University	University of Michigan (all campuses)	Wayne State University
Northern California	University of California, San Francisco	University of California, Berkeley	Stanford University
Southern California	University of California, Los Angeles	University of California, San Diego	University of Southern California
Illinois	University of Chicago	University of Illinois at Urbana-Champaign	Northwestern University
Massachusetts	Harvard University	Massachusetts Institute of Technology (MIT) - Excludes Lincoln Lab	Tufts University
North Carolina	Duke University	University of North Carolina (Chapel Hill)	North Carolina State University
Pennsylvania	Penn State University (all campuses)	University of Pittsburgh (all campuses)	Carnegie Mellon University

Source: Anderson Economic Group, LLC

ACADEMIC R&D EXPENDITURES

We compare the research and development (R&D) expenditures for each of the university clusters. In 2007, the URC had the fifth highest R&D expenditures of the seven university clusters at $1.4 billion. Total R&D expenditures by the seven university clusters totaled approximately $11.1 billion in 2007, making up over 20% of R&D expenditures by all U.S. universities. The URC relies on institutional funds for a higher share of its research and development spending than the average university, and more than all the other peer university clusters except Illinois.[11] See Table 13 on page 16.

11. Data are from the National Science Foundation Integrated Science and Engineering Resources Data System.The spending reported by MIT to the NSF does not include spending for the Lincoln Lab, because it is not classified as academic R&D. Lincoln Lab includes communications, space surveillance, missile defense, tactical surveillance systems, and air traffic control.

TABLE 13. Source of Funding for R&D Expenditures (in millions), 2007

	Total R&D Expenditures	Federal Government	State & Local Government	Industry[a]	Institution[b]	Other
Michigan's URC	**$1,405**	**61%**	**4%**	**4%**	**25%**	**5%**
Northern California	$2,083	60%	3%	6%	17%	14%
Southern California	$2,130	62%	2%	6%	18%	11%
Illinois	$1,240	62%	4%	3%	25%	7%
Massachusetts	$1,196	80%	0%	9%	2%	9%
North Carolina	$1,591	59%	8%	15%	16%	3%
Pennsylvania	$1,408	70%	6%	8%	14%	2%
All U.S. Universities	*$49,431*	*62%*	*6%*	*5%*	*20%*	*7%*

Source: National Science Foundation: Integrated Science and Engineering Resources Data System
Note: 2007 data is the most recent available from this source. Our 2008 annual report reported 2006 data.
Analysis: Anderson Economic Group, LLC

a. Industry funding are grants and contracts for R&D activities from for-profit organizations.

b. Institutional funding includes research funded from non-profit organizations, corporate foundations, endowments, and fellowships to students.

As shown in Table 14 below, the URC's research and development expenditures grew at the third slowest rate between 2006 and 2007. Only the Pennsylvania and Massachusetts clusters had slower growth than the URC. While Michigan's seven year average annual growth rate in R&D expenditures is not significantly behind the other clusters, slower growth in R&D expenditures in the last couple of years means that some of the university clusters now spend more on R&D than the URC.

TABLE 14. Growth in Total Academic R&D Expenditures

	Annual Growth 2000 - 2007 (CAGR)	Annual Growth 2006 - 2007	*Rank Growth 2006-07*
Michigan's URC	**5.8%**	**1.9%**	***5***
Northern California	5.6%	3.0%	*4*
Southern California	6.7%	5.6%	*2*
Illinois	6.7%	3.2%	*3*
Massachusetts	4.6%	1.1%	*7*
North Carolina	8.4%	11.1%	*1*
Pennsylvania	7.3%	1.5%	*6*
All U.S. Universities	*7.4%*	*3.5%*	

Source: NSF, Integrated Science and Engineering Resources Data System
Analysis: Anderson Economic Group, LLC

Part of the slower growth is due to the decrease in both federal government and state and local government funding. Federal government funding for the Northern

California, Illinois, and Massachusetts clusters decreased from 2006 to 2007. Federal funding for the URC increased during this time, but only by 1%. However, state and local government R&D funding for the URC decreased by 14% from $72.3 million in 2006 to $62.2 million in 2007. Similarly, state and local funding for the Southern California and Pennsylvania clusters also decreased during this time. Every cluster experienced increases in industry and institutional funding, which helped compensate for the decreases in government funding.

The share of science and engineering R&D expenditures by the URC is fairly consistent with U.S. university averages. As shown in Table 15, the URC had higher than average spending (as a percentage of total spending) for life and social sciences and lower than average spending for environmental sciences.

TABLE 15. Share of Total R&D Expenditures by Science and Engineering Fields, 2007

	Environmental Sciences[a]	Life Sciences[b]	Math & Computer Sciences	Physical Sciences[c]	Psychology	Social Sciences[d]	Sciences, Other	Engineering[e]
Michigan's URC	**1%**	**63%**	**2%**	**8%**	**1%**	**9%**	**0%**	**15%**
Northern California	2%	67%	2%	9%	1%	3%	2%	14%
Southern California	8%	65%	8%	6%	1%	3%	1%	9%
Illinois	4%	55%	9%	11%	2%	3%	1%	15%
Massachusetts	5%	51%	5%	13%	1%	3%	2%	21%
North Carolina	3%	76%	3%	4%	1%	5%	0%	8%
Pennsylvania	4%	50%	12%	6%	3%	3%	1%	22%
All U.S. Universities	*6%*	*60%*	*4%*	*8%*	*2%*	*4%*	*2%*	*15%*

Source: National Science Foundation, Survey of Research and Development Expenditures at Universities and Colleges
Analysis: Anderson Economic Group, LLC

a. Environmental sciences includes atmospheric and earth sciences, oceanography, and other miscellaneous sciences.
b. Life sciences includes agricultural, biological, medical, and other miscellaneous life sciences.
c. Physical sciences includes astronomy, chemistry, physics, and other miscellaneous physical sciences.
d. Social sciences includes economics, political sciences, sociology, and other miscellaneous social sciences.
e. Engineering includes aeronautical, biomedical, bioengineering, chemical, civil, electrical, mechanical, metallurgical, and other.

The seven comparison university clusters deviated significantly from the U.S. average for life sciences: the North Carolina and Northern California clusters spent significantly more, and the other university clusters spent significantly less. Furthermore, Massachusetts, Illinois, and Northern California spent more on the physical sciences. The Pennsylvania cluster spent significantly more on math and computer sciences than any other cluster and U.S. universities on average.

TECHNOLOGY TRANSFERS

University research and development expenditures often lead to the production and sale of new products and services in the private sector. The pharmaceutical, medical, computer technology, consumer electronic, telecommunication, agricultural products, and manufacturing industries are among the many industries benefiting from research and development conducted at universities. The success of academic research and development activities is often measured in terms of technology transfer to the private sector. Common indicators include the number of patent applications filed and the number of inventions disclosed in a given year. While these statistics show activity, they do not necessarily indicate the effectiveness of the activity. Other statistics, such as the number of patents granted, the number of licenses or options entered into, the royalty revenue, and the number of new start-ups are more informative indicators of technology transfer. We examine these indicators and compare the URC's performance to that of the other university clusters.

The URC ranks near the bottom when comparing its average annual technology transfer activities 2004 to 2008 to the peer university clusters. The URC ranks #5 in average annual number of invention disclosures, #3 in patent grants issued, #5 in licenses and options issued, and #5 in licensing revenue. See Table 16.

TABLE 16. Average Annual Patent and Licensing Activity,[a] 2004-2008

	Invention Disclosures	*Rank*	Patent Grants	*Rank*	Licenses/ Options	*Rank*	Licensing Revenue (in millions)	*Rank*
Michigan's URC[b]	**485**	***5***	**129**	***3***	**135**	***5***	**$37.1**	***5***
Northern California[c]	708	*3*	191	*2*	173	*2*	$183.9	*2*
Southern California[d]	720	*2*	124	*4*	135	*5*	$47.6	*4*
Illinois[e]	497	*4*	117	*5*	103	*7*	$193.7	*1*
Massachusetts[f]	769	*1*	193	*1*	191	*1*	$71.9	*3*
North Carolina[g]	433	*7*	81	*7*	140	*4*	$10.4	*7*
Pennsylvania[h]	450	*6*	100	*6*	147	*3*	$16.0	*6*

Source: Universities' websites and technology transfer offices, Association of Technology Managers (AUTM) Surveys

a. Average includes FY 2004-2008 data where available.

b. Michigan State University, the University of Michigan, and Wayne State University information was obtained from the URC.

c. The University of California provided statistics for all their campuses through their Office of Technology and it's Annual Reports for 2004-2008. Stanford University provided all statistics for 2004-2008 through their website except the number of patents issued, which was provided by their Office of Technology Licensing.

d. The University of California provided statistics for all their campuses through their Office of Technology and the office's Annual Reports for 2004-2008. USC data for 2004-2006 were collected from the AUTM surveys and through USC's Stevens institute for 2007-2008. USC data for 2008 are preliminary.

e. Northwestern University provided all statistics for 2004-2008 through their website. University of Chicago provided all statistics through their Office of Technology & Intellectual Property. University of Illinois, Urbana-Champaign provided all statistics through their Office of Technology Management website.

f. MIT, and Tufts reported 2004-2008 data on their websites. Harvard data were collected from the 2004-2006 AUTM surveys and through Harvard's Office of Technology Development for 2007-2008.

g. Data for UNC Chapel Hill and NC State University were collected from their Offices of Technology Development. Data for Duke University were provided from the 2004-2006 AUTM surveys and through their Office of Licensing & Ventures for 2007-2008.

h. Data collected for the Pennsylvania cluster were from the University of Pittsburgh's Office of Technology Management, Penn State's Intellectual Property office, CMU's Center for Technology Transfer, and the 2004-2006 AUTM surveys.

The URC's rankings in recent years are similar overall to the longer-run trend of technology transfer activities from 2002 to 2008. Looking at the average annual activity for a longer period, the URC ranks #4 for invention disclosures, #3 in patent grants, #6 in licenses and options, and #5 in licensing revenue. See Table 17 below.

TABLE 17. Average Annual Patent and Licensing Activity, 2002-2008

	Invention Disclosures	*Rank*	Patent Grants	*Rank*	Licenses/ Options	*Rank*	Licensing Revenue (in millions)	*Rank*
Michigan's URC	**453**	***4***	**127**	***3***	**122**	***6***	**$38.7**	***5***
Northern California	674	*2*	203	*1*	180	*2*	$155.1	*1*
Southern California	673	*3*	124	*4*	131	*5*	$40.4	*4*
Illinois	452	*5*	123	*5*	102	*7*	$141.4	*2*
Massachusetts	739	*1*	201	*2*	201	*1*	$66.0	*3*
North Carolina	421	*6*	79	*7*	134	*4*	$9.3	*7*
Pennsylvania	420	*7*	111	*6*	135	*3*	$14.1	*6*

Source: See footnotes in Table 16
Analysis: Anderson Economic Group, LLC

The URC has improved its performance on a number of technology transfer indicators since our first report three years ago that reported average annual technology transfer activity between 2002 and 2006. As shown in Table 18, the number of URC patent grants on average has significantly improved since 2002 compared to the other university clusters. From 2002 to 2006, the URC ranked #6 for patents grants, but looking at activity from 2004 to 2008 the URC ranks #3. Similarly, the URC ranked #5 for start-ups cultivated from 2002 to 2006, but from 2004-2008, the URC ranks #4.

TABLE 18. Average Annual Patent and Licensing Activity Rankings

	2002-2006			2003-2007			2004-2008		
	Start-ups	Patent Grants	Licenses/ Options	Start-ups	Patent Grants	Licenses/ Options	Start-ups	Patent Grants	Licenses/ Options
Michigan's URC	**5**	**6**	**5**	**5**	**4**	**5**	**4**	**3**	**5**
Northern California	3	1	2	2	2	2	3	2	2
Southern California	2	4	3	3	5	4	2	4	5
Illinois	6	3	6	6	3	7	6	5	7
Massachusetts	1	2	1	1	1	1	1	1	1
North Carolina	7	7	6	7	7	6	7	7	4
Pennsylvania	4	5	4	4	6	3	5	6	3

Source: Universities' websites and technology transfer offices, Association of Technology Managers (AUTM) Surveys[a]
Analysis: Anderson Economic Group, LLC

a. See footnotes in Table 16 on page 18.

The URC cultivated more start-up companies than the North Carolina, Pennsylvania, or Illinois clusters, as shown in Table 19. While the URC was ranked fifth in 2007 with 14 start-ups, the URC cultivated 28 start-ups in 2008, the third highest number of start-ups cultivated by a university cluster. On average the URC ranks well (fourth) in respect to highest number of average annual number of start-ups from 2004 to 2008.

TABLE 19. Annual Number of Start-ups[a] Cultivated at University Clusters, 2004-2008

	2004	2005	2006	2007	2008	Average, 2004-08
Michigan's URC	**28**	**14**	**18**	**14**	**28**	**20**
Northern California	17	14	18	27	27	21
Southern California	18	24	36	25	31	27
Illinois	16	13	13	16	12	14
Massachusetts	27	28	29	35	34	31
North Carolina	16	8	14	9	16	13
Pennsylvania	19	18	21	21	16	19

Data Source: Universities' websites and technology transfer offices (See footnotes in Table 16 on page 18)

a. Average includes FY 2004-2008 data where available.

To measure the success of each university's R&D expenditures, we examined the amount of licensing revenue generated by each dollar of expenditure. Since licensing revenue can have large year-to-year variations caused by the sale of a large license, we compared the average revenue over a five-year period (2004-2008) to the total R&D expenditures in 2007 (the most recent year for which data is available). Table 20 shows that the URC has performed better than the North Carolina, Pennsylvania, and Southern California clusters in terms of revenues earned per R&D dollar spent.

TABLE 20. 2004-2008 Average Annual Licensing Revenue as a Percent of 2007 Expenditures

	Licensing Revenue (in millions)	Total R&D Expenditures[a] (in millions)	Revenues per Expenditures
Michigan's URC	**$37.1**	**$1,405**	**2.6%**
Northern California	$183.9	$2,083	8.8%
Southern California	$47.6	$2,130	2.2%
Illinois	$193.7	$1,240	15.6%
Massachusetts	$71.9	$1,196	6.0%
North Carolina	$10.4	$1,591	0.7%
Pennsylvania	$16.0	$1,408	1.1%

Sources: See footnotes in Table 16 on page 18
Analysis: Anderson Economic Group, LLC

a. Total expenditures are for 2007.

IV. Impact on Jobs and Income

SCALE OF OPERATIONS & EXPENDITURES

The University Research Corridor makes significant contributions to the state's economy. URC institutions spent almost $7.3 billion on operations in FY 2008 (July 1, 2007 to June 30, 2008) and employed 48,786 full-time-equivalent faculty and staff throughout Michigan.[12] About a quarter (23%) of expenditures paid for instruction of students, while 16% of expenditures went towards university research, as shown in Table 21. Over a quarter (28%) of all expenditures went towards equipment, supplies, salaries, and maintaining facilities at U-M Hospital.

TABLE 21. Operational Expenditures by the URC, FY 2008

	Expenditures ($ in millions)	% of Total
Instruction	$1,699	23%
Research[a]	$1,133	16%
Public Services, Academic Support, Student Services, and Institutional Support	$1,507	21%
Operation and Maintenance of Plants, Auxiliary Enterprises, Depreciation, and Other Expenses	$875	12%
University of Michigan Hospital	$2,046	28%
Total Operational Expenditures	**$7,260**	**100%**

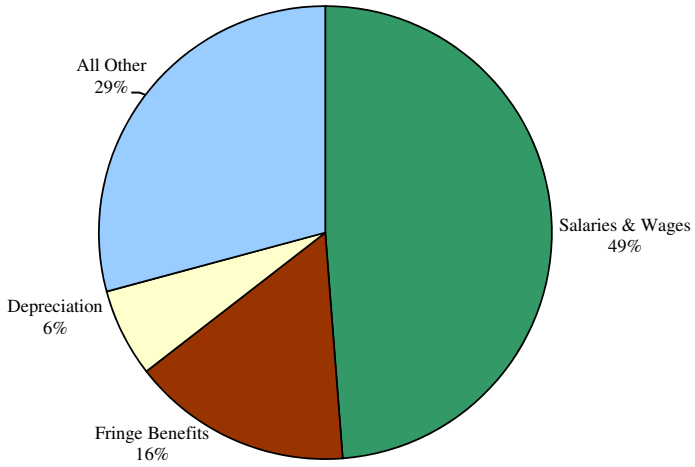
Data Source: IPEDS Finance FY 2008
Analysis: Anderson Economic Group, LLC

a. The data reported to IPEDS for research expenditures are lower than the research expenditures reported to the National Science Foundation. Research expenditures reported to IPEDS only include direct research costs. Indirect costs, while included in NSF reporting, are counted in other spending categories when reported to IPEDS.

We also examined URC expenditures by function, as shown in Figure 12 on page 22. Almost half (49%) of all operational expenditures were for salaries and wages for faculty and staff. Fringe benefits made up 16% of expenditures, while depreciation accounted for 6%. The remaining 29% paid for supplies, equipment, maintenance of plant, and any other expenditure not included in the previous categories.

12. Faculty and staff count is full-time-equivalent positions in fall 2006. Figure includes the University of Michigan Hospital doctors and staff.

FIGURE 12. URC Operational Expenditures by Function, FY 2008



Data Source: National Center for Education Statistics, IPEDS Finance
Analysis: Anderson Economic Group, LLC

URC expenditures encourage even more economic activity throughout the state of Michigan than indicated by total spending shown in Table 21 on page 21. The dollars the URC spends on supplies, equipment, and staff and faculty salaries are then re-spent as businesses and households throughout Michigan purchase other goods and services.

DEFINITION OF ECONOMIC IMPACT

We define *net economic impact* as the new economic activity directly or indirectly caused by the URC, excluding any economic activity associated with Research Corridor universities that merely replaces or displaces other economic activity in the state. For example, we exclude expenditures by students who would have attended another college in Michigan if the URC did not exist. Since these students would have stayed in Michigan and spent money in the state, we do not count these expenditures as new economic activity caused by the URC. We also exclude all expenditures by URC universities that go to firms outside Michigan.

To quantify the economic impact of URC universities' operational expenditures, we asked, in effect: "What would be the loss to the state if the three Research Corridor universities closed their doors?"

ECONOMIC IMPACT OF OPERATIONAL EXPENDITURES

New Earnings for Michigan Residents

The expenditures shown in Table 21 on page 21, pay the salaries of professors, researchers, doctors, administrative staff, and purchase supplies, equipment, and maintenance of physical plant. As the URC makes purchases, the money is then re-spent throughout the Michigan economy, creating a "multiplier" effect, generating more economic activity for the state.

In FY 2008, the URC's operations resulted in $9.3 billion in new earnings to households (compared to $8.3 billion in last year's 2008 benchmarking report). This takes into account the economic activity that would replace lost URC economic activity. For example, we account for the substitution of some URC staff and faculty to other jobs in Michigan if the URC universities no longer operated in Michigan. Therefore, not all current earnings by URC faculty and staff count as new earnings in our economic impact figure.

As shown in Table 22, we estimate that the net economic impact of URC non-payroll expenditures (excluding U-M hospital) was $2.16 billion in FY 2008. This includes the direct expenditures by URC universities for materials and supplies and the additional indirect economic activity that resulted from these expenditures. The U-M Hospital generated $746 million in net economic activity from its non-payroll operating expenditures. Finally, faculty and staff expenditures, after accounting for substitution, resulted in $4.3 billion in net new earnings, while student expenditures resulted in over $2 billion in net new earnings. See Table 22 below.

TABLE 22. Net Economic Impact of URC Operations, FY 2008

Impact Category	New Earnings in Michigan (in billions)
Non-payroll Operating Expenditures by the URC	$2.16
University of Michigan Hospital Non-payroll Operating Expenditures	$0.75
URC Faculty & Staff Expenditures	$4.33
URC Student Expenditures in Michigan	$2.05
TOTAL ECONOMIC IMPACT FROM OPERATIONS	**$9.29**

Source: Anderson Economic Group, LLC

As shown in Table 22, URC universities' non-payroll operating expenditures, including those by U-M Hospital, resulted in a net economic impact of $2.91 billion in Michigan ($2.16 billion plus $0.75 billion). Table 23 on page 24 breaks down this $2.91 billion into impact by industry in Michigan. As the URC spends money on such items as books, desks, computers, and insurance policies other businesses receive and re-spend this income. We estimated the portion of spending that occurs in Michigan, and used the U.S. Department of Commerce's Regional Input-Output Modeling System (RIMS II) multipliers to estimate how direct expenditures by the URC universities' indirectly affect other industries in the state.[13]

13. The U.S. Department of Commerce's RIMS II is based on input-output tables that show the distribution of inputs purchased by industry and outputs sold.

TABLE 23. Net Economic Impact of URC's Non-Payroll Expenditures by Industry, FY 2008

Industry	New Earnings in Michigan (in millions)
Agriculture	$17.3
Mining	$1.2
Utilities	$48.4
Construction	$13.6
Manufacturing	$244.6
Wholesale Trade	$81.2
Retail Trade	$121.2
Transportation	$69.3
Information	$58.6
Finance and Insurance	$108.5
Real Estate, Rental, and Leasing	$291.4
Professional, Scientific, & Technical Services	$91.5
Management of Companies & Enterprises	$38.4
Administrative & Waste Management Services	$79.7
Educational Services	$1,019.8
Health Care & Social Assistance	$484.2
Arts, Entertainment, and Recreation	$17.9
Accommodation and Food Services	$65.9
Other Services	$57.5
TOTAL NET ECONOMIC IMPACT, NON-PAYROLL EXPENDITURES	**$2,910.2**

Source: Anderson Economic Group, LLC

As illustrated in Table 23, the industries benefiting the most (in terms of level of new earnings) include manufacturing, real estate, educational services, and health care. All of these industries experienced new earnings in FY 2008 above $244 million.

Jobs Impact of URC Operations

We estimate that 69,800 jobs in Michigan in 2008 were directly or indirectly caused by the URC's operations in Michigan.This jobs figure includes 10,363 faculty members and 38,423 staff directly employed by the URC universities, and 21,014 indirectly-generated jobs in other industries in the state due to the expenditures by the URC universities and their faculty, staff, and students.

WAGE EARNINGS OF URC ALUMNI LIVING IN MICHIGAN

Alumni of URC universities contribute greatly to the state's economy. We calculated the earnings in 2008 of 572,123 URC alums living in Michigan using a model that accounts for the higher wages of URC alumni over the average college graduate's salary, the university of the graduate, and the alum's year of graduation. We detail our methodology in Appendix B of our first annual benchmarking study, released in 2007.

We estimate that in 2008 URC alumni earned over $26.6 billion, or 14.2% of all wage and salary income in Michigan. This is up from our estimate of $25.2 billion in 2007. While much of these earnings cannot be said to have been *caused* by the URC universities, this figure shows the scale of the URC's role in attracting and educating Michigan's workforce.

TABLE 24. Michigan Earnings of URC Alumni by Age and Degree, 2008 (in millions)

	21-24 Years	25-34 Years	35-44 Years	45-64 Years	Over 65 Years	Total
Bachelor Degree	$581	$4,186	$3,687	$7,168	$418	$16,039
Advanced Degree	$1	$2,960	$2,773	$4,378	$492	$10,604
Total Earnings	$582	$7,146	$6,460	$11,546	$909	$26,643
memo: Earnings as a percentage of wages & salary income in Michigan						*14.2%*

Source: Anderson Economic Group, LLC

ECONOMIC IMPACT OF INCREMENTAL URC ALUMNI EARNINGS

In addition to the gross earnings of URC alumni, we estimate the incremental earnings to URC graduates that is a result of their education at a URC university. Like all educational institutions, URC universities strive to increase the knowledge and skills of the students they teach. An increase in the usable knowledge and skills adds to their *human capital* and often allows a person to earn a higher wage—much like adding physical capital (e.g. buildings and equipment) allows a factory to increase production. For some small share of the URC's students, having access to a research university in Michigan is the difference between going to college and not. For others, it is the difference between remaining in the state for their college degree or pursuing their education outside Michigan. For the remainder of the students, the existence of URC universities simply means finding the right mix of features, location, and price, whatever their specific reason for choosing Michigan State, the University of Michigan, or Wayne State.

The main components of estimating the additional earnings of URC graduates are: (1) projecting the additional earnings of URC graduates, and (2) allowing for substitution of earnings that would have occurred even if the individual had not attended a URC university. We detail our methodology in Appendix B of our first annual benchmarking study, released in 2007. Note that using this methodology assumes that most of the current earnings of URC alumni living in Michigan are earnings they would have had even without the URC.

Using this same simulation model and an updated set of alumni data for 2008, we estimate that URC alums living in Michigan in 2008 earned $4.4 billion more due to the URC. Using the same tax and savings parameters and multipliers that we

used to estimate the economic impact of URC employees, we estimate that the net economic impact of incremental alumni earnings is $5.2 billion in 2008.

TOTAL NET ECONOMIC IMPACT

In FY 2008, the total net economic impact of the URC in Michigan was $14.5 billion. In other words, Michigan's residents were $14.5 billion richer due to the operations of the URC universities. This net economic impact figure takes into account the economic activity that would have occurred in Michigan even without the URC.

TABLE 25. Net Economic Impact of URC, FY 2008

Impact Category	New Earnings in Michigan (millions)
Non-payroll Operating Expenditures	$2,163.3
University of Michigan Hospital Non-payroll Operating	$746.8
Faculty & Staff Wages and Benefits	$4,331.0
URC Student Expenditures	$2,051.4
Subtotal: Impact of Operations	$9,292.5
Incremental Alumni Earnings[a]	$5,195.1
TOTAL ECONOMIC IMPACT	**$14,487.6**

Source: Anderson Economic Group, LLC

a. We estimate that $4.4 billion of earnings by URC alumni in 2008 were additional earnings directly caused by the education they received at a URC university. See "Wage Earnings of URC Alumni Living in Michigan" on page 25.

METHODOLOGY

In calculating the net economic impact, we follow a careful methodology that counts expenditures only once, takes into account substitution of one activity within the state by another, and uses very conservative multipliers for indirectly-caused activity. We detail our methodology for the economic impact of the operational expenditures by Research Corridor universities in "Operational Expenditures Methodology" in Appendix B.

V. Impact on State Revenue

This section provides an estimate of tax revenue the state of Michigan receives because of the URC's presence in Michigan. We estimate new tax revenue by first calculating the new wage and salary income that URC employees and alumni receive because of the URC.[14] Then, we estimate the income, sales, property, and transportation taxes generated as a result of this additional income. This estimate is, by necessity, an approximation, as the actual tax revenue collected by the state government is the result of millions of individual purchasing and tax planning decisions by URC employees and alumni. While we do not estimate *every* tax and fee the state collects because of the URC, we provide an estimate of most *new tax revenue* the state collects from (1) earnings of employees at URC universities and (2) earnings by URC alumni living in Michigan.

ADDITIONAL INCOME DUE TO THE URC

We estimate that $2.6 billion in wages of URC employees in Michigan was *caused by* the URC in 2008. This figure accounts for substitution of URC employees for other Michigan wages that would have been paid in the absence of the URC. We also estimate that URC alums living in Michigan in 2008 earned $4.4 billion more due to the URC.

CATEGORIZING INCOME

We categorize the earnings of employees and alumni caused by the URC into *marginal* and *average* income. The portion of alumni earnings that is earned *in addition to* what would have been earned without the URC is treated as "marginal income." We treat entire new salary and wage income for an employee or alum that is earned only because of the URC as "average income." This matters because people spend their first $1,000 of income differently than their last, and the state government taxes this income differently because of exemptions. Our methodology for this analysis is detailed in Appendix B of our first annual benchmarking study, released in 2007.

Employee Earnings. The income of URC employees is treated as average income. The earnings of URC employees comes largely from out-of-state income sources, so it is reasonable as a first approximation to treat URC employee jobs as jobs that would not exist without the URC, meaning each employee's entire income generates net new tax revenue. While it is possible that some of the income of URC employees could be treated as marginal income, treating it as average income is more conservative because average income is taxed at a lower average rate than is marginal income, as shown in Table 26 on page 28.

14. As described in the first annual benchmarking study, released in 2007, we use a conservative methodology to estimate the current earnings caused by the URC. Specifically, we assume that most URC graduates would have attended college somewhere else if these institutions were not in Michigan, and would have earned wages near those of the average for college graduates of their age.

URC Alumni. For some graduates, attending a URC university likely had no impact on their annual Michigan earnings (and therefore to the taxes they pay to the state of Michigan). Other graduates will earn extra income due to the URC, and therefore will pay additional taxes to the state. The proportion of their additional income that goes to taxes depends on whether their additional Michigan income due to the URC represents a pay boost (for graduates who would still be working in Michigan without the URC) or if their entire Michigan income is due to the URC (for graduates who otherwise would not be working in Michigan). As described below, we apply different effective tax rates to "average" and "marginal" income.

EFFECTIVE TAX RATES ON INCOME

This analysis recognizes that average and marginal income are taxed and spent differently. To account for this difference, we estimate an "effective rate" for each type of income that is taxed, which is the amount we anticipate they will pay in taxes divided by their income.[15] Table 26 below shows the percentage of income we assume is paid to the State of Michigan. Note that our analysis includes major taxes such as income, sales, state-level property, and gasoline taxes, but does not consider additional, non-sales taxes on alcohol and tobacco, or other state taxes and fees.

TABLE 26. Percentage of Income Paid to the State of Michigan

Tax	On Additional Marginal Income	On Additional Average Income
Personal Income Tax	4.35%	2.36%
Sales and Use Tax	1.70%	2.62%
Property Tax	0.38%	0.47%
Transportation Tax	0.13%	0.30%

Source: Analysis by Anderson Economic Group

Income Tax. The tax rate on marginal income in Michigan was 4.35% in 2008. We do not attempt to estimate the proportion of marginal income going toward tax exempt expenditures. To calculate the 2.36% income tax rate on average income, we divided the state's revenue from the income tax in 2007 by the state's personal income, then scaled the result to account for the personal income tax rate's rise from 3.9% to 4.35%.[16]

Sales Tax. We calculate the sales and use tax burden using data from the U.S. Bureau of Labor Statistics' 2005 Consumer Expenditure Survey. First, we identified spending categories subject to the sales and use tax.[17] We estimate that consumers in the middle 20% of earners (making between $33,381 and $53,358 in income)

15. For example, if someone makes $10,000 and spends $7,000 of that on items subject to the 6% state sales and use tax, he or she will pay 6% of $7,000, or $420 in taxes. His or her effective sales tax rate is $420 divided by $10,000, or 4.2%.

16. Base data source for the income tax in 2007 was the Michigan Senate Fiscal Agency. Revenue from income tax in 2007 was $7,324,800,000. According to the U.S. Bureau of Economic Analysis, personal income was $345,940,000,000 in 2007.

spent approximately 43.6% of their 2005 income on goods subject to the sales and use tax, yielding an effective rate on *income* of 43.6% times the 6% sales tax rate, or 2.62% of their entire income. This is the effective sales tax rate on additional average income. To calculate the effective rate on marginal income, we calculated the proportion subject to sales tax of the additional spending done by people in the middle 20% of earners and the second highest 20% of earners (making between $53,358 and $85,147 in income). We estimate that 28.4% of this additional income is spent in sales-taxable categories, resulting in an effective sales tax on marginal income of 28.4% times the 6% sales tax, or 1.70%.

Property Tax. We estimate the proportion of expenditures that goes toward property taxes on average using the 2005 Consumer Expenditure Survey. We find that, on average, people in the middle 20% of income spend 2.8% of their income on property taxes. We multiply 2.8% by the proportion state property taxes to all state and local property taxes (16.7%) to arrive at an effective rate on income of 0.47%.[18] We also find that 2.3% of the additional income earned by earners in the second highest quintile goes toward property taxes. Again multiplying by 16.7% of taxes going to the state government, we estimate the effective property tax rate on marginal income to be 0.38%.

Transportation Taxes. We estimate the proportion of expenditures that goes toward gasoline using the Consumer Expenditure Survey. We find that, on average, people in the middle 20% of income spend 4.7% of their income on gasoline. We multiply this rate by 6.3%, the effective rate of the gasoline tax,[19] resulting in an effective rate on income of 0.30%. We also find that 2.1% of the additional income earned by earners in the second highest quintile goes toward fuel. Again multiplying by the 6.3% effective gas tax rate, we estimate the effective gas tax rate on marginal income to be 0.13%.

TOTAL ADDITIONAL STATE TAX REVENUES

We find $1.27 billion in income categorized as "marginal," and $5.76 billion in "average" income ($3.12 billion from alumni and $2.64 billion from URC employees). We calculate the additional taxes to the State of Michigan due to the URC universities by multiplying this income by the effective tax rates identified in Table 26 of the preceding section. Table 25 below shows the results of this analysis: $414.2

17. We identified 15 such spending categories, including travel; alcoholic beverages; housing maintenance; repairs, and other household expenses; postage and stationery; clothing; vehicles and vehicle maintenance; entertainment; personal care products, and others. Although we are aware that some expenditures currently are subject to the state's sales and use tax, but are not reported, we did not account for evasion or avoidance in this analysis.

18. See 2004 U.S. Census of Governments State and Local Finance data.

19. Gasoline is not taxed as a percentage of its price, but rather at a per-unit rate of $0.15 per gallon. The gasoline tax of $0.19 per gallon is divided by $3 per gallon of gasoline to yield a 6.3% effective rate.

million in additional tax revenue to the state of Michigan paid by URC graduates in 2008.

TABLE 27. Additional Tax Revenue to State of Michigan Caused by URC, 2008

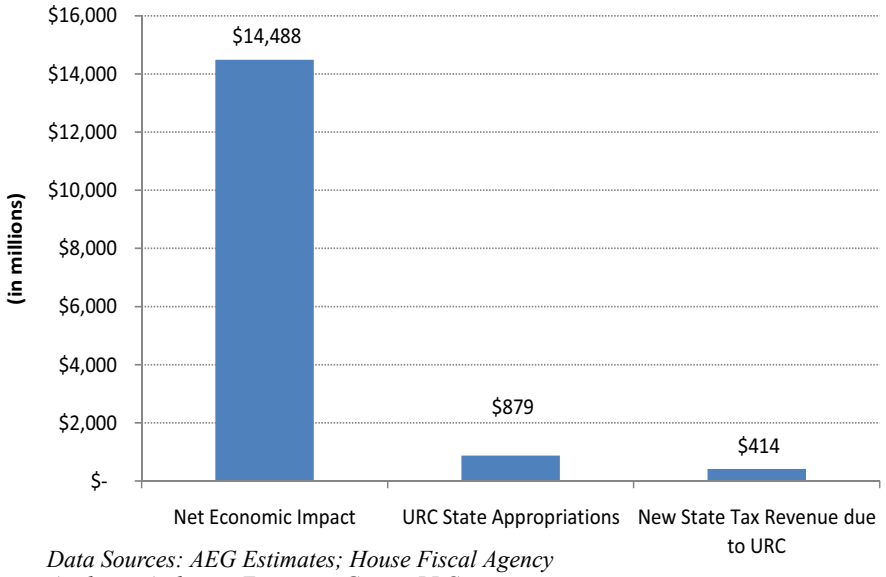
	Effective Tax Rate on Marginal Income	Marginal Income and Tax Receipts (million)	Effective Tax Rate on Average Income	Average Income and Tax Receipts (million)
Total Additional Income		$1,269		$5,760
Personal Income	4.35%	$55.2	2.36%	$136.0
Sales and Use Tax	1.70%	$21.6	2.62%	$150.7
Property Tax	0.38%	$4.9	0.47%	$26.9
Gasoline Tax	0.13%	$1.7	0.30%	$17.1
Subtotal		$83.4 (A)		$330.8 (B)
			Total Tax Receipts (A+B)	$414.2

Base Data Sources: AEG; 2005 Consumer Expenditure Survey by BLS

COMPARISON WITH ECONOMIC IMPACT AND URC APPROPRIATIONS

Comparing the URC's net economic impact on the state to the state's appropriations for URC universities illustrates how much greater the benefits of the URC universities are compared to the cost. As shown in Figure 13 below, the $14.4 billion in net economic impact is over 16 times greater than the state's funding for the URC universities in FY 2008 of $879 million. In addition, the State of Michigan receives $414 million in tax revenue from URC employees and alumni that it would otherwise not have received if the URC did not exist in Michigan.

FIGURE 13. URC Net Economic Impact and New State Tax Revenue vs. State Appropriations



Data Sources: AEG Estimates; House Fiscal Agency
Analysis: Anderson Economic Group, LLC

Appendix A: Data

TABLE A-1. Total Enrollment, Fall 2004-2007

	2004	2005	2006	2007	2004-2007 CAGR
Michigan's URC					
Undergraduate Enrollment	92,283	93,397	93,821	93,519	0.44%
Graduate Enrollment	38,167	37,969	37,814	40,126	1.68%
Other	2,052	1,965	1,985	2,052	0.00%
TOTAL	132,502	133,331	133,620	135,697	0.80%
Northern California					
Undergraduate Enrollment	29,443	30,058	30,285	31,220	1.97%
Graduate Enrollment	24,950	25,394	24,325	26,501	2.03%
Other	55	35	31	64	5.18%
TOTAL	54,448	55,487	54,641	57,785	2.00%
Southern California					
Undergraduate Enrollment	61,759	62,387	63,530	64,360	1.38%
Graduate Enrollment	31,030	31,394	32,717	33,544	2.63%
Other	226	496	304	321	12.41%
TOTAL	93,015	94,277	96,551	98,225	1.83%
Illinois					
Undergraduate Enrollment	43,292	44,664	45,458	45,082	1.36%
Graduate Enrollment	29,012	29,489	30,029	30,787	2.00%
Other	1,328	1,485	1,493	1,240	-2.26%
TOTAL	73,632	75,638	76,980	77,109	1.55%
Massachusetts					
Undergraduate Enrollment	18,567	19,627	19,090	19,066	0.89%
Graduate Enrollment	26,091	25,372	26,579	26,602	0.65%
Other	2,601	2,766	2,894	2,807	2.57%
TOTAL	47,259	47,765	48,563	48,475	0.85%
North Carolina					
Undergraduate Enrollment	45,580	46,065	47,184	48,167	1.86%
Graduate Enrollment	24,025	25,434	25,036	25,369	1.83%
Other	3,106	2,982	2,826	2,699	-4.57%
TOTAL	72,711	74,481	75,046	76,235	1.59%

TABLE A-1. Total Enrollment, Fall 2004-2007 (Continued)

(Continued)	2004	2005	2006	2007	2004-2007 CAGR
Pennsylvania					
Undergraduate Enrollment	93,207	91,926	95,435	97,465	1.50%
Graduate Enrollment	24,659	24,278	24,548	24,960	0.41%
Other	5,007	4,700	4,681	4,647	-2.46%
TOTAL	122,873	120,904	124,664	127,072	1.13%

Source: *NCES, IPEDS Enrollment*

TABLE A-2. Completions and Awards by Academic Program Area, 2006-07 academic year

	Physical Science, Ag, and Nat. Resources	Business, Mngt, and Law	Engineering, Math, Computer Science	Liberal Arts	Medicine and Bio. Science	Other
Michigan's URC						
Bachelor's Degrees	830	2,803	2,434	8,515	3,918	784
Advanced Degrees	542	2,845	2,127	3,508	2,423	223
Other	69	21	8	355	61	12
TOTAL	**1,441**	**5,669**	**4,569**	**12,378**	**6,402**	**1,019**
Northern California						
Bachelor's Degrees	485	490	1,766	4,851	1,680	56
Advanced Degrees	404	1,669	1,939	1,512	1,355	203
Other	0	0	13	187	81	0
TOTAL	**889**	**2,159**	**3,718**	**6,550**	**3,116**	**259**
Southern California						
Bachelor's Degrees	376	1,743	2,247	9,583	3,955	43
Advanced Degrees	315	2,173	2,584	3,114	2,229	4
Other	51	47	188	295	136	0
TOTAL	**742**	**3,963**	**5,019**	**12,992**	**6,320**	**47**
Illinois						
Bachelor's Degrees	761	1,175	2,015	5,411	1,832	268
Advanced Degrees	394	6,031	1,380	2,969	1,009	146
Other	0	29	0	23	16	5
TOTAL	**1,155**	**7,235**	**3,395**	**8,403**	**2,857**	**419**

TABLE A-2. Completions and Awards by Academic Program Area, 2006-07 academic year (Continued)

	Physical Science, Ag, and Nat. Resources	Business, Mngt, and Law	Engineering, Math, Computer Science	Liberal Arts	Medicine and Bio. Science	Other
Massachusetts						
Bachelor's Degrees	278	95	1,135	2,617	698	1
Advanced Degrees	318	2,024	1,698	2,674	1,602	31
Other	4	216	4	29	93	9
TOTAL	**600**	**2,335**	**2,837**	**5,320**	**2,393**	**41**
North Carolina						
Bachelor's Degrees	931	1,105	1,975	5,049	2,308	326
Advanced Degrees	492	2,020	1,150	1,797	1,658	38
Other	0	0	0	1	34	0
TOTAL	**1,423**	**3,125**	**3,125**	**6,847**	**4,000**	**364**
Pennsylvania						
Bachelor's Degrees	830	3,657	3,744	7,039	2,903	1,133
Advanced Degrees	345	1,630	1,604	2,606	1,384	103
Other	33	347	159	1,442	571	265
TOTAL	**1,208**	**5,634**	**5,507**	**11,087**	**4,858**	**1,501**

Source: National Center for Education Statistics, IPEDS Enrollment

TABLE A-3. Undergraduate Degrees Conferred 2006-2007, Percentage of Total Degrees Conferred

	Physical Science, Ag. and Nat. Resources	Business Mngt., and Law	Engineering, Math, Computer Science	Liberal Arts	Medicine and Bio. Science	Other
Michigan's URC	**4.30%**	**14.54%**	**12.62%**	**44.16%**	**20.32%**	**4.07%**
Northern California	5.20%	5.25%	18.93%	52.00%	18.01%	0.60%
Southern California	2.10%	9.71%	12.52%	53.40%	22.04%	0.24%
Illinois	6.64%	10.25%	17.58%	47.21%	15.98%	2.34%
Massachusetts	5.76%	1.97%	23.53%	54.25%	14.47%	0.02%
North Carolina	7.96%	9.45%	16.89%	43.18%	19.74%	2.79%
Pennsylvania	4.30%	18.94%	19.39%	36.46%	15.04%	5.87%

Source: National Center for Education Statistics, IPEDS Enrollment
Analysis: Anderson Economic Group, LLC

TABLE A-4. Graduate Degrees Conferred 2006-2007, Percentage of Total Degrees Conferred

	Physical Science, Ag. and Nat. Resources	Business Mngt., and Law	Engineering, Math, Computer Science	Liberal Arts	Medicine and Bio. Science	Other
Michigan's URC	**4.65%**	**24.38%**	**18.23%**	**30.07%**	**20.77%**	**1.91%**
Northern California	5.70%	23.57%	27.38%	21.35%	19.13%	2.87%
Southern California	3.02%	20.86%	24.80%	29.89%	21.39%	0.04%
Illinois	3.30%	50.56%	11.57%	24.89%	8.46%	1.22%
Massachusetts	3.81%	24.25%	20.34%	32.04%	19.19%	0.37%
North Carolina	6.88%	28.23%	16.07%	25.12%	23.17%	0.53%
Pennsylvania	4.50%	21.25%	20.91%	33.97%	18.04%	1.34%

Source: National Center for Education Statistics, IPEDS Enrollment
Analysis: Anderson Economic Group, LLC

Appendix B. Methodology

OPERATIONAL EXPENDITURES METHODOLOGY

In order to quantify the economic impact of the URC's activities, we asked ourselves the following question: What would the loss be to the state if the URC universities left Michigan? We then studied the loss in terms of jobs, earnings, and output.

We quantified the *net economic impact*, which we define as the new economic activity directly or indirectly caused by the University Research Corridor, excluding any economic activity that replaces or displaces other activity in the state. We followed the following steps to calculate the net economic impact of the URC's operational expenditures.

Determined In-State Expenditures. The first step in estimating the net economic impact of the URC's operational expenditures was to determine the payroll and non-payroll expenditures by the URC that remained within the state. We did this in the following steps.

1. We obtained salary, fringe benefit, and non-payroll expenditures for the URC universities for FY 2008 from the National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS).
2. We relied on information provided by the universities to determine the percentage of expenditures that went to businesses located outside of Michigan.
3. We used data from the universities and the 2007 Consumer Expenditure Survey from the U.S. Bureau of Labor Statistics to calculate URC student expenditures in Michigan, and to account for a percentage of expenditures that go to firms outside Michigan.

Accounted for Likely Substitution. After calculating the non-payroll and payroll expenditures by the URC and student expenditures, we accounted for spending that would have occurred even if the URC were not part of the state's economy. For instruction of Michigan residents, we used a substitution effect of 10%. One way to think about this is that 10% of URC students from Michigan would remain in Michigan for their college degree if the URC disappeared, and that the spending associated with their education would also remain in the state. Thus, this is not *new* economic activity caused by the URC.

We used a zero substitution effect for out-of-state students who come to Michigan. It is unlikely that most out-of-state students would come to Michigan for their bachelor's or advanced degree if the URC were not in operation. We counted the expenditures on the instruction of and spending by these students as new economic activity caused by the URC.

Most research dollars come from out-of-state sources. URC universities receive 93% of all federal research dollars in Michigan. To account for a small increase in research expenditures by other universities in Michigan in the absence of the URC, we chose a small substitution effect of 2% for research expenditures.

We used a substitution effect of 30% for faculty and staff expenditures. We assumed that almost all tenured faculty would leave the URC, but about half the staff would find jobs in Michigan. We used a substitution effect appropriate to the payroll share of staff and faculty that would leave the state. For hospital faculty and staff, we use a 14% substitution effect, assuming that some staff would go to other hospitals in Michigan if the URC universities did not exist.

Finally, we used a substitution effect of 30% for non-payroll hospital expenditures. Based on the operations of the hospital, we accounted for some of the clinical care currently provided by UMHS being taken up by other hospitals in Michigan. We assumed that speciality clinics and most research would go elsewhere.
See Table B-1 below.

TABLE B-1. Substitution Effect Parameters for URC Expenditures Analysis

Category	Parameter
Instruction of Resident MSU Students	10%
Instruction of Non-resident MSU Students	0%
Research Dollars	2%
Student Expenditures	6%
Faculty Expenditures	30%
Hospital Expenditures	30%
Hospital Faculty and Staff	14%

Source: Anderson Economic Group, LLC

Direct and Indirect Impacts. The *direct* economic impact is calculated as the in-state non-payroll operational expenditures by the URC and the in-state expenditures of URC faculty, staff, and students, after accounting for substitution. This is spending that only occurs in the state because of the URC. See Table B-2 on page B-4.

We calculated the *indirect* economic impact of URC's expenditures by multiplying the direct expenditures by U.S. Department of Commerce's Regional Multipliers (RIMS II). We use the multipliers for industry 611A00 Colleges, Universities, and Junior Colleges for the State of Michigan. See Table B-2 on page B-4.

Methodology Differences from 2008 Report. We made several changes to how we calculated the economic impact of the URC from last year's report. Due to differences in IPEDS reporting of financial information for colleges and universities, we were able to allocate depreciation to the research expenditures category where in past reports we were unable to do so. This reduced the expenditures in the instruction category and added some expenditures to the research category. Otherwise, we treated depreciation the same as we had in past years' reports. We also updated the amount students spend on living expenses based on new data from the Consumer Expenditures Survey for 2006 and updated room and board costs for the URC universities.

HUMAN CAPITAL METHODOLOGY

See our first annual URC benchmarking study, released in 2007, for our detailed methodology in estimating certain parameters used in alumni earnings.

Incremental Alumni Earnings in 2008 Caused by URC

We estimated the additional 2008 earnings using data on URC alumni, outputs from our human capital model simulation (regarding sorting graduates as detailed in Appendix B of our 2007 report), and using other data, such as wage and workforce participation data, which were part of our human capital simulation model used in our 2007 analysis.

We used the following methodology:

1. Estimate the current earnings of URC alumni living in Michigan using the methodology detailed in our 2007 URC economic impact report.
2. Estimate the proportion of URC alumni in each counterfactual group (as detailed in our 2007 URC economic impact report) by assuming that all past years' graduating classes exhibited the same behavior as our estimates for the current year's graduating class.
3. Use census and workforce participation data to calculate each counterfactual category's total earnings.
4. Subtract the current earnings from the counterfactual earnings to find the *additional* earnings of current URC alumni due to the URC.

Table B-2. Net Economic Impact of URC's Operations

FY 2008 (July 1, 2007 - June 30, 2008)

Direct Expenditures In-State, After Likely Substitution

				Impact in State of Michigan
A.	Instruction of In-State Students (Non-payroll)		$ 1,029,576,543	
	less: expenditures out of state	*40%*	$ (411,830,617)	
	Subtotal: Expenditures in state		$ 617,745,926	
	less: substitution of higher expenditures by other MI colleges & univ.	*10%*	$ (61,774,593)	
				$ 555,971,333
B.	Instruction of Out-of-State Students (Non-payroll)		$ 309,820,932	
	less: expenditures out of state	*40%*	$ (123,928,373)	
	Subtotal: Expenditures in state		$ 185,892,559	
	less: substitution of out-of-state students to other MI colleges & univ.	*0%*	$ -	
				$ 185,892,559
C.	Research Expenditures (Non-payroll)		$ 509,118,059	
	less: expenditures out of state	*50%*	$ (254,559,030)	
	Subtotal: Expenditures in state		$ 254,559,030	
	less: substitution of more research dollars coming into other MI colleges & univ.	*2%*	$ (5,091,181)	
				$ 249,467,849
D.	Student Living Expenses (excludes tuition and fee expenditures)		$ 1,760,677,441	
	less: expenditures out of state	*5%*	$ (88,033,872)	
	Subtotal: Expenditures in state		$ 1,672,643,569	
	less: likely substitution of students to other colleges in MI	*6%*	$ (100,358,614)	
				$ 1,572,284,954
E.	URC Employee Earnings & Fringe Benefits, After Taxes (excluding Hospital)		$ 2,987,699,657	
	less: expenditures out of state, savings	*20%*	$ (597,539,931)	
	Subtotal: Expenditures in state		$ 2,390,159,726	
	less: likely substitution to jobs with other universities in Michigan	*30%*	$ (717,047,918)	
				$ 1,673,111,808
F.	Hospital Expenditures (Non-payroll)		$ 607,069,000	
	less: expenditures out of state	*20%*	$ (121,413,800)	
	Subtotal: Expenditures in state		$ 485,655,200	
	less: likely substitution of higher spending by other MI hospitals	*30%*	$ (145,696,560)	
				$ 339,958,640
G.	Hospital Employee Earnings & Fringe Benefits, After Taxes		$ 1,252,961,730	
	less: expenditures out of state, savings	*20%*	$ (250,592,346)	
	Subtotal: Expenditures in state		$ 1,002,369,384	
	less: likely substitution to jobs with other health care systems in Michigan	*14%*	$ (140,331,714)	
				$ 862,037,670
	Total Direct Expenditures (in state, after substitution)			**$ 5,438,724,814**

Data Sources: National Center for Education Statistics, IPEDS Finance; URC Universities; 2005 Consumer Expenditure Survey

Indirect Expenditures In-State, After Likely Substitution

A.	Instruction of In-State Students (Non-payroll)	*2.1822*	$ 657,269,310
B.	Instruction of Out-of-State Students (Non-payroll)	*2.1822*	$ 219,762,183
C.	Research Expenditures (Non-payroll)	*2.1822*	$ 294,920,891
D.	Student Living Expenses (excludes tuition and fee expenditures)	*1.3047*	$ 479,075,226
E.	URC Employee Earnings & Fringe Benefits, After Taxes (excluding Hospital)	*1.6781*	$ 1,134,537,117
F.	Hospital Expenditures (Non-payroll)	*2.1968*	$ 406,862,500
G.	Hospital Employee Earnings & Fringe Benefits, After Taxes	*1.7672*	$ 661,355,301
	Total Indirect Expenditures (in state, after substitution)		**$ 3,853,782,528**

Table B-2. Economic Impact of URC's Operations (continued)

				Impact in State of Michigan
Total Direct & Indirect Expenditures In-State, After Likely Substitution				
A.	Instruction of In-State Students (Non-payroll)			$ 1,213,240,644
B.	Instruction of Out-of-State Students (Non-payroll)			$ 405,654,742
C.	Research Expenditures (Non-payroll)			$ 544,388,740
D.	Student Living Expenses (excludes tuition and fee expenditures)			$ 2,051,360,180
E.	URC Employee Earnings & Fringe Benefits, After Taxes (excluding Hospital)			$ 2,807,648,925
F.	Hospital Expenditures (Non-payroll)			$ 746,821,140
G.	Hospital Employee Earnings & Fringe Benefits, After Taxes			$ 1,523,392,971
	TOTAL NET ECONOMIC IMPACT OF UNIVERSITY OPERATIONS			**$ 9,292,507,342**
Jobs Impact on the State, After Likely Substitution				
A.	Number of FTE Faculty, Excluding Hospital		8,447	
	less likely substitution to other jobs in Michigan	*12%*	(1,014)	
	Subtotal: New faculty jobs in Michigan		7,433	
	** Indirect Employment Multiplier*	*2.20*	8,920	
	Total Faculty in Michigan Caused by URC Operations			16,353
B.	Number of FTE Faculty, Hospital		1,916	
	less likely substitution to other jobs in Michigan	*8%*	(153)	
	Subtotal: New faculty jobs in Michigan		1,763	
	** Indirect Employment Multiplier*	*1.93*	1,647	
	Total Faculty in Michigan Caused by URC Operations			3,410
C.	Number of FTE Staff, Excluding Hospital		27,113	
	less likely substitution to other jobs in Michigan	*40%*	(10,845)	
	Subtotal: New staff jobs in Michigan		16,268	
	** Indirect Employment Multiplier*	*2.00*	16,268	
	Total Staff in Michigan Caused by URC Operations			32,536
D.	Number of FTE Staff in Hospital		11,310	
	less likely substitution to other jobs in Michigan	*20%*	(2,262)	
	Subtotal: New staff jobs in Michigan		9,048	
	** Indirect Employment Multiplier*	*1.93*	8,454	
	Total Staff in Michigan Caused by URC Operations			17,502
	Total Direct & Indirect Jobs Caused by URC			**69,800**

Appendix C: About the Authors

CAROLINE M. SALLEE

Ms. Sallee is a consultant and director of the Chicago office at Anderson Economic Group, working in the Public Policy, Fiscal, and Economic Analysis practice area. Ms. Sallee's background is in applied economics and public finance.

Ms. Sallee is the primary author of the first two *Annual Economic Impact Reports* for Michigan's University Research Corridor. Her recent work includes fiscal and economic impact studies for Michigan State University and Wayne State University, and the benchmarking of Michigan's business taxes with other states in a project for the Michigan House of Representatives.

Prior to joining Anderson Economic Group, Ms. Sallee worked for the U.S. Government Accountability Office (GAO) as a member of the Education, Workforce and Income Security team. She also has worked as a market analyst for Hábitus, a market research firm in Quito, Ecuador, and as a legislative assistant for two U.S. Representatives.

Ms. Sallee holds a master's degree in public policy from the Gerald R. Ford School of Public Policy at the University of Michigan and a Bachelor of Arts degree in economics and history from Augustana College.

PATRICK L. ANDERSON

Mr. Anderson, principal and CEO, founded the consulting firm of Anderson Economic Group in 1996. Since founding the firm, he has successfully directed projects for state governments, cities, counties, nonprofit organizations, and corporations in over half of the United States.

Prior to founding Anderson Economic Group, Mr. Anderson served as the chief of staff of the Michigan Department of State and as a deputy director of the Michigan Department of Management and Budget, where he was involved in the largest state privatization project in U.S. history and the landmark 1994 school finance reform constitutional amendment. Prior to his involvement in state government, Mr. Anderson was an assistant vice president of Alexander Hamilton Life Insurance, an economist for Manufacturers National Bank of Detroit, and a graduate fellow with the Central Intelligence Agency.

Mr. Anderson has written over 100 articles published in periodicals such as *The Wall Street Journal, The Detroit News, The Detroit Free Press, Crain's Detroit Business*. His book *Business Economics and Finance* was published by CRC Press in August 2004, and his paper on "Pocketbook Issues and the Presidency" was awarded the Edmund Mennis Award for best contributed paper in 2004 by the National Association for Business Economics. He is a graduate of the University of Michigan, where he earned a master's degree in public policy and a bachelor's degree in political science.

CONTRIBUTORS

Alex L. Rosaen

Mr. Rosaen is a consultant at Anderson Economic Group, working in the Public Policy and Economics practice area. Mr. Rosaen's background is in applied economics and public finance.

Prior to joining Anderson Economic Group, Mr. Rosaen worked for the Office of Retirement Services (part of the Michigan Department of Management and Budget) for the Benefit Plan Design group. He also has worked as a mechanical engineer for Williams International in Walled Lake, Michigan.

Mr. Rosaen holds a Master of Public Policy degree from the Gerald R. Ford School of Public Policy at the University of Michigan. He also has a Master of Science degree and a Bachelor of Science degree in mechanical engineering from the University of Michigan.

Justin Eli

Justin Eli is an analyst in the Finance and Business Valuation and Public Policy and Economics practice areas. His work includes economic and financial analyses, business valuations, and strategy consulting. His recent work includes an industry review of the U.S. beer market, as well as an analysis of changes in the U.S. automotive industry. He also contributed to the book *Applied Game Theory and Strategic Behavior*, which was published in July 2009 by CRC Press.

Prior to joining AEG, Justin was a financial analyst at Macy's Inc. developing and implementing short and long term strategies for driving sales. In January of 2008, Mr. Eli received an award from the senior vice-president and director of planning for outstanding achievement and success in strategic planning of fourth-quarter sales.

Mr. Eli graduated from the School of Literature, Science, and the Arts at the University of Michigan with a bachelor's degree in Economics.