

University of New Brunswick

Vice-President (Research) & Office of Research Services

Annual Report 2012-2013





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Highlights from the year in research...

- Dr. David Burns installed as the Vice President Research.
- Grant revenues up on both campuses.
- NSERC Discovery grant success rate up by 4 percentage points.
- SSHRC non-Insight grant success rate up by 15 percentage points.
- CIHR Open Operating Grant success rate moves up to 22% from 0%.
- NSERC Engage grant success rate at 100%, again.
- Drs. Zengtao Chen, Ted McDonald and Hugh Thomas join the ranks of our University Research Scholars.
- Natural Products Research Group (Saint John campus) receive media attention.
- Several more highlights are described in the Success Stories section of the report.

Message from the Vice-President (Research)

As I settle into my 2nd year at UNB, I have spent much of my time getting to know the research strengths and desires of the university for the future. This understanding is important in order to determine how the research office can help to achieve our goals. The following annual report illustrates some of these strengths.

Research funding for 2012-2013 has stalled a bit with a slight decrease back to 2010-2011 levels. Similar trends were seen for most Comprehensive Universities, with few universities advancing (pg 5). Much of the decrease was due to fewer Canadian non-government contracts, though both non-tricouncil Federal and Provincial investments in research were increased. Despite this trend our research intensity as measured by revenue per faculty topped the \$100K mark again (pg 8). However, our tri-

council funding dropped by 8.6% from last year's level (pg 9-10). This results in a proportional lower allocation of indirect costs of research funding to the university that helps to support the university's research efforts (pg 9). Fortunately, even with the decrease in funding there was only a slight decline in numbers of graduate students, the graduate enrolment did not fall back to our 2010-2011 levels (pg 19). Likewise, it has not dampened our commitment to scholarly work and acknowledgement of the impact this work has on our society as shown by the research highlights of the year (pg 22-38)

During this last year, there has been a clear (\$80M over 5 years) commitment in the provincial government with the goal to support innovation. To help the university assist in achieving these



David Burns
VP Research

goals several new graduate fellowships programs have been developed through the New Brunswick Innovation Foundation and the New Brunswick Health Research Foundation. UNB is in an excellent position to take advantage of this opportunity.

Message from the Executive Director of ORS

The 2012-13 fiscal year regrettably saw a reversal of the up-ward trend in our research revenues that we had seen in the preceding fiscal year. While there are many positive stories emanating from the university's research activities in the 2012-13 fiscal year that are covered herein, I am concerned that we appear to be "stuck" in the 50-60M\$ research revenue band. In order to break out of this band and grow our research activity we must renew and revitalize our research enterprise. The first step of that process began in the current fiscal year with the Vice-President Research's initiation of discussions that are required for UNB to develop a new Strategic Research Plan.

During fiscal year 2012-13 we saw the provincial government signal its interest in supporting "innovation" as a key

component of its economic development agenda. These Initiatives are beginning to be felt with marked increases in both grant and contract revenues originating from the provincial government. UNB is seen as a key player in the province's innovation agenda given our prominent position as a centre for research activity in the province.

Critical to our need to grow our research activity is our ability to broaden our research base. For example, our new partnerships based in, but not limited to Saint John, related to the medical education program are beginning to generate research activity that will grow considerably over the next five years. Similarly, I see evidence-based social policy development research as a growth area that UNB is

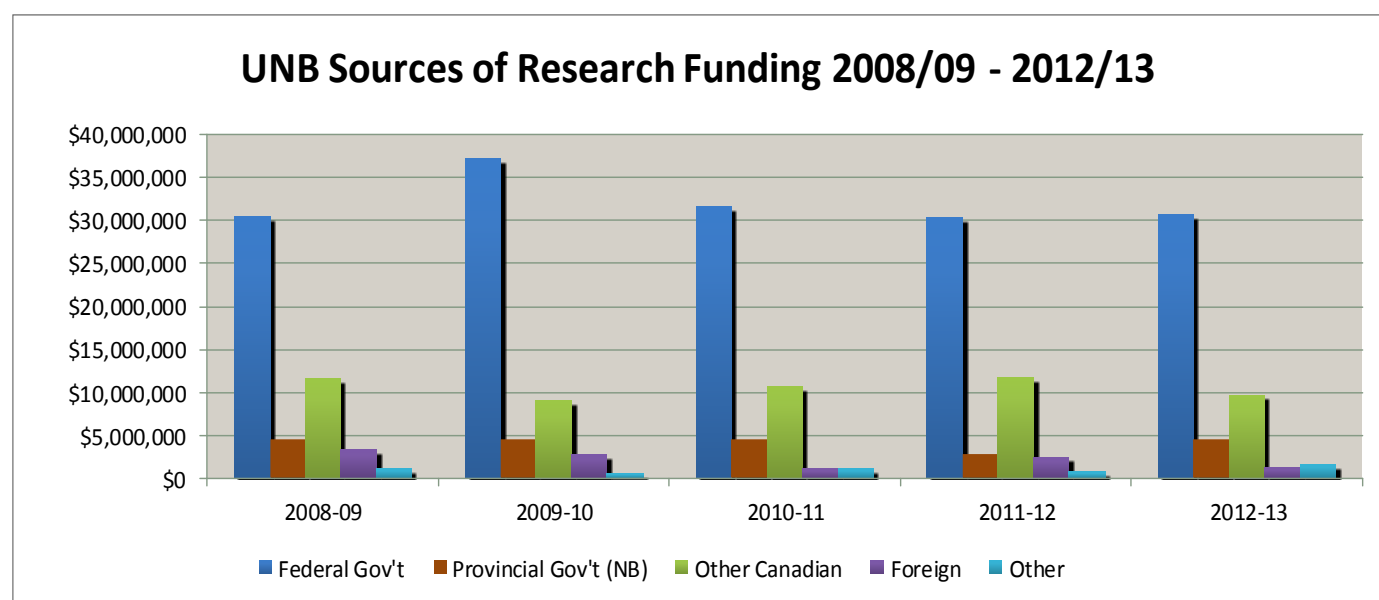
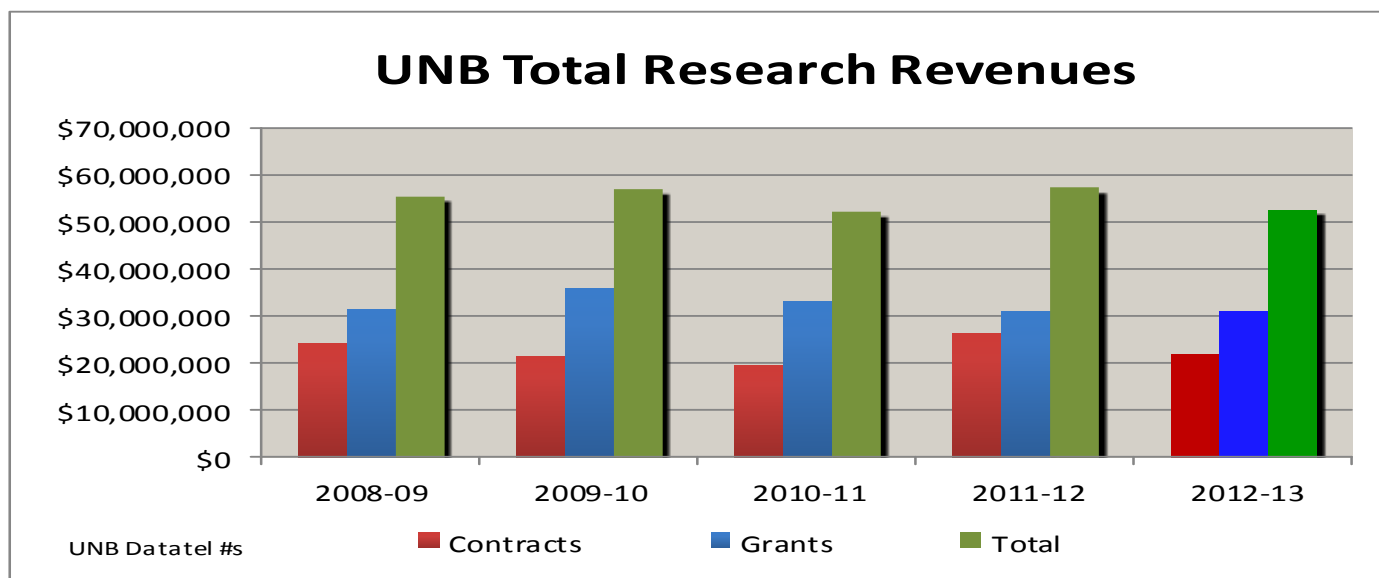


Dwight Ball
Executive Director (ORS)

aggressively pursuing from which considerable benefits will accrue to the university over the next five years.

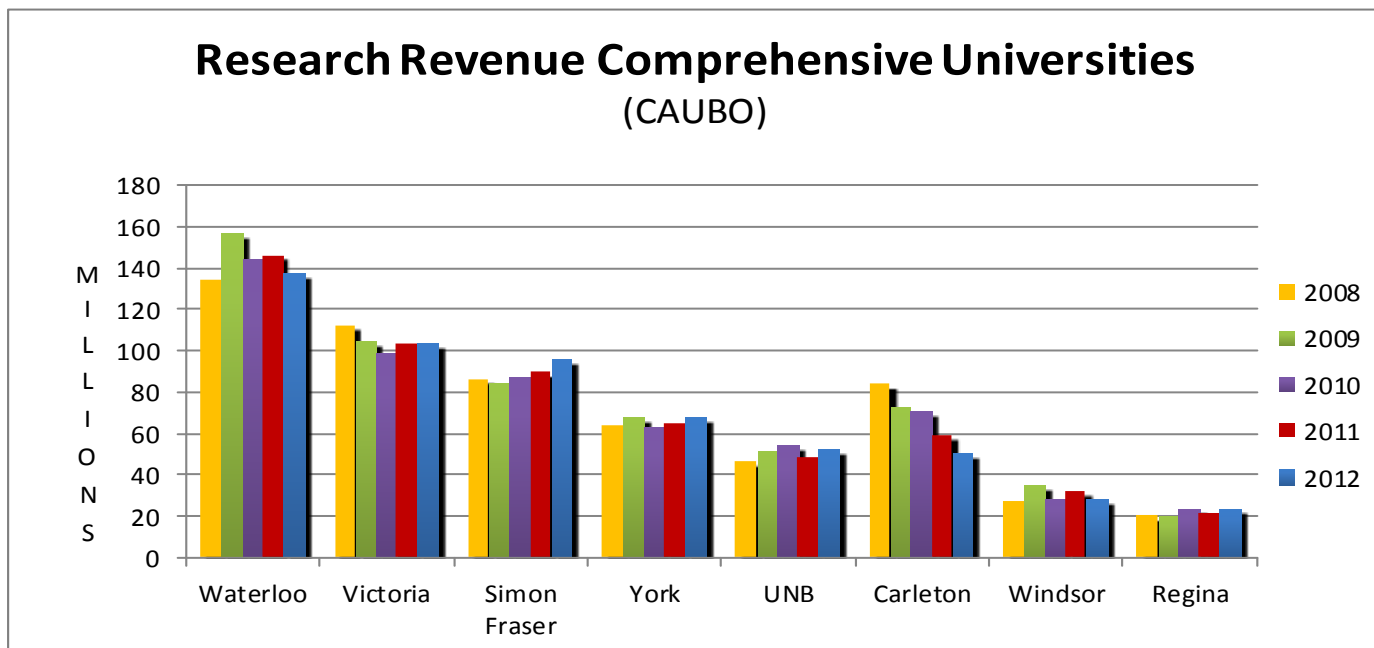
Research Revenue

The 2012-13 fiscal year saw our research revenues revisit the levels of 2010-11. After the significant upswing of 2011-12 we are now back at \$52,800,051, off 8% from 2011-12 and on par with 2010-11. Grant revenues, however, were up on both campuses, 3% in total and 5% in Saint John. This increase was due largely to a marked increase (138%) in Fredericton for New Brunswick provincial grant revenues and non-Tricouncil Federal government grants (+84%) in Saint John. Contract revenues were off in total (-14%) due largely to a marked drop in Canadian non-government contracts on both campuses, while provincial government contracts increased in Fredericton. Royalty revenues were off, due largely to the spike enjoyed in 2011-12 due to the IBM buy-out of Q1 Labs that resulted in elevated royalty revenues in that year.

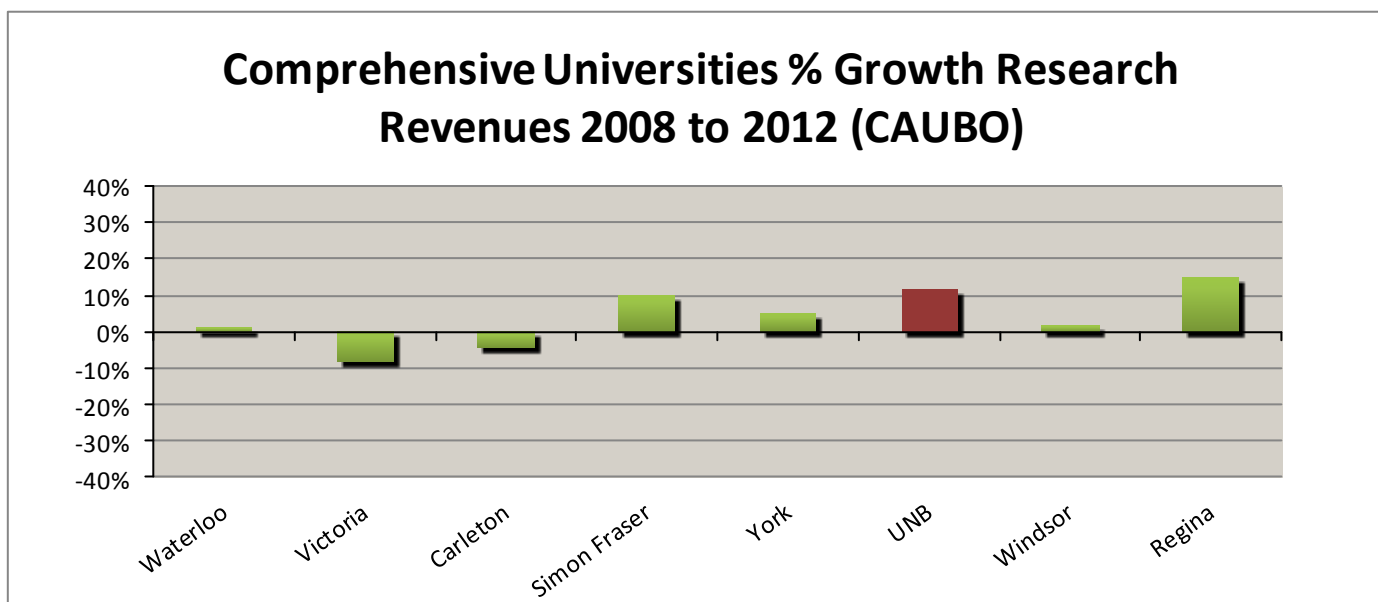


Research Revenue (continued)

The Canadian Association of University Business Officers (CAUBO) compiles research-related revenues based on mutually agreed upon definitions. It is this number that is used for inter-institutional comparisons. In the fiscal year 2012-13, UNB's CAUBO number was \$49,115,707, down 6% from the final CAUBO number for the previous year of \$52,286,979. The inter-institutional comparative revenues graphed below are one year in arrears due to reporting and publication delays. In 2012 UNB placed fifth, up one position from last year in its commonly reported peer group, having surpassed Carleton University.



We have routinely reported our percentage growth in CAUBO research revenues over a rolling five year period in comparison to our peer group of universities. Last year, we ranked 2nd after the University of Regina for the period 2008 to 2012.



Research Revenue (continued)

Research Revenue per Generating Unit

The following table attributes research revenues by generating unit during the last fiscal year. Note that other research revenues are generated by the university, but are not reported on this table (e.g., the Indirect Costs of Research grant).

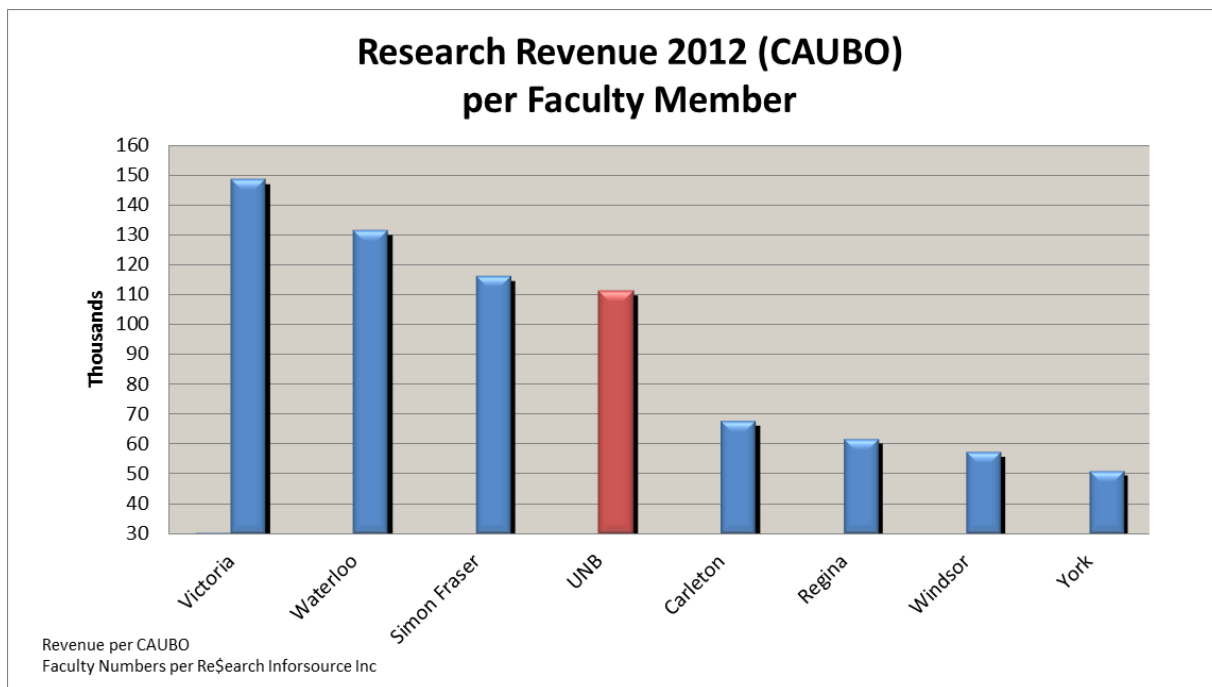
Research Revenues per Generating Unit				
UNIT	Grants	Contracts	Other	Total
ADMINISTRATION (F)	4,000	242,687		246,687
ARTS (F)	3,070,745	109,150	20,894	3,200,789
Arts	271,000			271,000
Anthropology				
Classics				
Economics	544,137	26,337		570,474
English	104,073		-45	104,028
History	445,733	67,813	19,515	533,061
Philosophy				
Political Science				
Psychology	522,702			522,702
French	46,122			46,122
Culture & Language Studies				
Sociology	1,136,978	15,000	1,424	1,153,402
COMPUTER SCIENCE (F)	1,036,104	813,687		1,849,791
EDUCATION (F)	827,589	31,570		859,159
ENGINEERING (F)	5,933,488	4,023,287	299,857	10,186,632
Chemical Engineering	2,622,899	1,194,956	231,640	4,049,495
Civil Engineering	609,044	595,388	44,508	1,248,940
Electrical Engineering	1,467,489	1,408,038		2,875,527
Mechanical Engineering	523,436	164,463		687,899
Geodesy & Geomatics	638,125	660,442		1,298,567
J Herbert Smith ACOA Chair	72,495		-46,291	26,204
FORESTRY	3,201,168	1,702,944	55,518	4,959,630
KINESIOLOGY	315,250	110,810		426,060
LAW	24,000	112,295		136,295
NURSING (F)	343,773			343,773

Research Revenues per Generating Unit (continued)

Research Revenues per Generating Unit				
UNIT	Grants	Contracts	Other	Total
SCIENCE (F)	5,532,141	2,621,809	114,451	8,268,401
Math & Stats	331,017			331,017
Biology	2,365,115	278,821	5,580	2,649,516
Chemistry	757,893	209,091		966,984
Earth Sciences	972,356	1,545,791	108,871	2,267,018
Physics	1,105,760	588,106		1,693,866
INSTITUTE OF BIOMEDICAL ENGINEERING (IBME)	401,293	2,298,753		2,700,046
CHRONIC ILLNESS RESEARCH INSTITUTE (CIRI)	77,068			77,068
CANADIAN RESEARCH INSTITUTE FOR SOCIAL POLICY (CRISP)	160,948	1,364,530		1,525,478
CDN. RIVERS INSTITUTE (CRI) (F & SJ)	1,341,452	464,075		1,805,527
SCHOOL OF GRAD STUDIES	228,000	1,645,603		1,873,603
RENAISSANCE COLLEGE	103,000			103,000
HIL		4,338		4,338
CADMI MICROELECTRONICS			31,226	31,226
ARTS (SJ)	-832	14,717		13,885
History & Politics	-489			-489
Social Science		14,290		14,290
Criminal Justice Studies	-343	427		84
Psychology				
BUSINESS (SJ)		149,767	6,200	155,967
SCIENCE & ENGINEERING (SJ)	2,978,636	948,246		3,926,882
Biology	2,751,401	815,579		3,566,980
Physical Sciences	98,900	110,000		208,900
Nursing/Health Sciences	49,335			49,335
Engineering				
Mathematical Science, Computer Science and Applied Stats	79000	22,667		101,667

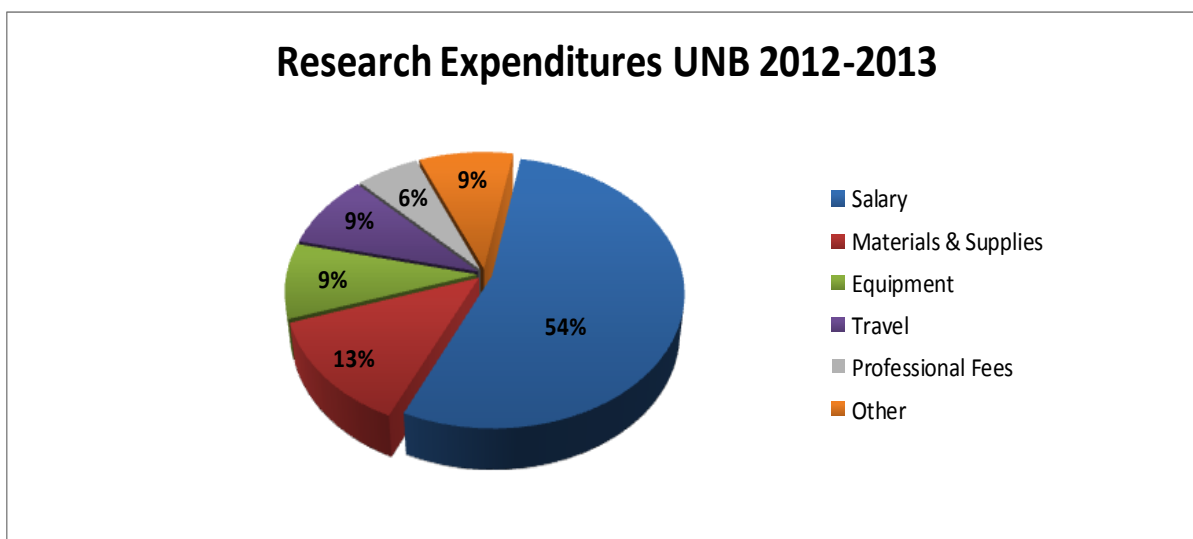
Research Revenue (continued)

A metric that is commonly cited when comparing the research intensity at universities is the research revenue generated per faculty member. In order to make such a comparison credible, independent sources are required for the two metrics. For our purposes, we use Re\$earch Info Source Inc. and CAUBO. In 2012, as in 2010 and 2011, UNB ranked fourth, having broken through the \$100k per faculty member barrier in 2011.



Research Expenditures

The majority of the research funding received by UNB goes back into the New Brunswick economy through salaries. In 2012-13, \$24 million was spent on student and non-student salaries. Equipment, materials and supplies consumed \$8.9 million and travel \$3.6 million.



NOTE: The bulk of all research revenues eventually flow back out as expenses. Due to the timing of different accounting tasks, however, total research expenditures will not equal total research revenues for the fiscal year.

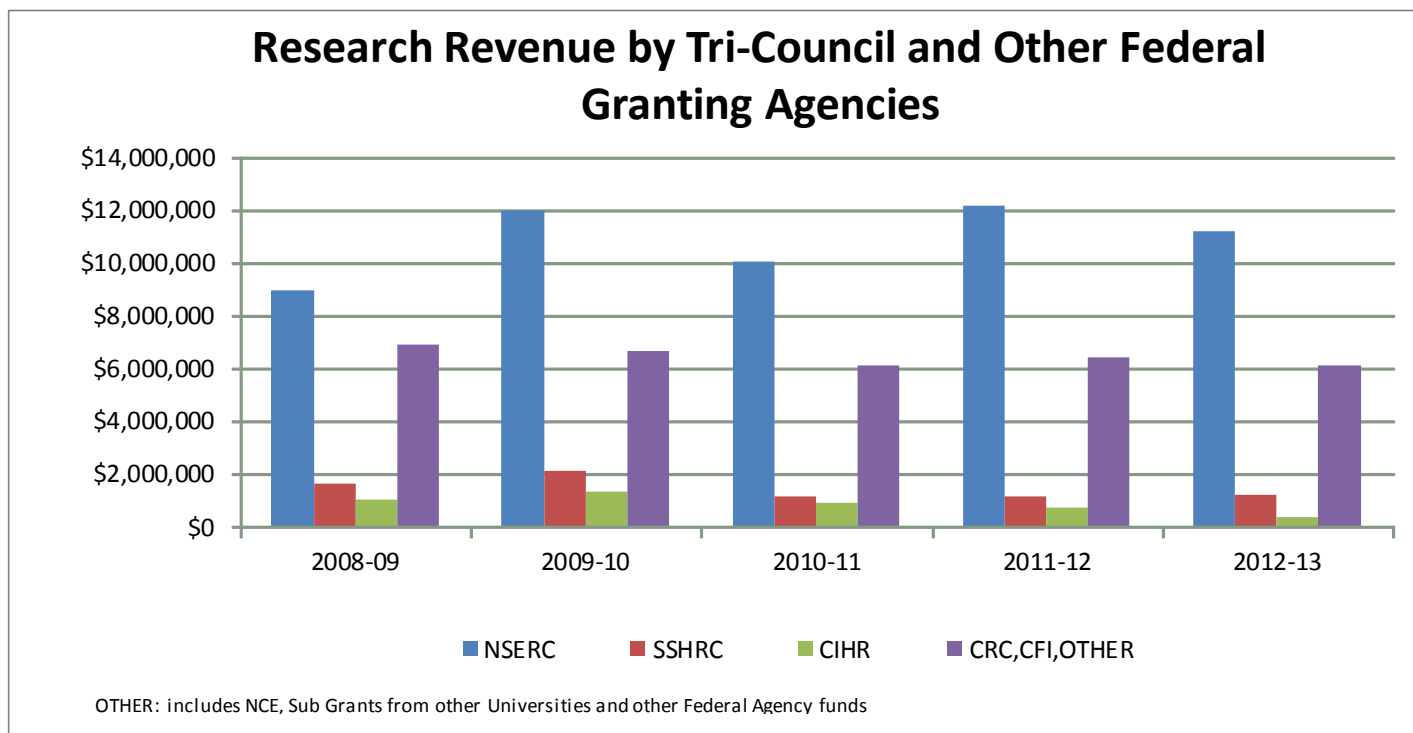
Indirect Costs of Research



The Indirect Costs of Research grant provides funding for research facilities, resources, management and administration, regulatory requirements, accreditation and intellectual property management. The amount universities receive from this program is contingent on their level of tri-Council funding based on a three-year rolling average. The university's allocation for 2012-13 was \$3,574,976, and the allocation for the 2013-14 fiscal year is \$3,559,359.

Tri-Council Funding

The University's tri-Council (NSERC, SSHRC, CIHR) revenues in 2012-13 decreased by 8.6% overall to \$12,828,188 from the \$14M level of 2011-12. The Fredericton campus saw a decrease of 10.2% while the Saint John campus saw a modest gain of just under 0.5%. Other tri-Council (CRC, CFI, other) grants dropped back to 2010-11 levels of \$6M from \$6.4M in 2011-12..



As indicated, grants from Tri-Council are a very important component of UNB's research activities. The details of our successes or lack thereof are being continuously scrutinized. To that end, details of our submissions to and awards from NSERC, SSHRC and CIHR for the calendar year 2012 are depicted on the following table (totals will differ from those presented for *fiscal year 2012-13*).

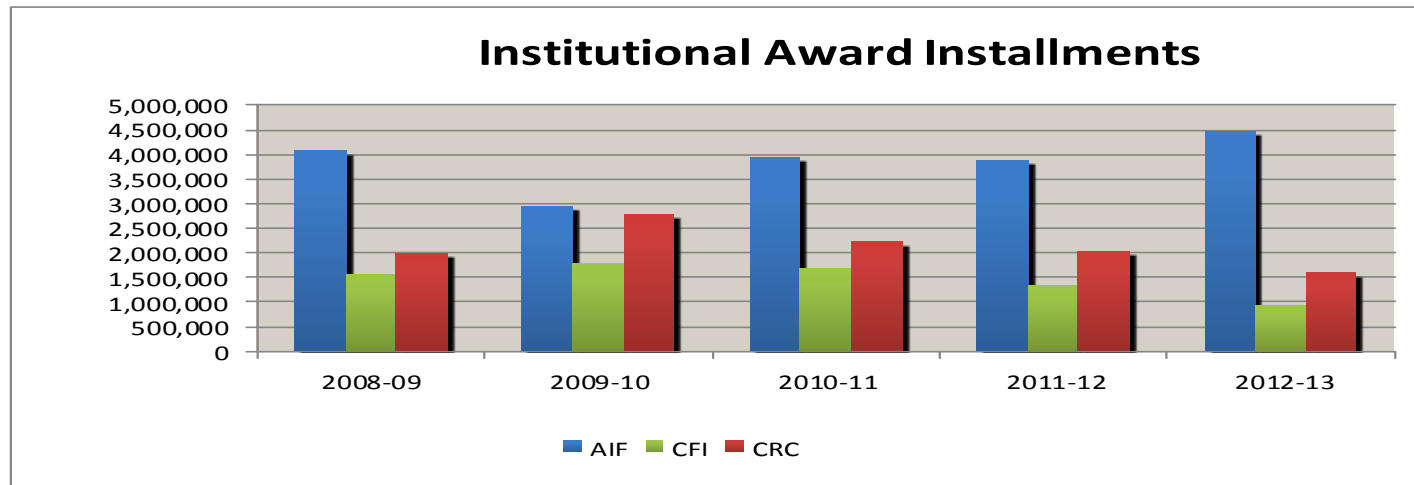
In order to facilitate comparisons, we have also provided last year's (2011) metrics.

Tri-Council Success

Tri-Council - 2012 Results							
Submissions	Program	Submitted	Requested	Successful	Awarded	Success Rate	Funding Rate
	CRD	4	562,157	3	452,157	75.0%	80.4%
NSERC	Strategic Project	1	296,000	0	0	0.0%	0.0%
	RTI	16	932,023	1	61,915	6.3%	6.6%
	Discovery	53	14,478,352	25	3,190,200	47.2%	22.0%
	Engage	25	618,540	25	614,540	100.0%	99.4%
	Other	12	757,060	6	231,926	50.0%	30.6%
	Total NSERC	111	17,644,132	60	4,550,738	54.1%	25.8%
SSHRC	Insight	20	3,184,850	2	259,311	10.0%	8.1%
	Other	10	530,816	5	295,591	50.0%	55.7%
	Total SSHRC	30	3,715,666	7	554,902	23.3%	14.9%
CIHR	OOG	9	2,160,297	2	175,170	22.2%	8.1%
	Other	11	1,457,716	2	28,000	18.2%	1.9%
	Total CIHR	20	3,618,013	4	203,170	20.0%	5.6%

Tri-Council - 2011 Results							
Submissions	Program	Submitted	Requested	Successful	Awarded	Success Rate	Funding Rate
NSERC	CRD	4	\$1,000,000	4	\$995,000	100%	99.5%
	Strategic Project	4	\$2,340,114	1	\$598,260	25.0%	25.6%
	RTI	18	\$1,330,827	3	\$291,462	16.7%	21.9%
	Discovery	42	\$11,649,751	18	\$2,585,000	42.9%	22.2%
	Engage	20	\$492,458	20	\$492,458	100.0%	100.0%
	Other	13	\$5,915,142	6	\$213,902	46.2%	3.6%
	Total NSERC	101	\$22,728,292	52	\$5,176,082	51.5%	22.8%
SSHRC	Insight	22	\$3,827,901	6	\$1,350,782	27.3%	35.3%
	Other	17	\$5,288,067	6	\$342,144	35.3%	6.5%
	Total SSHRC	39	\$9,115,968	12	\$1,692,926	30.8%	18.6%
CIHR	OOG	7	\$2,431,780	0	\$0.00	0.0%	0.0%
	Other	3	\$66,895	2	\$36,539	66.7%	54.6%
	Total CIHR	10	\$2,498,675	2	\$36,539	20.0%	1.5%

Institutional Funding



Atlantic Innovation Fund (AIF)

The Atlantic Canada Opportunities Agency announced project approvals for Round 9 applications in May 2012. Three UNB-led projects were approved:

Dr. Felipe Chibante (Chemical Engineering) was awarded \$1.5 million for his project intended to lower the cost of fullerene manufacturing for solar cells.

Dr. Weichang Du (Computer Science) was awarded \$1.4 million for his software engineering project to integrate business vocabularies, rules, and process modules for engineering enterprise systems.

Dr. Yun Zhang (Geodesy and Geomatics) was awarded \$1.9 million for his project to develop software systems for triple-sensitive surveillance cameras with improved sensitivity and imaging sensors.

As well, Dr. Wei Song (Computer Science) is playing an important role in a project led by Mariner Partners to develop internet monitoring solutions for companies offering TV and video to mobile devices.

Canada Foundation for Innovation (CFI)

In 2012-13, UNB was successful in having one new CFI project approved at a total value of \$199,724, plus an additional \$59,917 in Infrastructure Operating Funds to help maintain the equipment. UNB researchers are currently leading 28 active CFI infrastructure projects involving \$4.5 million from the CFI and \$6 million from matching sources.

Institutional Funding (continued)

Canada Research Chairs

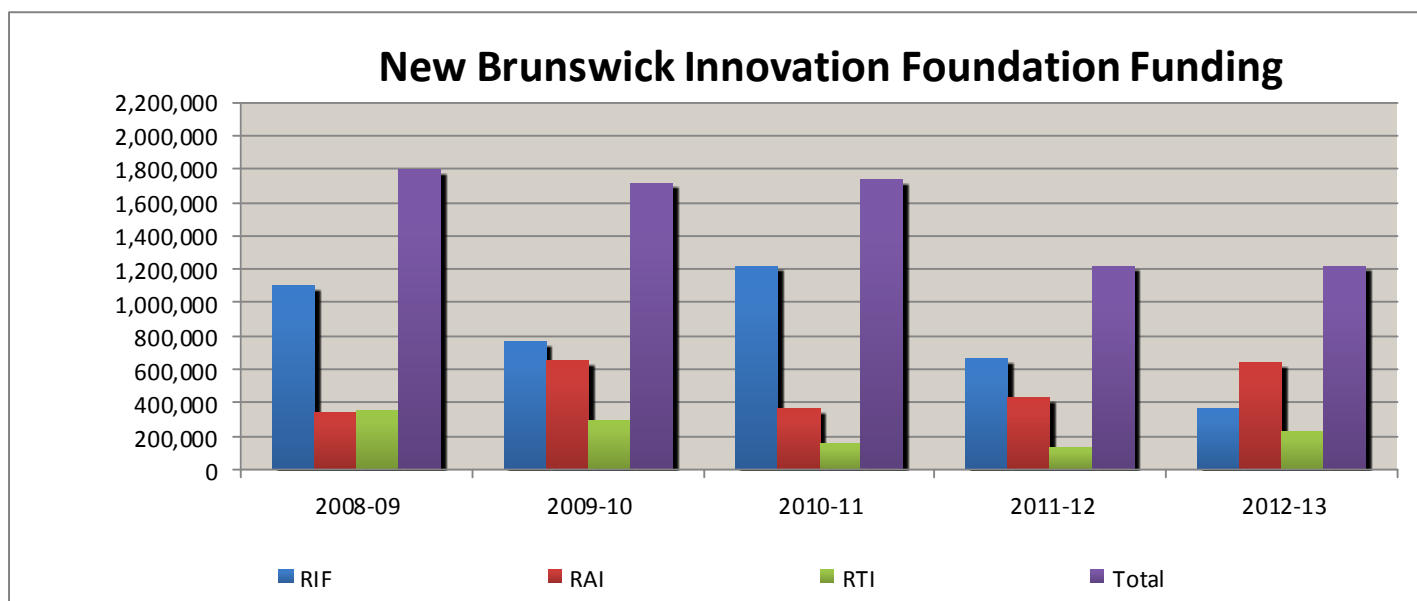
UNB received \$2.2 million for our 15 active Canada Research Chairs in 2012-13. During the fiscal year, Dr. Ying Zheng (Chemical Engineering) was awarded a Tier 2 Chair in Chemical Process and Catalysis. UNB also submitted a new nomination for a Tier 2 Chair, which, if successful, would bring us to our full allocation of 16 Canada Research Chairs.

UNB's CRC contingent as of April 30, 2012:

	Name	Department/Faculty	CRC in...	Tier
1	Bruce Balcom	Physics/Chemistry	Materials Science MRI	1
2	Rick Cunjak	Biology (F)	River Ecosystem Science	1
3	José Domene	Education	School to Work Transition	2
4	Michael Haan	Sociology/Economics	Population and Social Policy	2
5	Karen Kidd	Biology (SJ)	Chemical Contamination of Food Webs	2
6	Kerry MacQuarrie	Civil Engineering	Groundwater-Surface Water Interaction	2
7	Elizabeth Mancke	History	Atlantic Canada Studies	1
8	Christopher Martyniuk	Biology (SJ)	Aquatic Molecular Ecology	2
9	Kelly Munkittrick	Biology (SJ)	Ecosystem Health Assessment	1
10	Yonghao Ni	Chemistry/Chemical Engineering	Pulp and Paper Science and Engineering	1
11	Lucia O'Sullivan	Psychology	Adolescent Sexual Health Behaviour	2
12	John Spray	Geology	Planetary Materials	1
13	Doug Willms	Education	Literacy and Human Development	1
14	Yun Zhang	Geodesy & Geomatics Engineering	Advanced Geomatics Image Processing	2
15	Ying Zheng	Chemical Engineering	Chemical Process and Catalysis	2

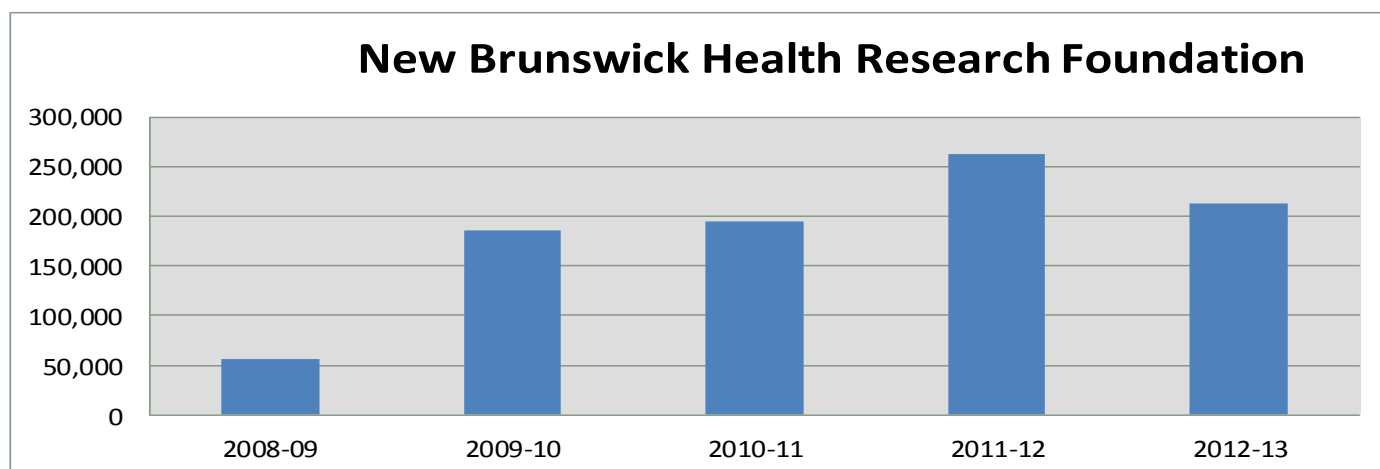
New Brunswick Innovation Foundation

The New Brunswick Innovation Foundation continued to be a strong supporter of research at UNB. However, although total funding in 2012-13 equalled the previous year, both years are off by approximately half a million dollars from the previous three years. In 2012-13, losses in the RIF program were offset by gains in both the RTI and RAI programs.



New Brunswick Health Research Foundation

The New Brunswick Health Research Foundation is now a well established research funding entity in the province. UNB has been successfully accessing NBHRF funds since 2008. As the graph below indicates, since 2009-10 NBHRF contributions to our research enterprise have been in the 220K–250K range.



Industrial Research Assistantship Program (National Research Council)

Since 2006, UNB, through ORS, has been providing short-term technical assistance to Canadian companies under the NRC IRAP contribution to Organization (C2Org) Program and since 2012 through the Digital Technology Adoption Pilot Program (DTAPP).

The objective of the C2Org initiative is to support the innovative needs of Canadian SMEs through the provision of short term technical assistance from faculty and staff of the University. UNB provides the expertise of its faculty, staff and associates to meet industry needs for advice on technical issues that include, but are not limited to:

- On-site troubleshooting of issues in manufacturing, packaging, testing, etc.
- Initial assessment of new product concepts or standards
- Literature searches
- Technology searches and reviews
- Selection of equipment
- Assisting with preparation of technical research methodologies
- Preliminary market research as part of a product development process
- Technical training of company staff
- Seminars on specific technical issues of interest to industry
- Ad-hoc advice

The objective of the DTAPP initiative is to support productivity growth of Canadian SMEs across all sectors through the adoption of digital technologies.

UNB is able to provide these services thanks to the support of the National Research Council's Industrial Research & Assistance Program (NRC-IRAP).

For the 2012-13 fiscal year, a total of 20 consultation projects, involving 15 researchers were completed worth a total of \$78,146. A total of three seminars and workshops on business intelligence and intellectual property commercialization were completed worth \$18,632.00.

Since inception a total of 139 projects have been completed under this program.

One DTAPP was completed by one researcher valued at \$35,141.00.

NRC-IRAP C2Org Program						
	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Projects Completed	19	17	25	18	19	20
# of UNB Faculty Involved	23	21	21	16	15	15

It is important to note that separate from the NRC- IRAP C2Org Program administered by ORS and reported above, the Wood Science & Technology Centre in the Faculty of Forestry & Environmental Management administers a C2Org Program specific to its industry sector.

Intellectual Property Management, Technology and Knowledge Transfer

The Industry-Government Services (IGS) division of the Office of Research Services connects business to researchers and guides research to market. In 2012-13, IGS:

- Obtained the following awards (\$116,560.47 total) from Springboard Atlantic Inc. to assist in moving technologies through the commercialization process: two Proof-of-Concept awards (totalling \$20,000) in Electrical Engineering; four Patent & Legal Awards (totalling \$36,851.92) in Electrical Engineering (2), Chemical Engineering, and Geodesy & Geomatics Engineering; two Market Support awards (totalling \$23,165) in Civil and Mechanical Engineering; and four Industry Engagement awards (totalling \$36,543.55).
- Facilitated 22 IRAP Network Member Agreements and 2 IRAP DTAPP projects with faculty.
- In support of the Pre-Awards office, assisted with 3 NSERC Interaction grants, 23 NSERC Engage grants, and 2 NSERC CRD grants.
- Managed 13 new invention disclosures.
- Entered into 3 technology transfer agreements with industry.
- Filed 30 patent applications.
- Had 6 previous patent applications issue as registered patents.
- Filed 3 new Section 9 trademarks, each of which was advertised.
- Received revenues (licensing income and patent reimbursements) of \$78,772.
- Helped to facilitate 3 successful ACOA Atlantic Innovation Fund awards valued at \$5,861,688.

Technology & Knowledge Transfer							
	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2000-2013
Disclosures	18	15	14	16	12	13	231
Patents Filed	22	22	27	23	19	30	226*
Patents Issued	7	6	4	4	4	6	42
Total Patents Pending	56	64	68	71	80	73	n/a
License Agreements	10	12	15	7	7	3	109
Gross Revenue Received**	\$269,107	\$448,991	\$287,190	\$281,390	\$1,954,029	\$78,772	\$4,492,988
Start-ups Created	2	2	3	0	1	0	18
* covers 85 separate technologies							
** Note: Gross Revenues = Licensing Income + Patent Reimbursements							

Intellectual Property Management, Technology Transfer and Knowledge Transfer (continued)

UNB's track record as measured by the common metrics for IP Management, Technology and Knowledge Transfer is comparable. The tables below report the number of formal disclosures made by researchers, the number of new US patent applications filed, and the number of licence agreements executed at UNB, normalized for size based on research expenditures. The metrics, reported for the 2011-12 and 2012-13 fiscal years, compare UNB to most Canadian and United States averages. UNB is at the Canadian average and but below the US average for disclosures (although while the US average went up, both the UNB and Canadian numbers fell overall. UNB filed more new US patents in 2012-13, but while still slightly above the Canadian average, it is still below the US average, which remained constant from the previous reporting period. The number of licence agreements executed at UNB continue to be above the Canadian and US averages.

Since the establishment of the Intellectual Property Management Program within the Office of Research Services in late 1999, UNB has been active in transferring technologies into the marketplace, with a strong focus on industry collaboration. In the 13-year period from 2000 to 2013, UNB has:

- Managed 231 invention disclosures;
- Filed 66 US Provisional, 53 Canadian, 66 Non-Provisional US and 41 Other (European, PCT, etc.) patent applications (226 total) for 85 separate technologies;
- Seen 42 patents issued;
- Filed 18 Section 9 trademarks for the University;
- Completed 109 technology transfer deals;
- Secured licensing revenues and patent reimbursements of just under \$4.5 million;
- Assisted in the creation of 18 UNB spin-off companies.

Technology and Knowledge Transfer (Universities and Research Hospitals)								
(Per \$million Research Expenditures)								
Metric (2011)	UNB	Canada	U.S.A		Metric (2012)	UNB	Canada	U.S.A
Disclosures	.31	.31	.36		Disclosures	0.21	0.21	0.38
Patents Filed	.11	.15	.22		Patents Filed	0.14	0.10	0.22
License Agreements	.13	.08	.08		License Agreements	0.12	0.07	0.10
Source: AUTM Licensing Survey FY 2011					Source: AUTM Licensing Survey FY 2012			

Research Ranking

The Research Ranking exercise, completed on a biannual basis, has become an important tool that assists the Office of the Vice-President (Research) in measuring research output of academic units at the University of New Brunswick. This exercise exists in the form of an electronic questionnaire that is completed by each person with the designation of Professor, Associate Professor, Assistant Professor, Adjunct Professor, Honorary Research Professor, Postdoctoral Fellow, Senior Research Associate or Research Associate. Once the

data is collected, a committee reviews the submissions from each academic unit and assigns a ranking of 1 through 10 to each unit based on their submission. A ranking of 1 signifies research excellence, while a ranking of 10 signifies extremely low research performance.

The on-line portal for the most recent ranking period (July 1, 2011–June 30, 2013) closed on August 31, 2013. The results for the 2011-13 ranking will be reported in next year's report.

Fredericton Campus

Department / Faculty					Department / Faculty				
	2003-05	2005-07	2007-09	2009-11		2003-05	2005-07	2007-09	2009-11
Business Administration	4	4	5	5	Forestry & Env. Mgmt.	1	1	1	1
Anthropology	5	5	5	4	French	6	5	5	5
Biology	2	1	1	1	GGE	1	1	1*	1
Chemical Eng.	2	1	1	2	History	1	1	1	1
Chemistry	1	1	2*	2	Kinesiology	4	4	3	4
Civil Eng.	2	2	2	2	Law	5	4	4	4
Classics & Ancient History	8	7	6	5	Mathematics & Statistics	4	3	3	3
Computer Science	2	3	3	3	Mechanical Eng.	1	1	2*	2
Culture and Language Studies	10	6	4	4	Nursing	4	4	4	3
Earth Science	1	1	1	2	Philosophy	7	6	4	4
Economics	4	5	5	5	Physics	2	1	1	2
Education	4	3	4	3	Political Science	3	3	4	4
Electrical & Computer Eng.	2	2	1	1	Psychology	3	2	2	2
English	2	2	2	2	Sociology	3	4	3	2

Saint John Campus

Department / Faculty					Department / Faculty				
	2003-05	2005-07	2007-09	2009-11		2003-05	2005-07	2007-09	2009-11
Biology	1	1	1*	1	Mathematical Sciences	5	3	3	2
Business	6	6	6	5	Nursing	7	6	6	5
Computer Science & App Stats	2	2	3	3	Physical Sciences	5	6	n/a	n/a
Engineering	5	5	6	6	Psychology	5	5	4	5
History & Politics	4	4	5	5	Social Sciences	5	6	5	4
Humanities & Languages	5	5	5	4					

n/a Department no longer exists

Research Outputs

In past reports we have presented UNB's percentage growth in publications between the reporting year and five years previous in comparison to a selected peer group of comprehensive universities. Beginning this year, due to unavailability of a required metric, we have changed the basic metrics that we will use to provide an indication of our research outputs.

We are reporting comparative rankings in the total number of publications produced by UNB based on ReSearch Infosource Inc's statistics. The ranking position is based on all universities assessed, however, we are only reporting the rankings for our selected peer group of comprehensive universities.

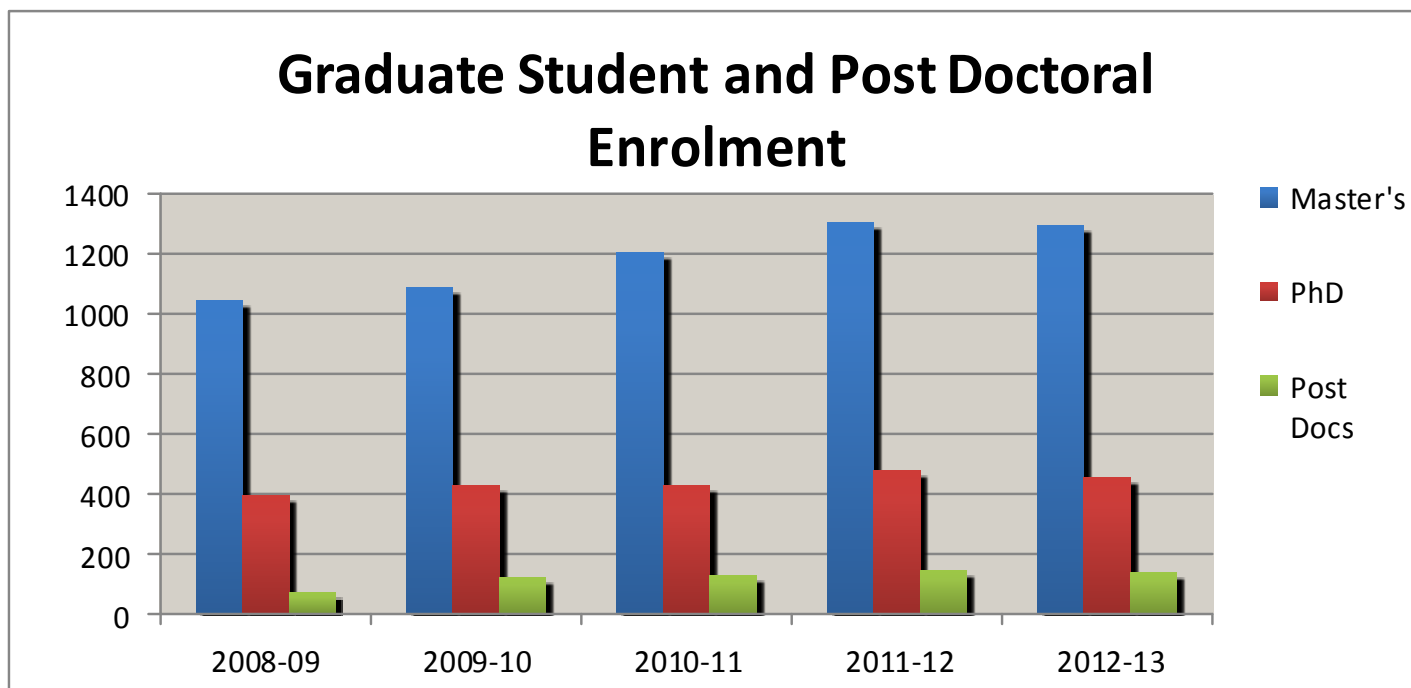
The Research Output Indicators measure each institution's success in publishing in the peer reviewed academic literature. Publication data was obtained from Observatoire des sciences des technologies' (OST) Canadian bibliometric which contains data from SCI-Expanded, SSCI and AHCI databases of Thompson Reuters. Faculty data were obtained from Statistics Canada and the ReSearch Infosource University R&D Database.

1. "Total Number of Publications" includes articles, notes and reviews published by researchers affiliated with Canadian universities and research hospitals in 12,129 peer-reviewed scientific journals covering natural sciences, hospital science, social science and humanities.
2. "Publication Intensity" is defined as the total number of publications per full-time faculty (full, associate and assistant faculty positions only were included). It is estimated that there is, on average, a minimum 2-year publication lag time.
3. "Publication Impact" points are based on the Average Relative Impact Factor (ARIF) which was developed and provided by OST. It is based on a measure of perceived impact of research through a calculation of citations received by journals. The impact factor does not measure the specific number of citations per article (ie direct impact), but rather, is a measure of the probability of being cited (ie perceived impact). OST developed the ARIF to compare the impact factor from several specialities because an article's probability of being cited is not the same for all fields. The ARIF does not include journals on the Humanities, a report short-coming that we must address in the future.

Research Output Indicators											
YEAR	Waterloo	Guelph	Victoria	Simon F	Carleton	York	UQM	UNB	Concordia	Windsor	Regina
Total Number of Publications											
2008	11	16	18	17	21	19	24	25	22	26	28
2009	10	16	18	17	20	19	24	25	21	26	28
2010	11	16	18	17	21	19	24	25	22	27	28
2011	10	16	18	17	21	19	24	26	22	27	30
2012	10	17	18	16	20	19	24	26	22	27	28
Publication Intensity											
2008	7	11	14	13	19	31	33	21	26	23	29
2009	6	12	14	13	19	25	37	22	24	21	28
2010	6	12	14	13	24	29	37	21	22	23	20
2011	6	11	13	14	19	33	37	21	22	23	25
2012	6	12	13	14	19	34	39	20	25	27	22
Publication Impact											
2008	13	23	14	7	33	17	26	40	28	34	31
2009	17	11	13	3	21	10	14	42	36	25	33
2010	17	16	18	3	11	15	24	38	22	34	37
2011	12	18	15	4	28	11	26	45	27	39	34
2012	17	20	14	6	31	11	27	43	34	39	19

School of Graduate Studies

The growth seen over the past several years in graduate student enrollment and Post Doctoral engagements ceased in 2012-13 although numbers did not fall back to 2010-11 levels. Masters students enrolled totaled 1295, down from 1308 the previous year but still above the 2010-11 level of 1208. Doctoral student numbers dipped from 478 in 2011-12 to 455 vs 426 in 2010-11. There were 134 Post-Doctoral Fellows at the university in 2012-13 compared to 144 in 2011-12 and 128 in 2010-11.



VP (Research) Representation

The VP (Research) holds the following positions on and off campus as part of the office mandate:

Interim President, New Brunswick Social Policy Research Network

Chairperson, Board of Directors:

- Canadian Research Institute for Social Policy
- Chronic Illness Research Institute
- Institute of Biomedical Engineering
- Springboard Atlantic Inc

Member, Board of Directors:

- AARMS
- ACENet
- Canadian Rivers Institute
- Fredericton Knowledge Park
- Huntsman Marine Science Centre
- McKenna Fund Advisory Board
- Muriel McQueen Ferguson Centre for Family Violence Research
- New Brunswick Health Research Foundation
- Pond-Deshpande Centre for Entrepreneurship & Innovation

- Wallace McCain Institute
- New Brunswick Innovation Foundation
- RPC
- Canadian Consortium of Ocean Research Universities

Member:

- Steering Committee, Canadian Association of Postdoctoral Administrators
- NSERC Atlantic Advisory Council
- Fredericton, Vision 2020 Committee
- Post Secondary Education Training & Labour “Making it Happen” Committee

Executive Director Representation

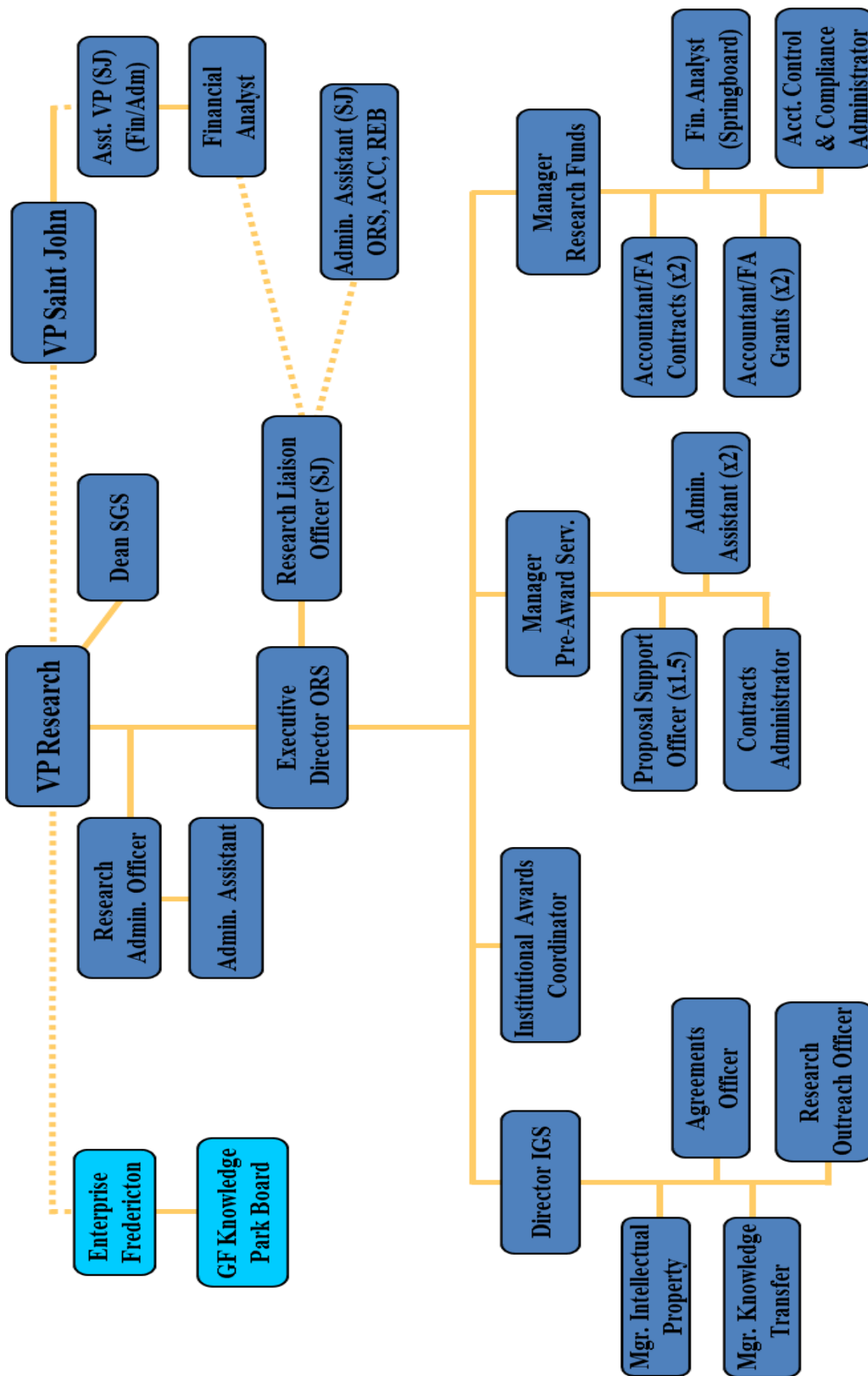
The Executive Director of the Office of Research Services represents the Office and/or the University in the following university functions:

- Chair, UNBF Asbestos Steering Committee
- Chair, Biohazards Safety Committee, UNB
- Member, Directors Plus
- Member, Advisory Board, Huntsman Marine Science Centre
- Representative of the VP Research, Advisory Board, Centre for Nuclear Energy Research

In addition, the Executive Director holds positions related to his professional and personal interests:

- Member, Society of Research Administrators International
- Member, Canadian Association of University Research Administrators
- Member, Admissions Committee, Association of Professional Engineers and Geoscientists of New Brunswick
- Fellow, Canadian Institute of Mining, Metallurgy and Petroleum
- Member, Association of Professional Engineers & Geoscientists of New Brunswick
- Certified Geologist, State of Maine

VP (Research) and Office of Research Services Organizational Chart



= VP Research & ORS (Fredericton and Saint John)

= Greater Fredericton Knowledge Park (External to UNB)*

* Note: UNB's VP Research is the President of the Greater Fredericton Knowledge Park Board.

University Research Scholars 2012: Dr. Zengtao Chen, J. Ted McDonald & Hugh Thomas

The award of University Research Scholar is intended for University of New Brunswick researchers who have demonstrated a consistently high level of scholarship, and whose research is, or has the potential to be, of international stature. The award shall honour leading researchers at the University. Recommendations for this award are made by a selection committee and approved by the Board of Governors.

Dr. Zengtao Chen

Dr. Chen is a professor in the Mechanical Engineering Department. He has been working on modeling of various engineering materials including metals, ceramics, and fibrous materials. He has received more than one million dollars in research funds, and published 43 journal papers since joining UNB in 2004. He was the recipient of many awards, such as the UNB merit award and the Harrison-McCain Young Scholar's award in 2007, the CFI Leaders Award in 2006, and the Humboldt Research Fellowship in 1999. He has supervised 3 Post-doctoral fellows, 2 PhDs, and 10 Masters. One of his PhD students has been hired by National Research Council in Ottawa as Research Officer, and the other was awarded the prestigious NSERC Post-doctoral Fellowship in 2011 and will start his Fellowship at the University of Waterloo in January 2012. This is the lone NSERC PDF of New Brunswick in 2011, and only one for UNB in the past five years.

Dr. Chen is currently supervising one visiting scholar, one project engineer, one PDF, two PhD students, and four MSc students. He is an executive board member of Canadian Fracture Research Corporation, and editor or guest editor of a number of international journals. He has been on the international academic committee and served as keynote speaker for many international conferences. He chaired the International Fracture Symposium at the 23rd Canadian Congress on Applied Mechanics in Vancouver in June 2011.



University Research Scholars 2012 (continued)

Dr. J. Ted McDonald

Dr. Ted McDonald is Professor of Economics and Academic Director of the Canadian Research Data Centre (RDC) at UNB. He joined the Department of Economics at University of New Brunswick in 2001. A well recognized expert in Labor Economics including immigration and health, he has established a research record over the past five years comparable to that of an average economist in a lifetime.

Since 2006, Dr. McDonald has published 20 papers in refereed academic journals, co-edited one book published by McGill-Queen's University Press; and produced three book chapters and nine other publications. These include papers published in Canada's top-ranked journal in Economics (Canadian Journal of Economics), in the world's top-ranked social science journal (Social Science and Medicine), and in highly respected field journals (Canadian Journal on Aging, Oral Oncology, and Canadian Public Policy). His contribution in the book, *High Skilled Immigration in a Globalized Labor Market*, puts him in the company of the world's foremost immigration researchers, such as Klaus Zimmermann and Paul Miller.

Dr. McDonald's publications have been widely cited in refereed journals. In recognition of his contribution to the field of immigrant health, Dr. McDonald was invited to contribute a chapter on cancer screening to the forthcoming *Encyclopedia of Immigrant Health*. Along with Dr. Chris Worswick of Carleton University, he has been invited to contribute a chapter on high skilled immigration for *The Handbook of Immigration Economics*.

As a well-recognized and respected scholar, he has been invited to serve on national committees such as the Social Dimensions of Aging grant adjudication committee of Canadian Institute of Health Research (CIHR) and the Citizenship and Immigration Canada Provincial Nominees Program External Advisory Committee. He has been deemed an international expert assessor by the Australian Research Council. He has served as a peer reviewer for a number of SSHRC and CIHR grant applications. He has also been frequently invited to referee papers for some of the top journals in the population health field. Since 2006, has given conference presentations and acted as a discussant or given an invited lecture 35 times at national and international conferences.

Recently, he received a large research grant from the Canadian Foundation for Innovation (CFI) and matching funds from the Regional Development Corporation to establish the New Brunswick Policy Research Institute (NBPRI) at UNB. The NBPRI will provide the physical, computing and database infrastructure necessary for academic and government researchers to conduct world-class population research on issues of great concern to provincial policymakers in areas such as health and wellness, education and training, economic development, and demography (including fertility, mortality, migration, and population recruitment and retention). Researchers from academic and government departments as well as NGOs in New Brunswick and across Canada will be able to analyze these valuable databases as part of their policy-relevant research programs.



University Research Scholars 2012 (continued)

Dr. Hugh Thomas

Dr. Thomas works in algebraic combinatorics, an area of mathematics which investigates the interplay between simple combinatorial structures and sophisticated algebraic constructions. This field has grown prodigiously over the past forty years, fueled by the great increases in the power of computers.

The principal focus of Dr. Thomas's work is on cluster algebras. These objects were invented only ten years ago, but they have attracted widespread attention because of their surprising links to a number of different topics within mathematics and physics.

Dr. Thomas's work is exciting in part because of its unexpected synthesis of widely disparate topics within mathematics, ranging from quantum groups to polyhedra. Experts in the field describe his work as absolutely first-rate, groundbreaking and beautiful.

Dr. Thomas has had 17 papers published in the past five years, with a further 6 accepted for publication, in the most influential international journals. He is the recipient of the 2011 G. de B. Robinson Award, given by the Canadian Mathematical Society to recognize excellent publications in the Society's journals.

Dr. Thomas has given 32 conference talks, and 36 seminar talks in North America, Europe, and Asia. He has been an invited visiting scholar at prestigious research institutes, including the Max Planck Institute in Bonn, Germany, and is gaining international recognition as one of the young leaders in his field.

Remarkably, Dr. Thomas is also an accomplished poet. Chapbooks of his poetry have been published by BookThug (Toronto), Paper Kite Press (Kingston, PA), and above/ground (Ottawa). Some of his literary work has been included in *Shift and Switch*, an anthology of new Canadian poetry.

While building his world-class research program, Dr. Thomas has also excelled as a teacher of undergraduates, winning the UNB Student Union teaching award for 2009-10.



UNB Research Success Stories in 2012-13

UNB projects receive \$4.8 million

Posted by [UNB](#) on 5/22/12

Three research projects at the University of New Brunswick have received funding from the Atlantic Canada Opportunities Agency in the latest competitive round of the Atlantic Innovation Fund.

Dr. Yun Zhang, Canada Research Chair in Advanced Geomatics Image Processing in UNB's geodesy and geomatics engineering department, received more than \$1.9 million from ACOA.

He and his team will use the funding to further develop and commercialize a digital image software technology with three times more colour sensitivity than other colour sensors available on the market today. Examples of where this technology may be used include: cellphone cameras, WebCams, digital cameras, and security cameras.

Dr. Felipe Chibante, associate professor in UNB's department of chemical engineering, and his team at the Applied Nanotechnology Lab received nearly \$1.5 million to lower the cost of fullerenes, which is the molecular form of pure carbon and is a critical ingredient for the plastic solar cell market.

Dr. Chibante and the collaborators on the project have developed fundamental synthesis methods that will be integrated in a unique plasma reactor to result in a price reduction of 50-75 per cent.

UNB computer science professor Dr. Weichang Du and his research team, in partnership with the IBM Centre for Advanced Studies, received more than \$1.4 million to create novel tools and processes to address current limitations in business process management and science oriented architecture.

The tools and processes will be imbedded in, or compatible with, existing IBM tools and will result in enhanced internal and client interaction, decreased response times, increased organizational efficiencies and reduced costs.

The \$4.8 million awarded to the three UNB projects was announced as part of the Harper Government's Economic Action Plan. The Honourable Bernard Valcourt, Minister of State for ACOA and La Francophonie, and the Honourable Keith Ashfield, Minister of Fisheries and Oceans and Minister for the Atlantic Gateway, made the announcement at UNB's Wu Conference Centre.

"Our Government's top priority is creating jobs, growth and long-term prosperity," said Minister Valcourt. "Our Government recognizes that innovation, research and development are crucial to a competitive economy and to creating high-quality jobs. These projects we are announcing will help bring new knowledge, new jobs and new business opportunities to all of Atlantic Canada."

The \$4.8 million investment was part of a larger announcement of close to \$49 million from the Atlantic Innovation Fund for 21 research and development projects throughout Atlantic Canada.

"The variety of projects being funded in Fredericton speaks to the diversity of talent and expertise living and working in our province," said Minister Ashfield.

"From improved business process management tools to digital image technology that will offer three times the coloured sensitivity currently on the market today, our private and public sector research community is creating game-changing technologies that will benefit the Canadian economy."

The Atlantic Innovation Fund encourages partnerships among private sector firms, universities, colleges and other research institutions to develop new or improved products and services. Hundreds of technologies, products, processes and services developed with the support of the AIF were successfully commercialized, resulting in millions of dollars in incremental sales.

UNB professor to study consumers' knowledge on energy – CBC News

Posted by [UNB](#) on 7/14/12

A University of New Brunswick professor of forestry and environmental management is tackling questions about New Brunswick's energy policy.

Tom Beckley has received a federal grant through the Social Sciences and Humanities Research Council.

He plans to use the money to find out how much New Brunswickers know about the utility system and energy issues.



Beckley says he will also compare the landscape effects of various types of energy development.

"It seems like we deal with all of these technologies one at a time. Like, do we refurbish Lepreau or not? Do we rebuild Macataquac Dam or not? Do we promote wind energy or not? Not, if we didn't refurbish Lepreau, how many windmills would we need – looking at it more systematically."

Beckley says the proposed NB Power sale a few years ago got him interested in the subject.

He researched it for his own interest, realized how complex the issue was, and thought the public might not understand a lot about generation and distribution of power, he said.

"Understanding what consumers know about the power system, how they might change their behaviour to shift load seasonally, or even during the time of day."

Improving rehabilitation

Posted by [UNB](#) on 7/20/12

The Honourable Keith Ashfield, Minister of Fisheries and Oceans and Minister for the Atlantic Gateway, visited with Dr. Chris McGibbon from the University of New Brunswick today where he highlighted how federal investments are helping strengthen healthcare across the country, in particular his research aimed at improving rehabilitation and assistive technologies for persons with lower-extremity amputation or other diseases or injuries that affect mobility.



Pictured from left to right are: Dr. Chris McGibbon, UNB's Institute of Biomedical Engineering, Hon. Keith Ashfield, Rob Smith, graduate student researcher in mechanical engineering, Keillor Steeves, undergraduate student researcher in kinesiology, and James Fowler, undergraduate student researcher in kinesiology.

UNB joins search for life on Mars

Posted by [UNB](#) on 8/17/12

Following a tense and delicate – yet ultimately successful – landing on Mars last August 6, NASA's Curiosity rover almost immediately began sending information back to Earth. On that early Monday morning, John Spray was at the Jet Propulsion Laboratory in California, one of numerous scientists unable to contain his excitement.

Having worked on the Mars Science Laboratory (Curiosity's official name) for the past several years, Spray was anxious to start analyzing the data. As the director of the University of New Brunswick's Planetary and Space Science Centre, Spray is among those who believe that the truth behind Mars' mysterious and potentially life-supporting past will finally be unearthed as a result of this mission.

A planetary geologist by trade, Spray and his fellow researchers at UNB are responsible for one of the Mars rover's key instruments - the Alpha Particle X-Ray Spectrometer (APXS).

"The APXS instrument is positioned at the end of a two-metre long arm when extended," says Spray, "and it is accompanied by a microscopic imager, which is akin to using a hand lens to look at things. The APXS can be used to determine the chemistry of the materials (dust, soils and rock) we are studying."

In addition to equipping the rover with the APXS Spectrometer, Spray and his UNB colleagues Beverley Elliott and Lucy Thompson will also study the geology of the site where the Rover landed – the 155 km-diameter, Gale impact crater.

Spray, Elliott and Thompson will examine the geology of the site to figure out how and when the crater was formed, as well as helping to identify the materials it now contains.

As geologists, we have to interpret the context of the rover and help to work out what happened on Mars around 3.8 billion years ago," says Spray.

As it would the layers in a cake, the Mars rover will climb up the 5-km high mound that defines the centre of the crater, studying the different materials and linking them to processes that formed them, which may have generated river, lake, volcanic and impact products over billions of years.

"The basal layers would have been formed first, and over time additional layers have accumulated to make a pile. Each one could represent a few million years in time. The rover is going to climb up these layers and study all the way back from early Martian time to the present," adds Spray.



A planetary geologist by trade, Spray and his fellow researchers at UNB are responsible for one of the Mars rover's key instruments - the Alpha Particle X-Ray Spectrometer (APXS).

The APXS and other instruments will be used to help interpret this data.

Over the next two years, Spray and scientists at the Jet Propulsion Laboratory in Pasadena, California, will analyze the data and look for evidence of environments that could have supported life.

"The mission itself is to identify suitable habitats for life; so where life could have existed, such as lakes, rivers, and oceans."

As a proud UNB researcher and faculty member, Sprays believes that the Curiosity project is great opportunity to showcase smaller universities' capacity to do big research.

"I think it is important for UNB in the sense that it shows we are not only a teaching university, which is a great thing in itself, but also that we do research at the international level, and work with JPL and other institutes," says Spray.

"You don't necessarily have to be at the University of Toronto, or McGill or UBC to do good research. You can be at smaller universities like UNB which, quite frankly, punches above its weight in terms of cutting-edge research."

Bruce Broster receives 2012 Canadian Professional Geoscientist Award

Posted by [UNB](#) on 9/19/12

Vancouver – Geoscientists Canada is pleased to announce the recipient of the 2012 Canadian Professional Geoscientist Award – Dr. Bruce E. Broster, P.Geol. of Fredericton, New Brunswick.

The Canadian Professional Geoscientist Award is given to recognize the achievements of an individual, who has made an outstanding contribution to the development and practice of professional geoscience and who has advanced public recognition of the profession in Canada in his or her capacity as a registered professional geoscientist.

To be eligible for the award a nominee must meet a number of specified criteria, which include: a solid career as a professional geoscientist, an outstanding record of voluntary service to the community, and service to Geoscientists Canada or to one of the provincial or territorial professional associations that regulate geoscience in Canada.

The Award, which consists of a labradorite and marble sculpture made by a Canadian geoscientist artist, is given to a person in mid-to-late career.

This year's recipient, Dr. Bruce E. Broster, P.Geol. is an accomplished and respected professional geologist who has been involved at every level of his profession from research and teaching, to independent geological consulting and government relations.

Dr. Broster, graduated with a B.Sc. in Earth Sciences from the University of Waterloo in 1974 and received his PhD from the University of Western Ontario in 1982, after which his academic career brought him to positions at the University of British Columbia, the University of Windsor, and finally to the

University of New Brunswick (UNB) where he served as Chair of the Department of Earth Sciences. Over the course of his tenure at UNB, he has supervised 14 MSc and 3 PhD students; he has published 44 refereed journal papers, 30 government publications, 109 abstracts, 29 published reports and articles and received more than \$1 million in research funding from industry and the Natural Sciences and Engineering Research Council of Canada.



Bruce Broster

Further to his outstanding academic achievements, Dr. Broster, has been a very active volunteer and has served as President to many technical, learned and professional organizations including; Geoscientists Canada, the Association of Professional Engineers and Geoscientists of New Brunswick, the Geological Association of Canada's Environmental Earth Science Division, and the Canadian Quaternary Association.

In announcing the award the President of Geoscientists Canada, Tim Corkery, P.Geol. stated "We are delighted that Bruce Broster was chosen by our judges to be this year's award recipient. Bruce is very well known to many Canadian

geoscience organizations both as a dedicated volunteer and wise counsel. Dr. Broster is also highly regarded for his ability to prepare young geoscientists for the opportunities and challenges ahead by effectively bridging the gap between academia and professional practice". The citation for the 2012 award, which will be presented to Dr. Broster at a later date, will read as follows: "Presented to Bruce Broster, P.Geol. in recognition his outstanding contributions to the geoscience profession, its professional associations, academia and industry".

Nominations for this award are considered annually, although the award will not necessarily be presented each year. Further details on the award criteria and nominations process can be obtained from [Geoscientists Canada](#).

The mission of Geoscientists Canada is to develop consistent high standards for licensure and practice of geoscience, to facilitate national and international professional mobility, and to promote recognition of Canadian geoscientists.

Yun Zhang receives the First Giuseppe Inghilleri Award

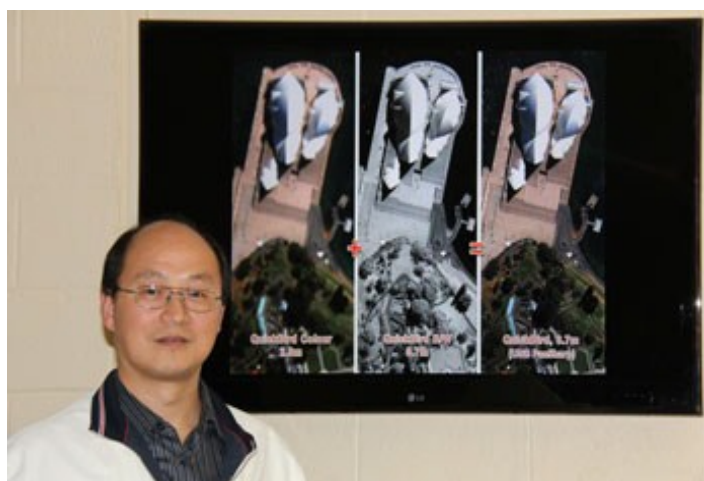
Posted by [UNB](#) on 9/19/12

Dr. Zhang is the first person to ever receive the [Giuseppe Inghilleri Award](#), which is to be presented only once every four years to a nominee who has significantly enhanced the applications of photogrammetry, remote sensing, or spatial information sciences in the four years preceding the ISPRS congress.

Dr. Zhang received the award for his important work in image fusion and automated pan-sharpening to improve the resolution of colour satellite imagery.

He was recently featured in a Natural Sciences and Engineering Research Council of Canada video, "NSERC Presents 2 Minutes with Yun Zhang."

Dr. Yun Zhang is seen here standing in front of a before-and-after UNB PanSharp (fusion) image. UNB PanSharp technology and its global impact is one of the main reasons for Dr. Zhang's award. The low resolution colour and the high resolution black-and-white are original images from the QuickBird satellite. The high resolution colour image is the result produced by UNB PanSharp.



Researchers gather at UNB to discuss findings on Canada's hot issues

Posted by [UNB](#) on 10/18/12

Poverty and inequality, tax and fiscal issues, health outcomes, and integration of immigrants are among some of the issues researchers from across the country will discuss during the [Evidence-Based Policy Formation and Evaluation Conference](#) being held Tuesday, Oct. 23, 2012, at the Wu Conference Centre, UNB Fredericton.

A crucial component of effective policymaking is that policy be consistent with the best available empirical evidence; however, years of fiscal challenges and budget crises have meant our governments' capacity to formulate evidence-based policy is limited. Not only is it limited in terms of the ability to conduct evaluative research, but also to interpret the available evidence effectively.

Academia has an increasingly important role to play in doing research that is relevant to governments' policy needs, and transferring their research findings effectively. This conference will have active participation of senior staff from the Government of New Brunswick; the goal is to find ways to produce more, and interpret existing evidence-based policy for New Brunswickers and beyond.

The conference is held annually and organized by the Canadian Research Data Centre Network and The University of New Brunswick Research Data Centre (UNBRDC).

UNB research contributes to world's first thought-controlled prosthetic leg

Posted by [UNB](#) on 11/22/12

It's been years of research in the making and recently the groundbreaking bionic leg was put to the ultimate test when Zac Vawter climbed 103 flights of stairs to the top of Chicago's Willis Tower—one of the world's tallest skyscrapers.

University of New Brunswick Alumnus, Levi Hargrove, the lead researcher at the Center for Bionic Medicine at the Rehabilitation Institute of Chicago, worked with Vawter for months prior to the smart leg's first public launch.

Hargrove is a three-time UNB graduate and maintains close contact with his former UNB supervisors, Kevin Englehart and Bernie Hudgins, who were also instrumental in launching the world's first smart leg.

Research conducted by Englehart's students, Roua Razak and Dan Rogers from UNB's Institute of Biomedical Engineering, contributed to the sophisticated neural control of the smart leg.

The robotic leg is designed to respond to electrical impulses from muscles that remain in Vawter's amputated leg. When Vawter thought about climbing the stairs, the motors, belts and chains in his smart leg synchronized the movements of its ankle and knee.

The computerized prosthetic limb weighs about 10 pounds and uses two motors.

Bionic – or thought-controlled – prosthetic arms have been available for a few years, thanks to pioneering work done at UNB's Institute for Biomedical Engineering. Knowing leg amputees outnumber people who've lost arms and hands, Hargrove's research focuses more on lower limbs.

But, he says he would not be in the po-

sition he is today without the guidance and support of Englehart and Hudgins.

"They were true mentors in every sense of the word," said Hargrove. "I would not be in my position today without their support. They introduced me to the field of research, imparted their substantial knowledge, and arranged for my laboratory exchange with the Rehabilitation Institute of Chicago. Equally important, I felt that they valued and respected my contributions."

Englehart says that teaching is the greatest motivating factor for what he does—besides the promise of improving the quality of life for amputees.

"I feel privileged to have the opportunity to work with talented and motivated people like Levi," said Englehart. "It was clear very soon after having met Levi that he was a natural leader. In addition to his intellect, he has the ability to see the most important, practical aspects of complex issues, and he has tremendous self-confidence in his abilities. He's also a very down to earth individual who works easily with others."

Hargrove says the work being performed at UNB's Institute of Biomedical Engineering is truly revolutionary and has been pushing the boundary of artificial limb control since the 1960s and continues to do so today.

"I chose to stay at UNB because I was encouraged to be part of their groundbreaking research," said Hargrove. "I was given opportunities to travel internationally to other leading laboratories and was introduced to many thought-leaders in the field."

Hargrove grew up in Bath, N.B., and was exposed to electrical engineering at a very young age, as his father and grandfather are both engineers. After taking a biomedical engineering course at UNB during his undergraduate years, he real-

ized he had found the area in which he wanted to make a long-term career.

He and Englehart plan to continue working together for years to come.

"It's inevitable that we'll continue to work together," said Englehart. "We share the same goals, we complement each other's strengths, and enjoy working together."

As for amputee Zac Vawter, his exceptional journey started with surgery in 2009. When Vawter's leg was amputated, a surgeon repositioned the residual nerves that normally would carry signals to the lower leg and sewed them to new spots on his hamstring. That is what allows Vawter to use a bionic leg.

The surgery is called "targeted muscle reinnervation" and it's like "rewiring the patient," Hargrove said in an interview with CBC. "And now when he just thinks about moving his ankle, his hamstring moves and we're able to tell the prosthesis how to move appropriately."

Experts far and wide agree that this research is leading edge.

Most artificial legs are passive. Others have motorized or mechanical components but don't respond to the electrical impulses caused by thought.

"This is a step beyond the state of the art," said Daniel Ferris of the University of Michigan in an interview with CBC. "If they can achieve it, it's very noteworthy and suggests in the next 10 years or so there will be good commercial devices out there."

The \$8-million project is funded by the U.S. Department of Defense and involves Vanderbilt University, the Massachusetts Institute of Technology, the University of Rhode Island and the University of New Brunswick.

Wendy Robbins contributes to national report about women in university research

Posted by [UNB](#) on 11/22/12

The [Council of Canadian Academies](#) recently released a report entitled, [Strengthening Canada's Research Capacity: The Gender Dimension](#), and UNB's Wendy Robbins was among the 15-member expert panel to contribute to the report.

In response to a request by the Minister of Industry in the fall of 2010 after the notable absence of female candidates for the prestigious Canada Excellence Research Chairs program, the expert panel was struck.

The in-depth, authoritative assessment of women in university research has found that although there has been significant progress in the representation of women in the university research ranks, there are still gender equity challenges that must be overcome and the passage of time will not be enough to ensure parity.

Wendy J. Robbins, professor of English and coordinator of UNB's Women's Studies Program, volunteered with the Council of Canadian Academies to examine which factors influence the career trajectory and statistical profile of women researchers in Canadian universities.



Wendy Robbins

UNB technology featured on hit TV show

Posted by [UNB](#) on 11/28/12

A recent episode of CBS's prime-time hit, *The Big Bang Theory*, featured a subtle homage to technology that can be traced to the University of New Brunswick.

As the director of the University of New Brunswick's Planetary and Space Science Centre, John Spray is among those who believe that the truth behind Mars' mysterious and potentially life-supporting past will finally be unearthed as a result of NASA's latest Curiosity rover mission.

Spray and his fellow researchers at UNB – Beverley Elliott and Lucy Thompson – are part of the science team responsible for one of the NASA Curiosity rover's key instruments: the Alpha Particle X-Ray Spectrometer (APXS).

In a recent *Big Bang Theory* episode, a note about the APXS instrument is visible on a whiteboard behind series star Jim Parsons.

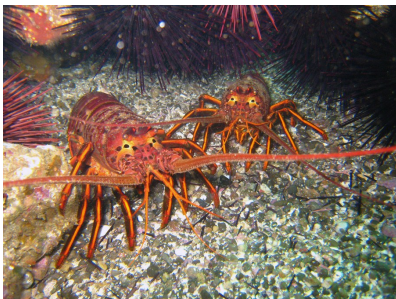
In addition to working directly with the APXS Spectrometer, Spray, Elliott and Thompson will study the geology of the site where the rover landed: the 155 km-diameter Gale impact crater.

Spray, Elliott and Thompson will examine the geology of the site to figure out how and when the crater was formed, as well as helping to identify the materials it now contains and the geological conditions the crater formed under.

UNB researcher gets nod from ABC news

Posted by [UNB](#) on 11/30/12

For the first time, scientists have figured out how to determine the age of a lobster – by counting its rings, like a tree.



Raouf Kilada, a research associate at the University of New Brunswick Saint John and lead author of a scientific paper documenting the process, presented his findings Thursday at a scientific conference in Portland.

Scientist already knew how to tell a fish's age by counting the growth rings found in its inner ear and a scallop or clam's age from the rings of its shell.

But nobody knows how old lobsters can live to be. Some people estimate they live to over 100. Before now it was thought that when lobsters, shrimp and crabs molt, they shed all parts of their bodies that might record annual growth bands.

Kelly Munkittrick wins international award for work in developing countries

Posted by [UNB](#) on 12/07/12

The [Society of Environmental Toxicology and Chemistry](#) (SETAC) announced Kelly Munkittrick, University of New Brunswick researcher located in Saint John, as the winner of the 2012 SETAC Global Partners Capacity-Building Award during the SETAC North America 33rd Annual Meeting last month in Long Beach, California.

In the past 10 years, Munkittrick has actively contributed to the education, professional development, training and networking of scientists in the developing countries of Latin America. In addition, he has helped those scientists make connections with potential collaborators in the SETAC research community and in other relevant environmental organizations.

Munkittrick complements this significant presence with a substantial and consistent program of activities in the region, all of which have contributed to a growing group of new environmental scientists as well as to the widening of SETAC involvement in the region.

The SETAC Global Partners Capacity-Building Award was initiated by the society in 2008 to recognize individuals or groups for their contribution toward building capacity in the environmental sciences within countries with developing economies.

Emphasis is given to promoting the advancement and application of scientific research related to contaminants and other stressors in the environment, education in the environmental sciences and the use of science in environmental policy and decision-making. In 2012, two awards were given, with the second a posthumous one to Michael Kishimba of the University of Dar es Salaam, Tanzania.

The 33rd SETAC North America Annual Meeting welcomed 2,300 professionals from around the world, impacting environmental research with special session topics ranging from "Deepwater Horizon: What Have We Learned?" to "Debating Global Climate Change."

SETAC is a not-for-profit, worldwide professional organization comprised of more than 6,000 individuals and institutions in 100 countries dedicated to the study, analysis and solution of environmental problems, the management and regulation of natural resources, research and development, and environmental education. Our mission is to support the development of principles and practices for protection, enhancement and management of sustainable environmental quality and ecosystem integrity.

Global report showing chemical exposure a concern for humans and wildlife

Posted by [UNB](#) on 2/21/13

A [global report](#) released February 19 by UNEP and WHO shows that humans and wildlife are being exposed to diverse chemicals and there is growing evidence and concern about their health impacts. These chemicals – called endocrine disruptors – interfere with the system that controls metabolism, development and reproduction in us, birds, mammals, amphibians, reptiles, and invertebrates.

A UNB Saint John professor, Karen Kidd, was one of the editors of this review which covers the scientific advances in our understanding of endocrine system diseases and disorders in wildlife and humans. It has several sobering messages.

Humans and wildlife are exposed to many diverse chemicals every day. Dozens of chemicals are in the blood, fats and breast milk of humans and we find very similar chemicals in fish, whales, and polar bears. These chemicals include plasticizers, additives in personal care products and cleaners, flame retardants, pesticides and many banned substances like PCBs.

“While we understand how some of these individual chemicals are interfering with the endocrine system in wildlife, the effects of these mixtures on wildlife and humans is a big knowledge gap and a big concern.”, Kidd says.

“I hope that this report raises awareness of this issue globally, especially

with policy makers. It is critical to reduce the risk that some chemicals pose to human and wildlife health. We are especially concerned about the developing fetus and newborns because chemical exposure at these early stages in life can reprogram tissues and lead to diseases and disorders later in life”, she says.

Some chemicals are present in wildlife and humans globally, even in remote polar environments, because of their transport long distances through wind and water currents and global trade.

“While we understand how some of these individual chemicals are interfering with the endocrine system in wildlife, the effects of these mixtures on wildlife and humans is a big knowledge gap and a big concern.”, Kidd

Many persist and are stored in the body while others are rapidly excreted, lasting only a few hours.

When production and use of a chemical increases, levels in humans and wildlife go up. When chemicals are taken off the market, levels in humans and wildlife go down.

There is also more understanding that chemicals are affecting wildlife in simi-

lar ways to humans. This is because there are some similarities between humans and wildlife in how endocrine systems work and the hormones that both use to control development, growth and reproduction. For example, exposures to PCBs are linked to lower thyroid hormones in marine mammals, fish, birds and humans. The synthetic estrogen in the birth control pill is effective at preventing pregnancy in humans and reproduction in fish because, once released in municipal wastewaters, it feminizes male fish and reduces their ability to spawn.

There are global declines of wildlife species. Though some of this is due to loss of their habitat, climate change and overexploitation, we now have more evidence that exposure to chemicals contributes to the decline of wildlife populations. When chemicals have been banned (such as antifouling compounds, pesticides like DDT, and PCBs), environmental levels of these chemicals have declined and numbers of birds, marine mammals and molluscs have increased.

We also know that diseases and disorders of the endocrine system are on the rise. Globally there are increases in several endocrine cancers (e.g. breast, testes, thyroid), other diseases (e.g. Type 2 diabetes) and disorders (e.g. obesity, testicular non-descent) in humans. Incidences of these diseases and disorders are increasing faster than can be explained by genetics alone and are likely linked to environmental factors like chemical exposure.

Algae for bioremediation and diversification

Posted by [UNB](#) on 3/21/13

Algae have been the buzzword of the last few days after the announcement by Prime Minister Stephen Harper and French Prime Minister Jean-Marc Ayrault that the National Research Council of Canada and the Commissariat à l'énergie atomique et aux énergies alternatives of France will collaborate on a project using algae to reduce greenhouse gas emissions in Alberta.

Some confusion has ensued as the project, which will use microalgae to remove some of the greenhouse gases from Alberta oilsand emissions, has been portrayed as a project to make biofuels from seaweeds.

Thierry Chopin, professor of marine biology and algal expert at the University of New Brunswick in Saint John, explains that the mix-up may have come from the confusion that often exists with respect to the use of the terms algae and seaweeds.



Giving a simple definition of what algae are isn't simple. Algae is a diverse group of organisms sharing only a few characteristics: they do photosynthesis (capturing carbon dioxide and producing oxygen); they do not make flowers and have simple reproductive structures; and they are relatively simple without roots, stems and leaves. Algae can be microscopic, referred to as microalgae (like the unicellular phytoplankton forms); however, they can also be very large organisms, referred to as macroalgae (like the giant kelps that can grow taller than some trees). Algae can be found in marine waters, freshwater, on trees (associated with fungi in lichens), boring in stones, in high altitude snow in glaciers, in geothermal sources and even in deserts.

Seaweeds are only a group within the algae; they are the macroalgae found in the sea. Referring to them as 'seaweeds' is unfortunate, as they are far from being the weeds of the sea. In French, they are described as 'algues marines' and in Spanish as 'algas marinas'. There are approximately 10,500 known species of seaweeds. Around 500 species have been used for centuries for human food and medicinal purposes, directly as food or indirectly for the compounds that can be extracted from them. The largest group of organisms cultured at sea is seaweeds, which represents 51% of the total world aquaculture in the marine environment, while fish aquaculture represents only 9%.

All algae, including the ones intended for Alberta and the ones found in the Bay of Fundy, absorb dissolved nutrients, like nitrogen and phosphorus, to grow, while at the same time trapping CO₂ and releasing O₂. That is why they can be used for bioremediation of either greenhouse gas emissions or of nutrients from fish farms.

Chopin notes that it is interesting to watch people finally realizing that algae can be used for bioremediation and a whole array of valued-added products, not necessarily for biofuels. "Cultivating algae is relatively expensive", said Chopin, "so, trying to sell them inexpensively, to be competitive with the present fossil fuels, isn't an interesting perspective, when more lucrative markets can be found in the more immediate future."

That is the strategy he has been promoting for coastal regions over the last decade with the development of integrated multi-trophic aquaculture (IMTA).

The seaweeds he is growing in the Bay of Fundy recapture some of the inorganic dissolved nutrients from fish farms. He is also developing new markets in collaboration with industrial partner, Cooke Aquaculture Inc. For instance, seaweeds included in recipes for human consumption, seaweeds as partial substitution in fish feed, seaweeds in cosmetics and, hopefully soon, seaweeds for the production of biogas (methane).

What is key is to diversify the applications and niches based on the same original biomass. Chopin, who is never shy of creating new acronyms, calls it the integrated sequential biorefinery (ISBR) approach.

While the projects are different in terms of the organisms they use and their purposes, they are based on the same principle – use biological remediation, taking advantages of the ecosystem services provided by these extractive organisms; and, while producing a biomass, it's better to make it a crop with diversified value-added applications.

UNB Saint John study shows promising fight against TB – CBC News

Posted by [UNB](#) on 3/27/13

Scientists in Saint John are scouring the woods and shorelines for plants that could help in the global fight against tuberculosis.

“We’ve been able to find endophytic fungi from plants here in New Brunswick that can inhibit or kill TB,” said John Johnson, a biology professor who works with the team of graduate students at the University of New Brunswick Saint John campus.

The work by the Natural Products Research Group, started in 2007, is still in the early stages.

“If we came up with something tomorrow, it could be 10 years to 15 years before it goes through all the steps, all the development, before you can get it to some kind of a point where you’re ready for a clinical trial,” he said.

Still, Johnson is hopeful the team is on the track to finding new antibiotics that could change how doctors treat the disease.

UNB team releases report with scientists’ views on the potential effects of global warming

Posted by [UNB](#) on 4/18/13

At a time when scientists in some sectors are increasingly constrained in what they are allowed to say about their climate related research findings, it is more important than ever to highlight the informed opinions of New Brunswick’s scientists on how ecosystems may change with rising temperatures and precipitation. Policy making in natural resources management often involves making trade-offs between short-term economic gain and long-term environmental impacts. Biologists and ecologists have important, detailed knowledge about cause and effect and potential consequences to the natural world due to human activities.

Tom Beckley, professor of forestry and environmental management at UNB; Shawn Dalton, senior consultant and owner of Thrive Consulting; and Arielle DeMerchant, master environmental management candidate, recently released a report entitled ‘Potential Effects of Climate Change on New Brunswick Freshwater and Terrestrial Ecosystems’ to New Brunswick’s Department of Environment.

Funded by the province’s Environmental Trust Fund, the report provides an overview of research-informed opinions from New Brunswick’s leading experts in aquatic and terrestrial ecology.

Dr. Beckley says the report allows the voices of forestry and biology experts to be heard by government, something he says is of utmost importance to addressing issues surrounding climate change.

“A lot of what policy-makers do is risk-assessment,” said Dr. Beckley. “They are weighing long-term costs and risks against short-term gains. Scientists usually prefer to limit their public comments to the narrow confines of their specific data and studies. This means scientists rarely like to talk about the future. But the public trusts scientists and when surveyed nearly always put scientists at the top of the list of people who should be guiding decision-making on resource manage-

ment issues and their environmental effects.”

The authors of this report encouraged roughly 40 scientists to go ‘outside their comfort zone,’ and provide some informed speculation about the potential impacts that could arise with altered temperature and moisture regimes associated with global warming. “Research-driven speculation by the province’s leading scientific experts is one of the best tools we have to predict the effects of and combat climate change.” Dr. Beckley said. “Some scientists feel their credibility is at stake by speculating, but I argue that if we don’t make our work and opinions public, then our governments and industries are left to make environmental decisions without some of the most informed opinions and the best knowledge available.”

The experts agree that by mid-century New Brunswick’s mean annual precipitation and temperatures will be higher and there will be more extreme weather events. One common conclusion was that by 2050, New Brunswick’s rivers and forests will be different, but not radically different than today.

“Many noted that because of the natural diversity of the Acadian Forest, change will occur slowly and our ecosystem may be more resilient than some others,” said Ms. Demerchant. “However, many said that we’ll see a decline in the balsam fir and white spruce and we could see higher numbers of red oak. We could see a decline in the number of Canada lynx, but an increase in white-tailed deer. Many believe Atlantic salmon and brook trout numbers will continue to drop and we could see a different variation of bird species compared to what we have today.”

Virtually all the scientists interviewed say the specific drivers of ecological change are extremely difficult to predict, and many agree that the appropriate response to this is to try to maintain diversity in our ecosystems. Most also agree that targeted efforts to help particular species or ecotypes are less important than dealing with the problem at the source: reducing emissions.

Smart Skin Technologies set to launch new golf product

Posted by [UNB](#) on 4/26/13

UNB-born business, [Smart Skin Technologies](#) of Fredericton has been working with a major golf club manufacturer to help launch Quantifeel – a new product that tests the pressure points on a golfer's grip throughout the swing.

Founder and CEO Kumaran Thillainadarajah said in an interview with [entrevestor.com](#) that they hope the deal will be finalized in a couple days and Quantifeel will be available in golf stores by the end of the year.

A native of Sri Lanka, Thillainadarajah started Smart Skin in 2008 through the

UNB faculty of business administration's Activator Program as a student in the Technology Management and Entrepreneurship program offered through UNB's Dr. J. Herbert Smith ACOA Chair in Technology Management and Entrepreneurship Centre. He wanted to create a pressure-sensitive skin that could serve as a second touchpad on a smartphone. Since then, they've expanded to the areas of sports training and industrial packaging.

Quantifeel will be used to help golfers choose the right grip when they're buying golf clubs. Thillainadarajah knows his biggest challenge will be in marketing the new product.

In an interview with [entrevestor.com](#), Thillainadarajah said they'll need to educate the market and let players, coaches and retailers know the importance of the grip in a golf swing and the new-found ability to measure it. He's hoping his product will spread quickly knowing golfers are always on the lookout for the next big thing to advance their game.

Thillainadarajah would like to see it in thousands of stores within the next 12 to 18 months.

Smart Skin has been working with UNB's Institute for Biomedical Engineering—one of the world's top facilities for prosthetics.

Extra Stories ...

Posted by [UNB](#) on 10/24/12

The Transportation Association of Canada Annual Conference was held recently in Fredericton. Three UNB Civil Engineers were recognized for their work at that conference.

Eric Hildebrand, professor in civil engineering, was the winner of the 2012 Award of Academic Merit from the Transportation Association of Canada. The Award of Academic Merit recognizes individuals who have made a long-term contribution to the advancement of the academic field and to the development of tomorrow's transportation leaders. This award was presented at the TAC Annual Banquet and is one of the four categories awarded to recognize someone who has made an outstanding contribution to transportation in Canada.

Trevor Hanson, professor of civil engineering, and Coady Cameron, MScE Candidate, were awarded Best Technical Poster Award by the TAC Pavements Standing Committee for their poster presentation Can Smartphones Collect IRI data?

Posted by [UNB](#) on 10/24/12

[PowerShift Atlantic](#) received the R.J. Templin Award at the Canadian Wind Energy Association (CanWEA) annual meeting held in Toronto recently.

The R.J. Templin Award was first awarded in 1985. It is to recognize any individual or organization who has undertaken scientific, technical, engineering or policy work that has significantly advanced the wind energy industry in Canada.

Dr. Liuchen Chang, professor of electrical and computer engineering at UNB and Michel Losier, director of PowerShift Atlantic, NB Power, received the award in honour of PowerShift Atlantic.

Extra Stories ...

Posted by [UNB](#) on 10/26/12

This past August and September, Google's Street View Crew visited UNB Fredericton and Saint John with a tricycle and a SUV equipped with 360-degree cameras.

Creating a street view of a city, or a university campus and putting it in a geographical database allows people to tour the city or the campus without actually being there; it's a virtual tour.

When Google pioneered its Street View technology in the United States in 2007, it seemed quite remarkable. But how original was the concept? No very, it seems.

The basic idea behind Street View was investigated back in 2000 in the Department of Geodesy and Geomatics Engineering at UNB by a research team led by Prof. Y.C. Lee. The research results were presented by then graduate student Stephen Rawlinson at the annual conference of the American Society for Photogrammetry and Remote Sensing in St. Louis, Missouri, in April 2001. The results were subsequently published in the conference proceedings and then in Mr. Rawlinson's master's thesis.

Wondering how street view works? Well if you take a look at the poster that was produced by Dr. Lee in 2001 for GGE's 40th anniversary celebrations, it concisely shows the principles involved. The background technologies were (and still are) taught in GGE's mapping and geographical information systems courses.

Google has been very successful with its technology, one that is very similar to that developed earlier at UNB. Currently, there are 20 petabytes of data for Street View, consisting of photos taken along five million miles of roads, covering 39 countries and about 3,000 cities.

Did Google get the idea for Street View from UNB? We'll probably never know.

Posted by [UNB](#) on 2/25/13

UNB professor and former provost and vice-president (research), Greg Kealey, has won one of four prestigious Canada prize awards from the [Federation for Humanities and Social Sciences](#), which recognize the best Canadian scholarly books in the humanities and social sciences.

Dr. Kealey won the Canada Prize in the Social Sciences for his book [Secret Service: Political Policing in Canada from the Fenians to Fortress America](#), which was co-authored with Reg Whitaker and Andy Parnaby and published by University of Toronto Press.

During his 11-year tenure at UNB, Dr. Kealey proved he has what it takes to be a leader. Under his leadership, the university's research capacity saw significant growth with a threefold increase in external funding to almost \$60 million annually. His ability to foster collaboration across disciplines, build consensus and capitalize on opportunities has created a productive and stable culture for scholars and researchers on both campuses. In 2008, Dr. Kealey became UNB's first provost with responsibility for overall academic leadership of the university, playing a key role in implementing change and innovation, as well as the development of the Strategic Plan in 2010-11.

Despite his dedication to his academic administrative roles, he managed to also sustain a distinguished career as a scholar of history, a respected teacher and a prolific writer and editor – for which he is now being recognized.

Celebrating the best Canadian scholarly books – not simply within a single academic discipline, but across all the disciplines of the humanities and social sciences – the Canada Prizes are awarded to books that make an exceptional contribution to scholarship, are engagingly written, and enrich the social, cultural and intellectual life of Canada.

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