

Annual Report on Research Activities at Saint Mary's University - 2013

Dr. J. Kevin Vessey

Associate Vice President Research

Preface

This report conforms to the template agreed upon by Universities in Nova Scotia and the Department of Labour & Advance Education, as of September of 2013. It is intended to report each January on the research activity of the previous year. In some items, the reporting period is the previous fiscal year (1 April 2012 to 31 March 2013; e.g. funding statistics) and in others, the academic year (1 September 2012 to 31 August 2013; e.g. enrolments) or the previous Calendar Year 2012 (e.g. publications).

Introduction

The *Research Mission* of Saint Mary's University is to engage in research that applies to, and is valued by communities from around the corner, to around the world, and that cultivates intellectual curiosity and creativity of our faculty and students.

The *Major Research Objectives* of Saint Mary's University 2012-17 Strategic Research Plan (SRP) are:

- To carry out high quality research that builds on existing strengths and partnerships, with particular emphasis on interdisciplinary endeavours;
- To develop research programs that are valued by, relevant to, and engage communities - locally, regionally, nationally and internationally;
- To ensure that students, both undergraduate and graduate, benefit from research activities at the University.
- To disseminate and translate the outcomes of our research to receptor communities who can best benefit from them.

The five *Major Research Themes* of Saint Mary's SRP are:

- Research for Atlantic Canada Communities:
- Innovation in Business and Workplace Studies:
- The Environment and Natural Resources:
- Astronomy, Computational Sciences, and Subatomic Physics:
- International Development and Human Migration Issue;

Research Activities

1. Research Highlights (maximum 3)

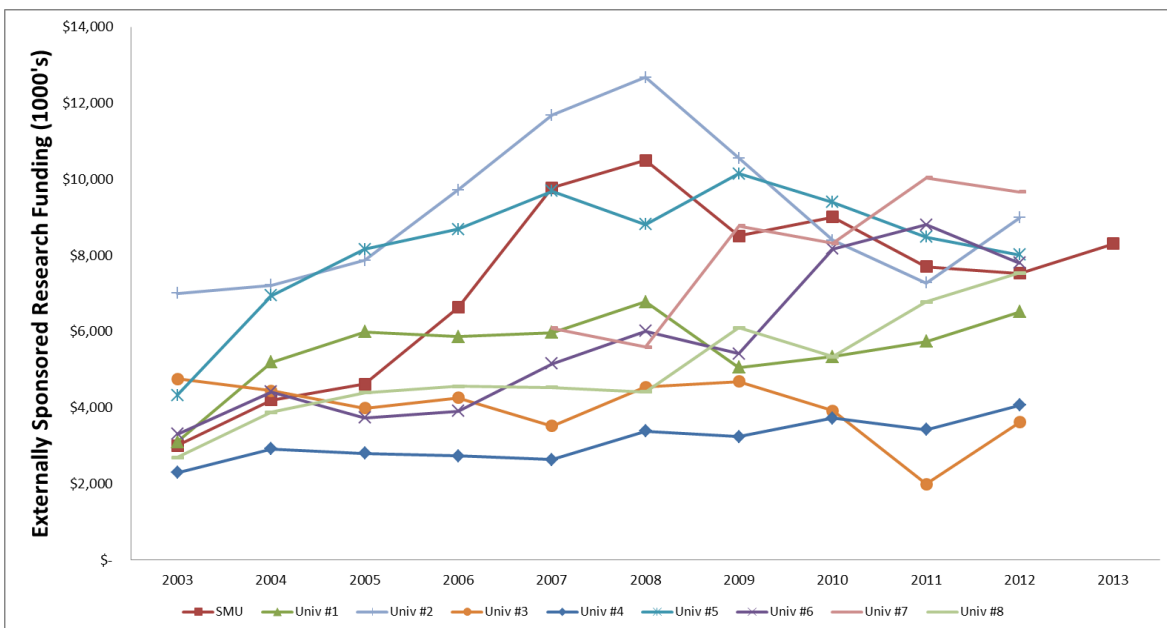
- **Saint Mary's University establishes the Community Conservation Research Network:** Dr. Tony Charles, Department of Finance, Information Systems and Management Science, and Director of the School of Environment, establishes the Community Conservation Research Network (CCRN; <http://www.communityconservation.net/>). The CCRN is an international partnership of aboriginal organizations, community partners, non-governmental organizations (NGOs), university participants and government bodies with 11 study sites around the world. The CCRN is supported by an SSHRC Partnership Grant of \$2.5M over a 6-year period. With the in-kind and cash contributions from these partners, the total value of the project is over \$4M. The CCRN is providing a way for local communities and industries to balance their economic, social and environmental concerns. New insights from the CCRN's research into regional and community environmental governance, capacity-building for aboriginal self-governance, local networking and the success of conservation

initiatives will yield important lessons for communities, policy makers and decision makers at all levels.

- Saint Mary’s University Home to World’s First Professorship in Safety Culture:** Saint Mary’s University’s CN Centre for Occupational Health and Safety is now home to the first-ever professorship in safety culture. Thanks to an ongoing partnership with CN Rail and a significant infusion of new funding, Dr. Mark Fleming will bring his 20 years of international research experience to work with industry partners to highlight the importance of safety culture. The CN Professorship will enable development of practical tools and strategies to enhance safety culture. Increasingly industries identifying the need to improve their safety culture but struggling with what to do in practice. While CN will provide what Dr. Fleming describes as a “living laboratory”, the professorship will build long-term partnerships with other industries trying to improve their safety culture.
- Research by geoscientists at Saint Mary’s University integral to the search for oil and gas reserves in the Offshore of Nova Scotia:** Drs. Andrew MacRae and Georgia Pe-Piper will build on their contributions to Nova Scotia’s Play Fairway Analysis (PFA), a digital atlas that plots the potential for petroleum (gas and oil) in deep water in the southwest of the Scotian Basin, with more than \$450,000 in research funding. Initiated by the Offshore Energy Research Association of Nova Scotia (OERA), the analysis revealed an encouraging potential for offshore reserves and was one factor resulting in \$2 billion in work commitments for future exploration by Shell and BP.

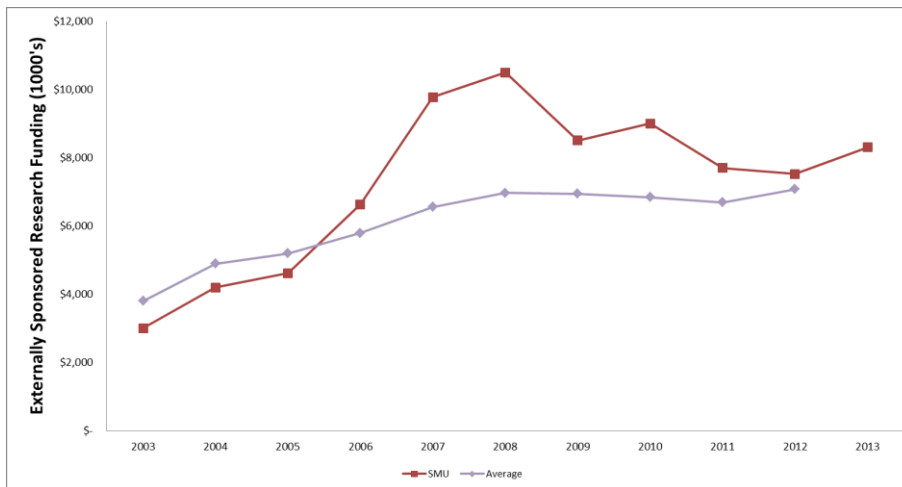
2. Research Funding

- a) **Total externally sponsored research at SMU relative to eight “comparator” Canadian Universities (2003-2012).** Comparator universities were selected based upon levels of research funding in 2003 and/or regional considerations (key to the comparator universities can be found in Appendix 1; the key is for internal use only and not to be circulated outside of SMU).



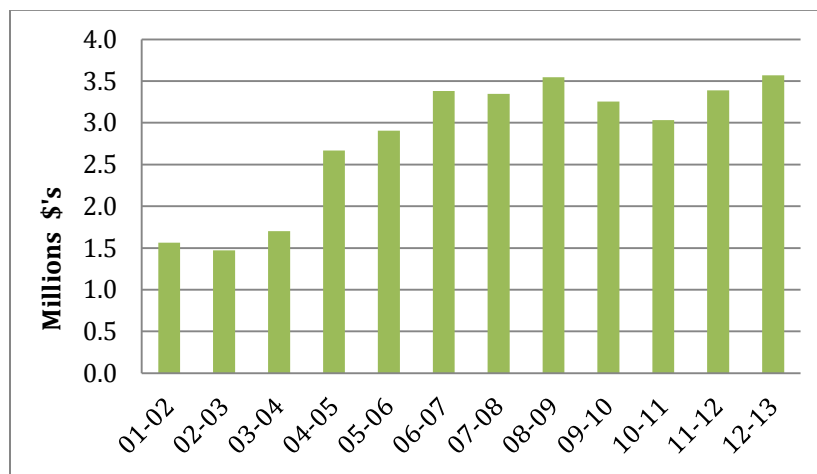
Source: CAUBO

Total externally sponsored research at SMU relative to average of eight “comparator” Canadian Universities (2003-2012).

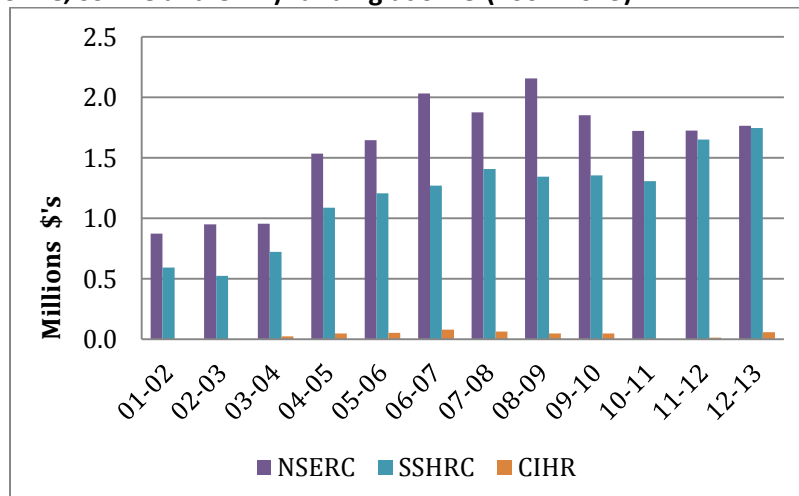


Source: CAUBO. NB: Peak in 2007-08 due to large CFI and NSERC institutional grants.

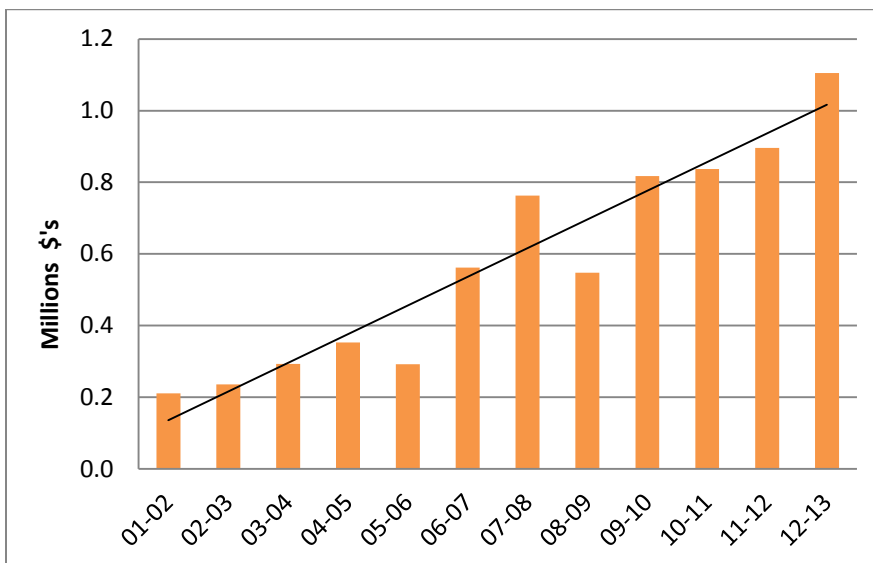
b) Total Tri-Council (NSERC, SSHRC and CIHR) funding at SMU (2001-2013)



Tri-Council (NSERC, SSHRC and CIHR) funding at SMU (2001-2013)

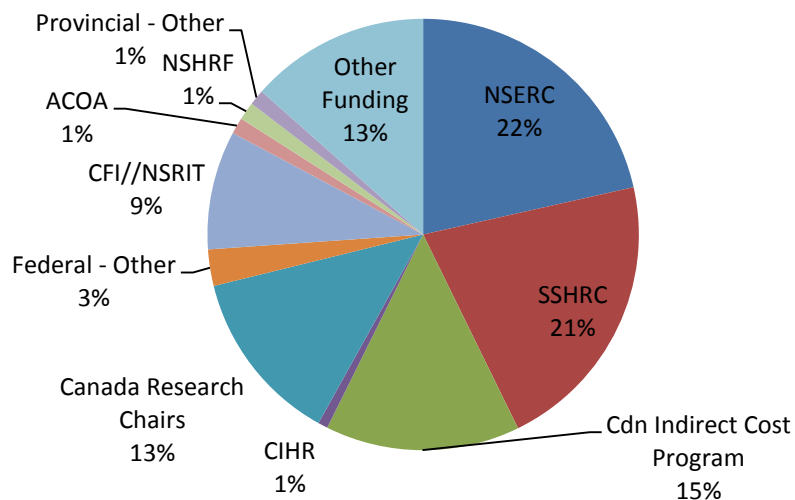


Total grant and contract funding from “other” sources (industry; NGO; government departments, etc.) (2001-2013).



c) Sources of external support for research – 2013:

SMU Externally Funded Research - 2013



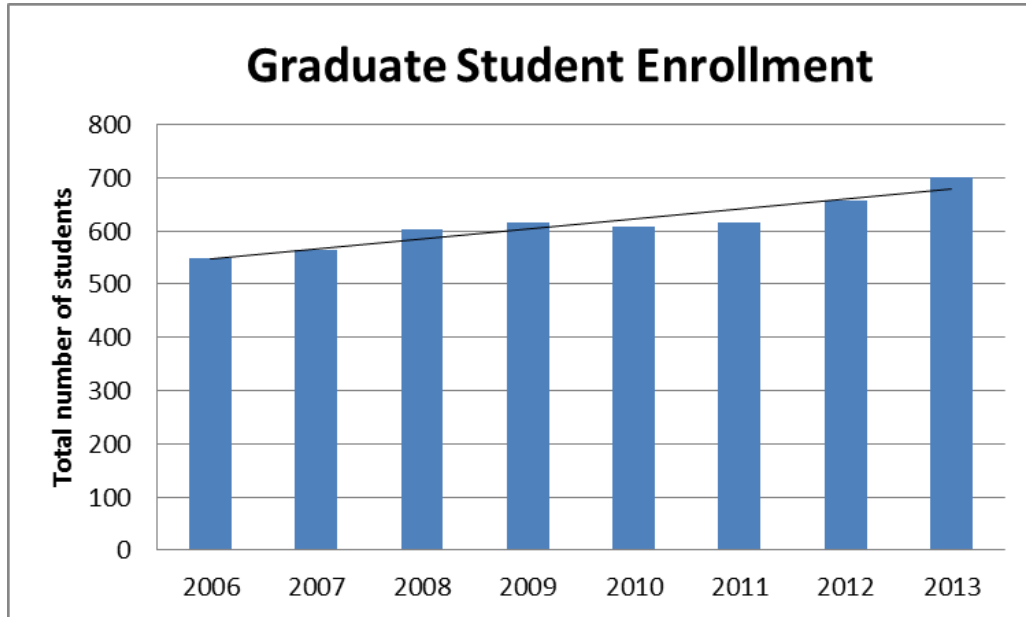
d) **Research Universities of the Year (RUY) rankings:** Research InfoSource (<http://www.researchinfosource.com/>) RUY rankings rate the top 50 Universities in Canada in terms of research impact relative to research funding. RUY rankings take into account both financial input and research output and impact/quality measures. The financial input measures are: total sponsored research income and research intensity. The research output and impact/quality measures are: total number of publications, publication intensity and publication impact.

	Year									
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Rank	48	47	47	41	37	36	36	35	42	39

3. Highly Qualified Personnel (HQP) Training

Saint Mary's University offers 23 graduate programs across a wide range of fields in the Arts, Commerce and Science discipline. These include 4 PhD programs, 18 Master's programs and 1 graduate diploma program.

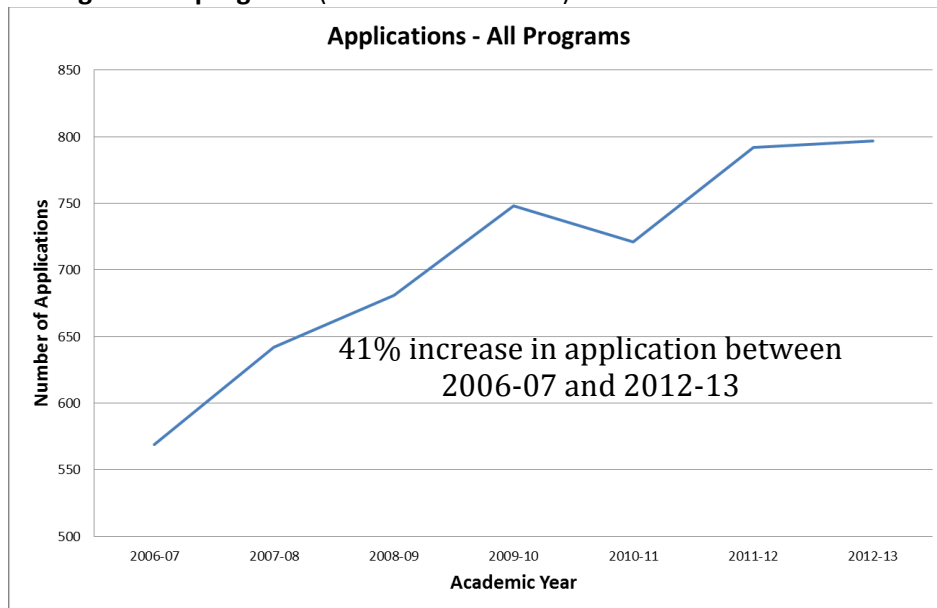
- Total graduate student enrolment (based upon winter (Jan-Apr) term, 2006-2013)



- Graduate student enrolment in research versus professional programs (based upon winter (Jan-Apr) term, 2006-2013)



- **Applications for graduate programs (2006-07 to 2012-13)**



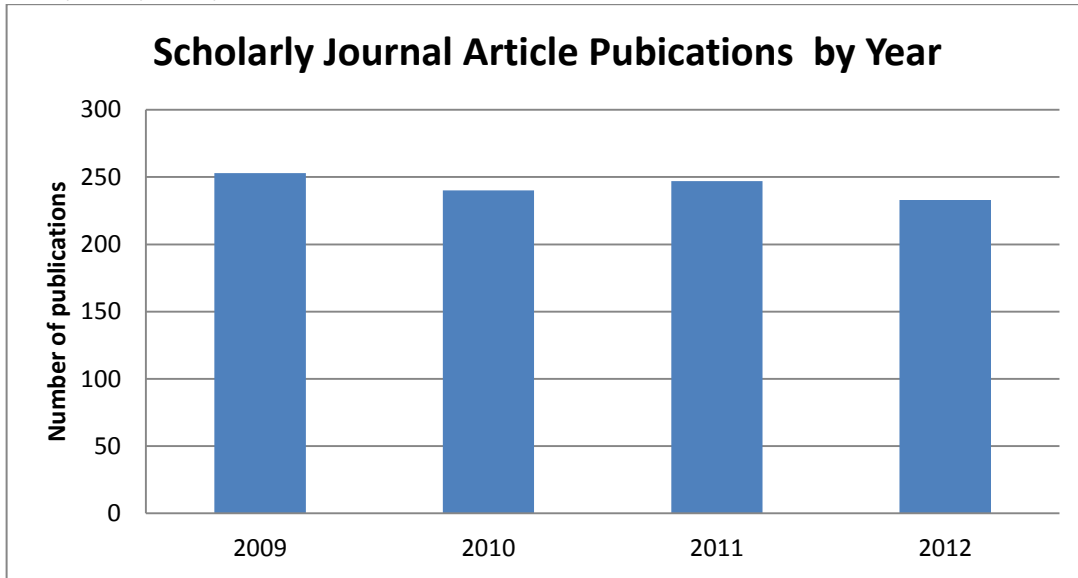
- **Saint Mary’s Student Recognized by Cancer Care Nova Scotia:** Mohammed Al-hamdani, a PhD candidate in Industrial/Organization Psychology, was presented an Excellence Award in Leadership by Cancer Care Nova Scotia. Al-hamdani’s Master’s thesis shows the benefits of plain cigarette packaging to help reduce smoking rates for Canadians, lowering their risk for cancer. He has also published research about the importance of healthy public policy, and has addressed emerging tobacco and alcohol control issues at conferences.
- **Saint Mary’s student publishes his fifteenth scientific research paper:** Chemistry grad Art Hendsbee discovered a passion for crystallography while at Saint Mary’s. It’s a rare feat for an undergraduate student to have co-authored a published scientific research paper; but recent Saint Mary’s University chemistry grad Art Hendsbee can point to a remarkable fifteen, including a recent publication in a premier chemistry journal that features original research. “In my freshman year, before I started in Dr. Masuda’s lab, I was somewhat lost academically,” says Art. “Once I became part of a research team and discovered my interest in crystallography, that all changed.”
- **Saint Mary’s Welcomes its First Banting Postdoctoral Fellow:** Dr. Karen Foster joined Saint Mary’s University in September 2012 as a recipient of a prestigious Government of Canada Banting Postdoctoral Fellowship. The Banting Fellowship is valued at \$140,000 over 24 month. Dr. Foster joins us from York University where she was a Research Associate, having completed her PhD in Sociology at Carleton University in 2011. Dr. Foster’s work looks at the concept of "productivity" as an economic indicator and its influence on economic theory, government policy, and business discourse. Dr. Foster plans to base the analysis in the Atlantic Canadian context, where concerns about economic productivity have historically been front-and-center in the relations between the Atlantic Provinces and the federal government, and within the provinces' governments, civil society and business community.
- **Saint Mary’s Welcomes Fulbright Scholar:** Ms. Cambria Findley-Grubb joined Saint Mary’s University as a Fulbright Scholar to research how education policy impacts First Nations groups in Atlantic Canada and in parts of the United States. Ms. Findley-Grubb joins us from Chapman University in Orange, California where she graduated with a triple BA in Peace and Conflict Studies, Political Science, and Religious Studies. Before join SMU, she had just completed a summer internship at Urban Spirit in Louisville, KY doing poverty and community education. The Gorsebrook Research institute for Atlantic Canada Studies will host Ms. Findley-Grubb for her Fulbright research while at Saint Mary’s.

4. *Industry Engagement (Springboard Atlantic Inc. performance indicators)*

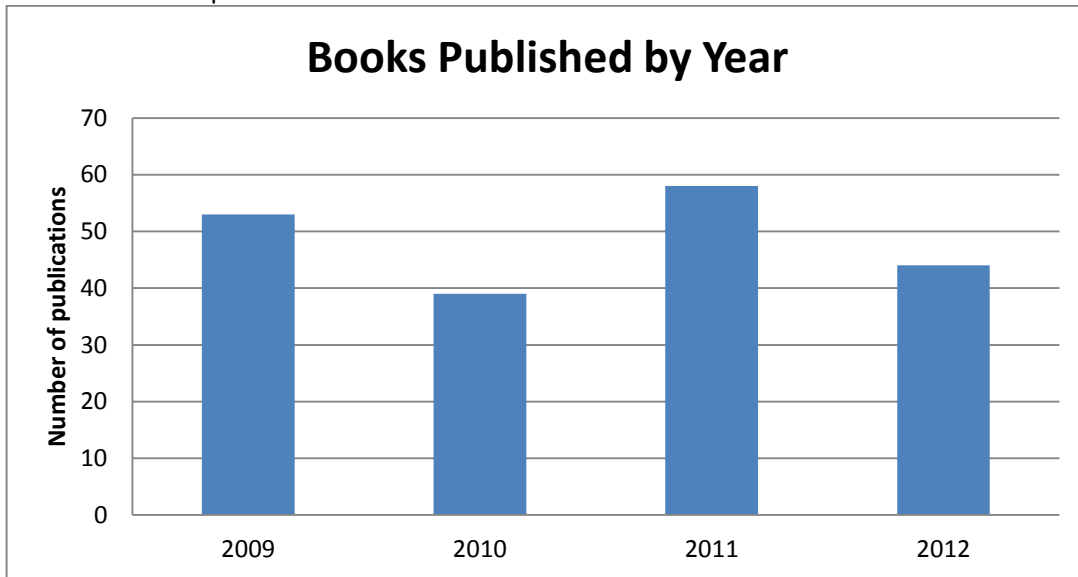
	Year 2 - 2012/2013				
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	YTD
1. Total Research Revenues (Annual)					\$ 8,208,159.41
2. Industry Engagement Activity	9	8	12	9	38
Total IRAP NMA Projects: (#)		1	2		3
IRAP DTAPP Projects (#)					
Tri-Council Industry Partnerships (#)	3	1	0	1	5
-Interaction - #					0
-Engage - #	2	1			3
-IE(CCI), ARD - #					0
-ARTi #					0
-CRD - #				1	1
-I2I - Pre-Market/Phase 1/1b/2a/2b - #					0
Industry Partnership Scholarships (IPS, I-USRA, IRDF) - (#)	1				
-CIHR POP - #					0
-SSHRC Partnerships (industry only) - #					0
Provincial Funds (Industry Project related):					
# of projects		1	7	1	9
\$ raised for those projects		\$ 24,043.00	\$ 134,900.00	\$ 100,000.00	\$ 258,943.00
Industry R&D Contracts (no sponsored funding) - (#)	5	5	2	6	18
Leases - Lab or incubation - (#)					0
Funds from industry contracts - (\$)	\$ 472,795.00	\$ 37,035.00	\$ 143,849.00	\$ 114,105.00	\$ 767,784.00
Admin Overhead generated - (\$)	\$ 88,640.00	\$ 12,091.00	\$ 6,784.00	\$ 19,680.00	\$ 127,195.00
Industry Internships generated by ILOs/TTOs - (#)	1		1	1	3
3. Workshops with Industry (#):					
Number of Workshops: (#)		2	1	1	4
4. ACOA AIF Projects:					
Number of AIF Projects Leading: (#)					0
Number of AIF Projects as Suncontract: (#)					0
Industry Funds leveraged: (\$)					0
Total Project Dollars: (\$)					0
5. Technology Transfer:					
Number of Tech Transfer Agreements: (#)	4			1	5
Revenues from Assignment, Option, Licensing and Royalty Agreements - \$					0
New Spin Off Companies: (#)					0
Disclosures					0
Assignments					0
Patents Filed		1	1		2
Patents Awarded	1				1
Trademarks Awarded					0

5. Knowledge Creation and Mobilization

- **SMU scholarly journal article publications¹:** Searches were performed in Web of Science, EBSCO, and Proquest databases held by Saint Mary's, and Science Direct databases for the publication years 2009, 2010, 2011, and 2012.

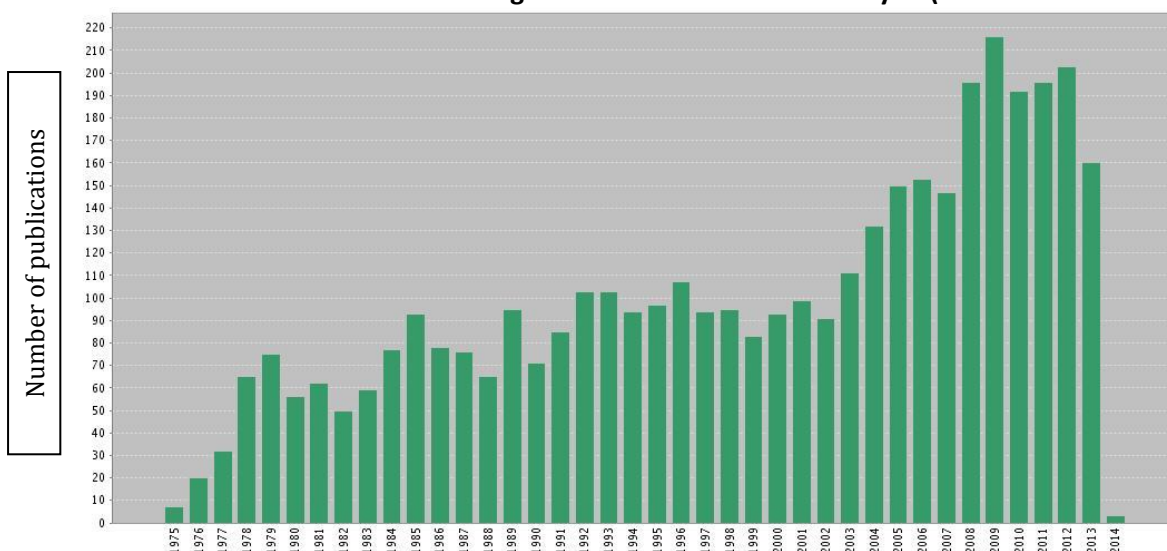


- **SMU Book Publications¹:** Searches were carried out in the OCLC WorldCat Local database, configured for Saint Mary's University. For the 2009 to 2012 publication years, complete books, and non-article publications, such as government reports were identified. Book chapters were also identified where possible.

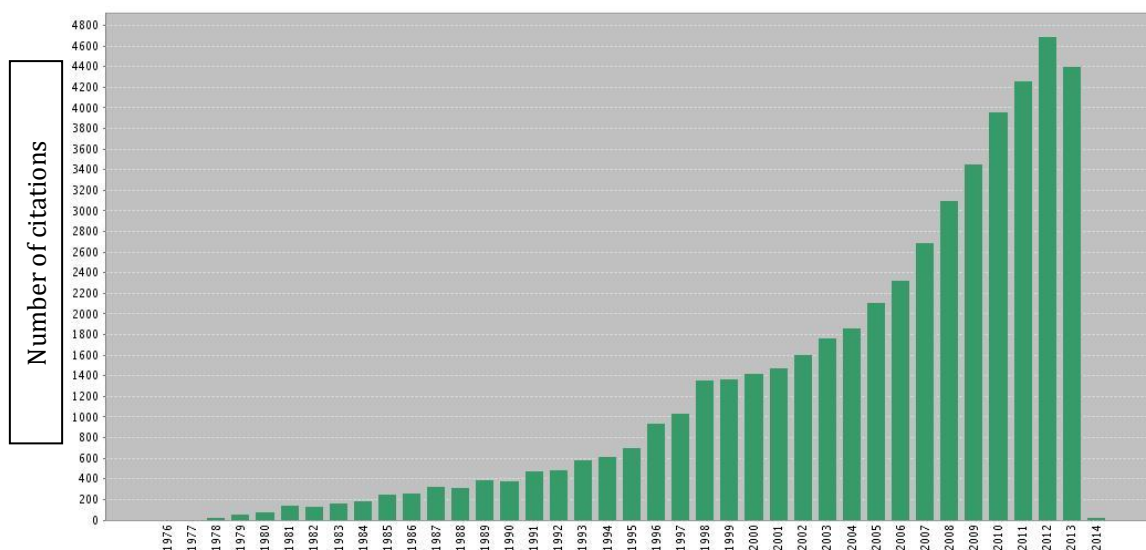


¹Compiled by staff at the Patrick Power Library.

- Thomson Reuters “Web of Knowledge” Database Publication Analysis (run on 31 Dec. 2013)



Total number of SMU publications by year.



Total number of papers published citing SMU publications by year.

6. Research Collaborations - Internal, regional (Atlantic), national and/or international

- **Saint Mary’s launches the Atlantic Green Chemistry Innovation program:** Atlantic Canadian researchers developing green technologies will soon be able to get them to market more easily with the launch of the Atlantic Green Chemistry Innovation Program (AGCIP) at Saint Mary’s University. Along with partners, GreenCentre Canada, Springboard Atlantic Inc. and eight other Atlantic Canadian Universities, this program will provide the region’s brightest minds with specialized expertise and resources that will accelerate the pace of innovation and ensure more discoveries make it to market. The Saint Mary’s Atlantic Center for Green Chemistry boasts 23 green chemistry researchers working in nine universities. The Centre’s director, Dr. Robert Singer, said his members will take full advantage of the new program by leveraging the strengths of each of the partners
- **Saint Mary’s and eight other University partners in the Atlantic Computational Excellence Network (ACenet) receive major funding:** ACenet is a consortium of Atlantic Canadian Universities providing researchers with high performance computing (HPC) resources, collaboration and visualization tools,

software, training, and support. The consortium, as component of the national HPC body - Compute Canada, recently was awarded major funding to support its infrastructure and operations by the Major Science Initiatives (MSI) Program of the Canada Foundation for Innovation. As the Nova Scotian partners in the application, Dalhousie, STFX and SMU will share in \$2.99M of the CFI award, which was matched by NSRIT to the same amount.

- **Saint Mary's joins MEOPAR:** Established in 2012, the Marine Environmental Observation Prediction and Response Network (MEOPAR) is a team of outstanding Canadian researchers dedicated to addressing critical issues related to human activity in the marine environment, and the impact of marine hazards on human activities in coastal regions. MEOPAR is one of Canada's Networks of Centres of Excellence (NCE). Through strong multi-disciplinary training, MEOPAR fosters highly qualified personnel capable of placing Canada at the forefront of marine research and hazard management. Dr. Tony Charles of our Department of Finance, Information System and Management Science is the lead researcher at SMU involved in MEOPAR.
- **Saint Mary's joins the BioFuelNet Canada NCE:** Biologists Kevin Vessey and Zhongmin Dong are lead researchers in Saint Mary's involvement in the newly formed Network of Centres of Excellence (NCE), the BioFuelNet Canada (BFN). BioFuelNet brings together the Canadian biofuels research community. The objective of BioFuelNet is to aggressively address the challenges impeding the growth of an advanced biofuels industry, which is a key component of the energy mix of the future. Advanced biofuels are produced from non-food materials, such as algae, agricultural waste, forestry by-products and municipal waste.

7. Research Environment

- **Federal and Provincial Grants support Wind Energy Research:** Engineering professor, Dr. Adel Merabet, received \$173,226 for research aimed at developing control systems in wind energy. The funding from the CFI Leaders Opportunity Fund and the NSRIT will allow the purchase of state-of-the-art equipment for research in wind energy. Through experiments with this infrastructure, Dr. Merabet and his student researchers will develop high performance control systems capable of drawing the most power possible from wind energy. The technology developed at Dr. Merabet's research laboratory is transferable to other renewable energy sources such as solar, tidal and ocean energy.
- **Federal and Provincial Grants support Green Chemistry Research:** Chemistry professor, Dr. Jason Masuda, received \$343,574 from the CFI Leaders Opportunity Fund and the NSRIT towards the purchase of a Nuclear Magnetic Resonance (NMR) Spectrometer for The Maritimes Centre for Green Chemistry. The NMR Spectrometer is an essential tool for the analysis of chemicals and reveals the composition, purity, and structure of compounds. It will allow researchers at Saint Mary's to make advances in areas of chemistry like carbon capture and ionic liquids as reaction media.
- **Canada Foundation for Innovation Grant Supports Clean Trace-Metal Environmental Analytical Lab:** Dr. Linda Campbell, Department of Environmental Science, received a \$122,000 Canada Foundation for Innovation Leaders' Opportunity Fund to support her research on mercury contamination of inland, freshwater aquatic ecosystems. The grant funds Saint Mary's Clean Trace-Metal Environmental Analytical Laboratory (CTEAL), an integrated laboratory system for the preparation and analysis of environmental samples for trace-level mercury and metal contaminants. The "clean-room" infrastructure within this laboratory allows very small samples to be analyzed with significantly reduced risk of external contamination.

8. Other success stories:

- **Dr. Hugh Broders Receives Funding to Study Endangered Bats (12 July 2013):** The province announced in July that it will spend \$94,000 from the Species at Risk Conservation Fund for research on vulnerable species. Dr. Hugh Broders (Biology) and his team will receive \$10,000 from the fund

for white-nose syndrome research. White-nose syndrome has decimated bat populations throughout eastern North America. It was first confirmed in Nova Scotia in the spring of 2011. Broders's lab group is studying the genetic characteristics of bats, looking for individuals in the populations have a genetic predisposition to be able to survive the fungus. His research group is also trying to track the population and movement of bats in order to better understand how the disease spreads.

- **Child and Youth Mental Health Goes Under the Microscope** (5 July, 2013): Dr. Michael Zhang, of the Department of Finance, Information Systems & Management Science at Saint Mary's University will be part of a four-person team looking at the impact of mental health disorders like autism, anorexia and depression on individuals, the community and the existing services in place in Atlantic Canada. The team received \$2.5M in funding from the Canadian Institutes of Health Research for the 5-year study. The other researchers on the team include project leader Dr. Rick Audas of Memorial, Dr. Kate Tilleczek of UPEI, and Dr. Scott Ronis of University of New Brunswick. A wide range of government is expected to be involved along the way.
- **Saint Mary's Research Making Rare Earth Elements Less Rare** (4 June, 2013): Research by Dr. Jaroslav Dostal, professor emeritus of our Department of Geology, and the U.S. Geological Survey on a unique deposit of heavy rare earth elements at Alaska's Bokan Mountain could help scientists understand how rare earth element deposits form. Rare earth elements are important, but scarce, elements used in components in many cutting edge electronic and defense technologies. Currently, very little is known about the geologic setting in which REE deposits form. Understanding these geologic settings and how they come to be is a crucial step to being able to determine where mineable concentrations of REE might be found. Dostal also sits on the board of UCORE, the company that is currently developing the property at Bokan Mountain.
- **Book by Dr. Trudy Sable is Shortlisted for Literary Prize** (1 April, 2013): *The Language of This Land, Mi'kma'ki*, written by SMU's Aboriginal and Northern Research Director, Trudy Sable, and linguist Bernie Francis, has been shortlisted for the Atlantic Book Award for Scholarly Writing. The book is an exploration of the Mi'kmaq world view as expressed in language, legends, song and dance. It examines the importance of language and how its rhythms, sounds and patterns are bound with the seasonal cycles of the animals, plants, winds, skies and trade routes.
- **Dr. Shelagh Crooks Named 3M National Teaching Fellow**: Dr. Shelagh Crooks, Department of Philosophy, has been honoured with the prestigious 3M National Teaching Fellowship in recognition of her exceptional accomplishments in teaching and educational leadership. The 3M Fellowship recognizes educational leaders and innovators across Canada, and has been known for 28 years as our country's most prestigious award in teaching. Driven by a desire to help instill the value of critical reflection in her students, Dr. Crooks has inspired many to challenge their intellectual boundaries and embrace new ideas and describes her classroom as a "thinking laboratory."
- **Dr. John Young Named Science Champion** (November 2012): Dr. John Young, Professor Emeritus in Saint Mary's Department of Chemistry, was named 2012 Science Champion at the Discovery Centre's recent 10th Annual Discovery Awards. The award honours Dr. Young's 40-year commitment to science education in the community. Although officially retired as a professor since 1995, Dr. Young continues active research of fluid storage systems for solar energy and champions chemistry outreach activities, including conducting interactive, computer-interfaced student tours of his Saint Mary's lab.
- **Dr. John McMullan was presented the Saint Mary's 2012 President's Award for Excellence in Research** (November 2012): When the federal or provincial government makes changes to its gaming rules, one of the first people reporters often seek out for comment is Dr. John McMullan. A long-standing faculty member in the Department of Sociology and Criminology, Dr. McMullan is an influential voice in the gaming field with research that illuminates critical issues in gambling regulation. He also helps shape the future of Canada by promoting research-based policy

development. In recognition of the important role he's played influencing both scholarship and social policies and practices, Dr. McMullan recently received the Saint Mary's 2012 President's Award for Excellence in Research.

- **Saint Mary's Celebrates Renewed Canada Research Chair** (16 October 2012): Dr. Robert Thacker had his Tier 2 CRC in Astronomy renewed. Dr. Thacker has proven himself as a leading researcher in the area of large scale astronomical structures and galaxy formation. He is also an enthusiastic and effective communicator for astronomical research nationally and internationally.
- **Dr. Gavin Fridell joins Saint Mary's as new Canada Research Chair in International Development Studies** (12 October 2012): What does fair trade mean? How does purchasing fair-trade goods, purchased through a fair trade network, beneficially impact a Southern farmer or migrant worker? These are the questions that interest Dr. Gavin Fridell, Saint Mary's new Canada Research Chair (Tier II) in International Development Studies (IDS). He believes that commodity agreements like fair trade coffee have the potential to promote local development and channel greater income into the hands of poor farmers and rural workers. To evaluate this potential, as Canada Research Chair of IDS, Fridell is conducting a comparative analysis of national and international agreements, including fair trade coffee, the banana industry, and the endangered Canadian Wheat Board. He will also investigate the political, economic, and ideological dimensions of trade policy, with particular focus on Joseph Stiglitz, Vice President and Chief Economist at the World Bank who has become a global political celebrity since being forced to resign after publicly dissenting International Monetary Fund policies.
- **Saint Mary's biologist is one step closer to building a better beet** (10 September 2012): Fuelled by funding from the National Research Council's Industrial Research Assistance Program, Saint Mary's biologist, Dr. Kevin Vessey is one step closer to building a better beet---and even more important, to helping a PEI company turn the vibrant red root into a low carbon biofuel. Dr. Vessey and his team are working in partnership with Atlantec BioEnergy Corporation (ABC), a company set up to develop a commercially viable way to use Prince Edward Island beets to develop high-quality ethanol products for the marketplace. In conducting their field trials, ABC is testing a bacterial inoculant developed in Dr. Vessey's lab.