

*Discover the Unknown
Invent the Future*

Faculty of Science, University of Manitoba

Status, Initiatives, Future Directions

April 11, 2021

Stefi Alison Baum



**University
of Manitoba**



Our Mission

We are the largest faculty at the only U15 University in Manitoba

- We have ~1/4 of the students at UM and teach ~1/4 of the UGS
- We provide the mathematical and scientific training for students from all faculties for all professions (nurses, doctors, pharmacists, engineers, agriculture, teachers, business leaders, scientists)
- We infuse RESEARCH into every part of our mission, from pedagogy to student engagement to community and industry collaboration.
- HQP is our business and we produce all the science PhDs for the Province.

A Changing Landscape 2010->2020

TOTAL UNDERGRADS DOUBLED: 3063 -> 6180 (~5% Indigenous sd)

FASTEST GROWING MAJORS (GROWTH by factor 2-7)

- Actuarial Math
- Biology
- Computer Science
- Genetics
- Physics and Astronomy
- BS Psychology
- Statistics

A Changing Landscape 2010->2020

- TOTAL GRADUATE STUDENTS: 20% growth over the decade (~2.5% Indigenous sd).
 - **Masters -up 10%**
 - **PhD – up 33%**
- In the future, the masters and PhD programs must grow to meet the needs of the Province and create the innovators and knowledge producers who will transform the economy.
 - **Compared to our Western colleague universities we produce far fewer masters and PhD students relative to the size of our Faculty.**

A Changing Landscape 2010->2020

THE GROWTH OF RESEARCH

- TOTAL EXPENDITURES: 8.2Million -> 12.2 Million (*TOTAL*)
- CIHR – 400K -> 800K (*HEALTH*)
- NSERC Discovery – 3.8 Million -> 4.3 Million (*FUNDAMENTAL*)
- CFI – 2.0 Million -> 4.5 Million (*INFRASTRUCTURE*)
- MITACS – 50K -> 650K (*INDUSTRY HQP*)
- INDUSTRY CONTRACTS – 600K -> 3.0 Million (*INDUSTRY*)

A Changing Landscape 2010->2020 NOW WELL CONNECTED TO COMMUNITY

University of
Manitoba scientist
part of team working
to develop drugs to
fight COVID-19
(CBC Mar 2020)

U of M building
database for Arctic
researchers
(Winnipeg Free
Press October
2020)

Astronomers
glimpse black hole's
magnetic personality
(Globe and Mail
March 2021)

Faculty of Science Social Media Presence

The Faculty of Science has a very active following on Facebook, Twitter, Instagram and LinkedIn. LinkedIn is the newest Faculty page, started in September 2019.

The engagement data includes all comments, shares, and reactions since each page was launched.



A Changing Landscape 2010->2020 - SUMMARY

- SCIENCE STUDENT NUMBERS HAVE DOUBLED
- SCIENCE RESEARCH HAS GROWN ENORMOUSLY, PARTICULARLY RESEARCH WITH INDUSTRY
- SCIENCE @UManitoba IS NOW A KNOWN ENTITY
- SCIENCE IS WELL POSITIONED FOR THE FUTURE (See next slides)
- To Live Long and Prosper – SCIENCE needs enhanced infrastructure support and Research/Graduate Program Support
 - These enhancements would have huge positive impact for the Province and its Economy



Faculty of Science, University of Manitoba

Current Initiatives and Future Directions:

- **1. Preparing the Workforce for Tomorrow**
- **2. Indigenous Achievement in Science**
- **3. Creating University-Industry-Government Partnerships**



Preparing the knowledge workforce for Tomorrow's Economy – Our Major Objectives

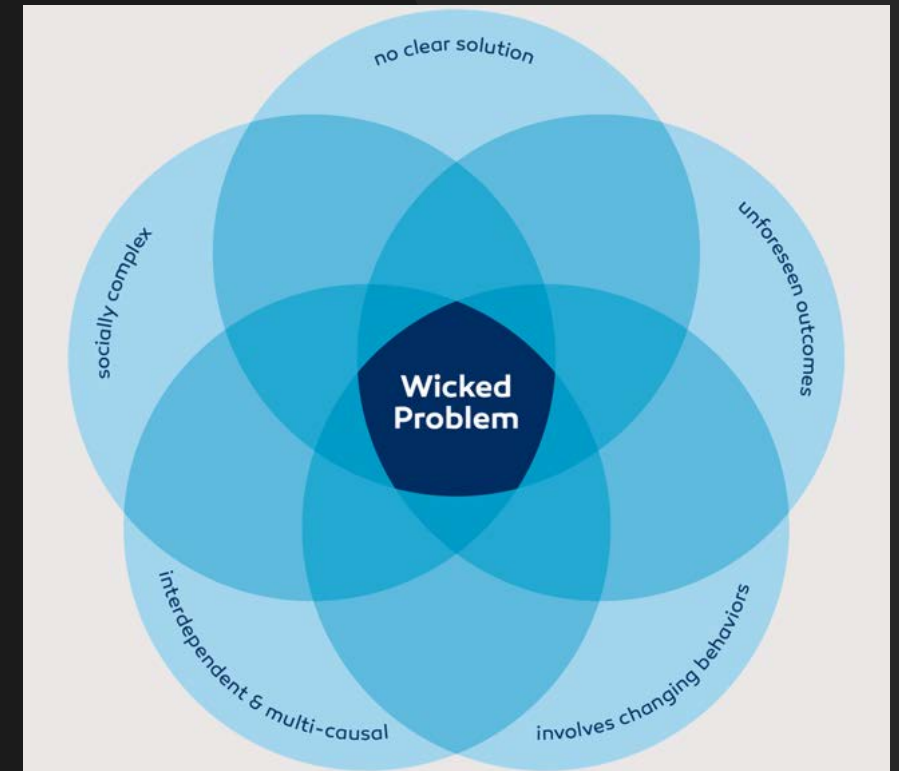
- **Objective 1: Create the premiere (brains & hands on) science learning environment where students acquire depth, breadth, ingenuity and resilience. Think and Do.**
- **Objective 2: Create paths of engagement between Science and society to build a reinforcing evolving cycle of experiential learning and knowledge exchange.**
- **Objective 3: Live the mantra - Science is for everyone.**



NEW DEGREE PROGRAMS – FORWARD LOOKING

- New interdisciplinary degree programs
 - BS Data Science (2021), MS Data Science (2022), Masters in Business Analytics (with Asper – 2022).
 - BS Integrated Science (2022),
 - BS Neuroscience and Computer Cognition (2023)
 - BS Applied Physics (2023)

The current nature of scientific problems and global issues, ranging from climate change to pandemics, often requires knowledge and skills that span multiple disciplines.



NEW CLASSES that BROADEN

- THE ART OF SCIENTIFIC VISUALIZATION (2020, 2021)
- SCIENCE ENTREPRENEURSHIP (with Asper and Sci alumni) (2021)
- SCIENCE POLICY (2018 on)
- TWO EYED SEEING/INDIGENOUS SCIENCE (fall 2021)
- CERTIFICATE OF SCIENCE COMMUNICATION PILOT started fall 2020
- BIOINSPIRED ARCHITECTURAL MATERIALS (Chem - Architecture) 2022
- NEW for credit ESSENTIALS (preparatory) COURSES – fall 2021

Opportunities in and out of Classroom

SCIENCE SKILLS FOR THE 21ST CENTURY

Undergraduate Student Workshop

Presented by:
Faculty of Science & UM Extended Education



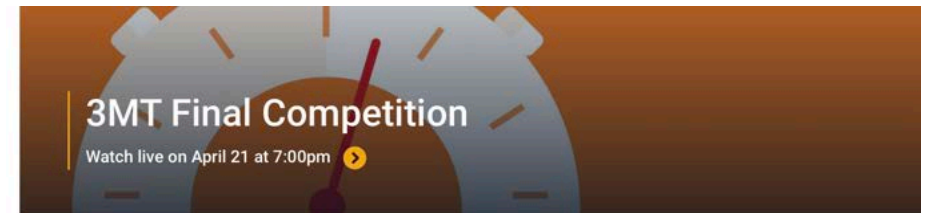
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Work Integrated Learning

- **SCIENCE COOP**
 - in all science disciplines & growing (2019 – record 341 students).
 - Programs now Nationally Accredited.
- **GENERAL SCIENCE WORK INTERNSHIP PROGRAM**
 - For Three Year General Students (~2500) Starting Fall 2022.



STUDENT ENGAGEMENT IN NATIONAL AND INTERNATIONAL COMPETITIONS



Faculty of Graduate Studies

Home / Faculty of Graduate Studies / Student experience / Three Minute Thesis (3MT)

Student experience

Three Minute Thesis (3MT®)

Three Minute Thesis (3MT) is an annual competition for graduate students in a thesis-based program. The University of Manitoba 3MT is part of an overall strategy to highlight our graduate students, promote UM research and connect with the community.

Education (K-12) and Public Engagement: Building the Next Generation

- It begins with role models and inspiration (faculty and students reach out)
- Diverse students engage in outreach e.g. Saturday Science Club, Math Mania, Birds & Windows, Let's talk science.
- Science Rendezvous grown to 800 student organizers, > 5000 campus visitors, preceded by Science Discovery Week (schools)
- **Our UM STUDENTS** get real life lessons in Leadership, Project Management, Communication.



The Wawatay
Project Starts
Summer 2021
with our first
cohort of 10
students-
the inaugural
Wawatay Scholars

WHAT IS WAWATAY?

Wawatay opens the doors of science to high potential Indigenous students, regardless of preparation.



Community Partners

Wawatay involves reaching out and working directly with our students' home communities. The first, and certainly one of the most important aspects of Community Partnership, is nominating high-potential students for the program.

This entails working with the Wawatay lead to customize each community's nomination criteria. Possible student nomination criteria include ability to problem solve, inquisitive, hardworking and of course, an interest in science. Students interested in this program should reach out to their community leaders or contact the Wawatay Lead.





THE STUDENT EXPERIENCE

The goal of Wawatay is to increase Indigenous student success at graduating with a science degree. Wawatay will develop student potential, challenge promising students, and offer continuous personal and academic supports.



ANITA MURDOCK, INDIGENOUS SCIENCE STUDENT REPRESENTATIVE.

A person wearing a wide-brimmed hat and a dark vest is using a long, light-colored pole to stir the water in a shallow pond. The water is rippled, and the background is a natural, outdoor setting.

EXPERIENTIAL RESEARCH

From day one through to graduation, our students will engage in research, working on projects that reflect their personal interest and projects that relate directly to their home communities.

SIX WEEK SUMMER ON CAMPUS ORIENTATION KICKS OFF WAWATAY BEFORE FIRST SEMESTER

Includes introduction to the university, BEAHR training in professional skills and Indigenous research, research presentations from science faculty, assessment and personal academic advising, Indigenous connections, mentoring, supports, social events and a Team Project.

WHAT IS WAWATAY?

Transforming Scientific Research
Wawatay combines classical scientific approaches with Indigenous ways of seeing, knowing, learning and doing to enhance the power of science.



Our Foundation



HONOUR TRADITIONAL KNOWLEDGE

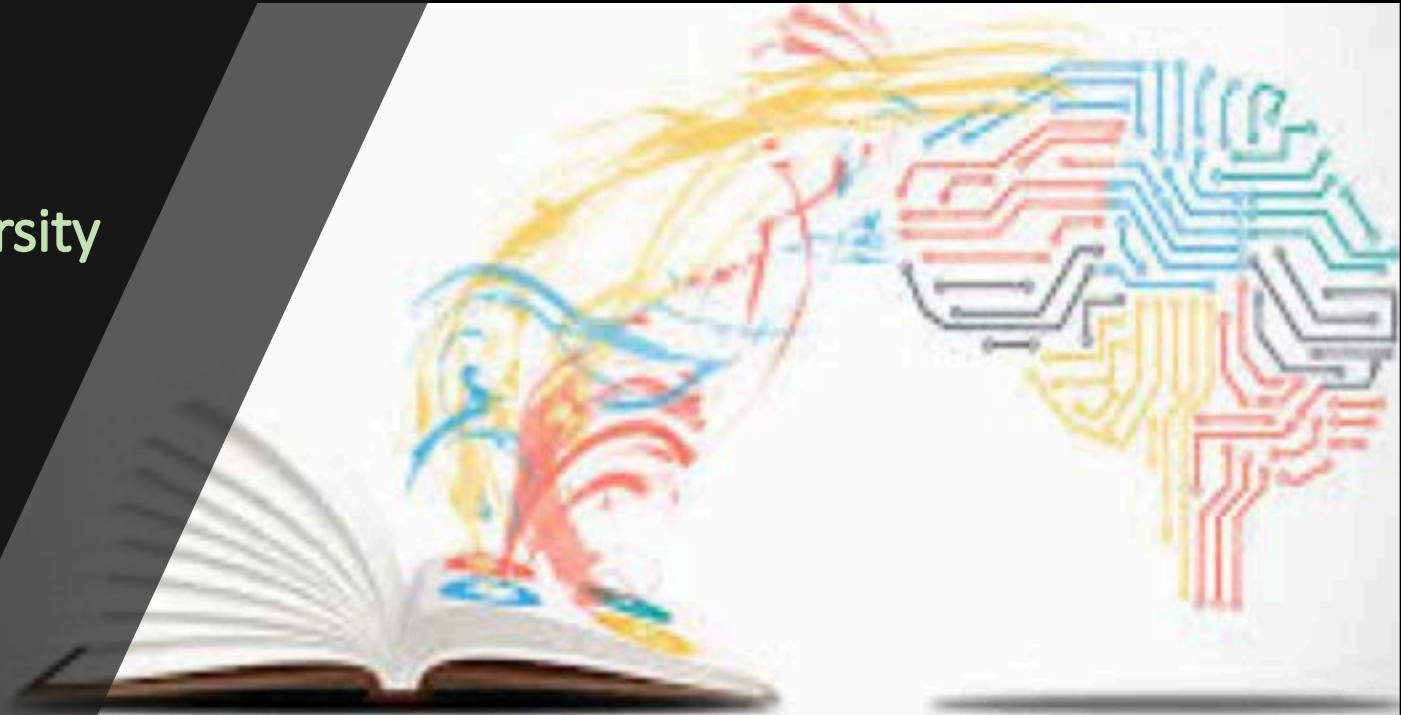
Embrace traditional ways of knowing and weave two eyed seeing into research, teaching, and learning.



Building University Industry Government Partnerships

FACULTY OF SCIENCE OBJECTIVES

1. Accelerate Transfer of Knowledge from University to Industry
2. Enhance Industry and Government awareness of Science capabilities
3. Support Commercialization of University Research and Startup Creation.
4. Build a virtuous reinforcing cycle of science HQP and life long learning for Manitobans



Feeding the Golden Goose, Gathering the Golden Eggs

- Discoveries and inventions from research and knowledge workers are the golden eggs underpinning societal advance and economic strength
 - When Covid-19 strikes, they illuminate the pathway out
 - They spawn great industries, keep the economy vibrant, fuel the startup economy, provide societal solutions.
- Science Faculty researchers (and their HQP) are Geese laying golden eggs
 - **Discovery research is the currency of university science researchers and students. It creates the seeds that, through application, transform society and economies.**



The Faculty of Science Deliberately Opened for Industry Collaboration

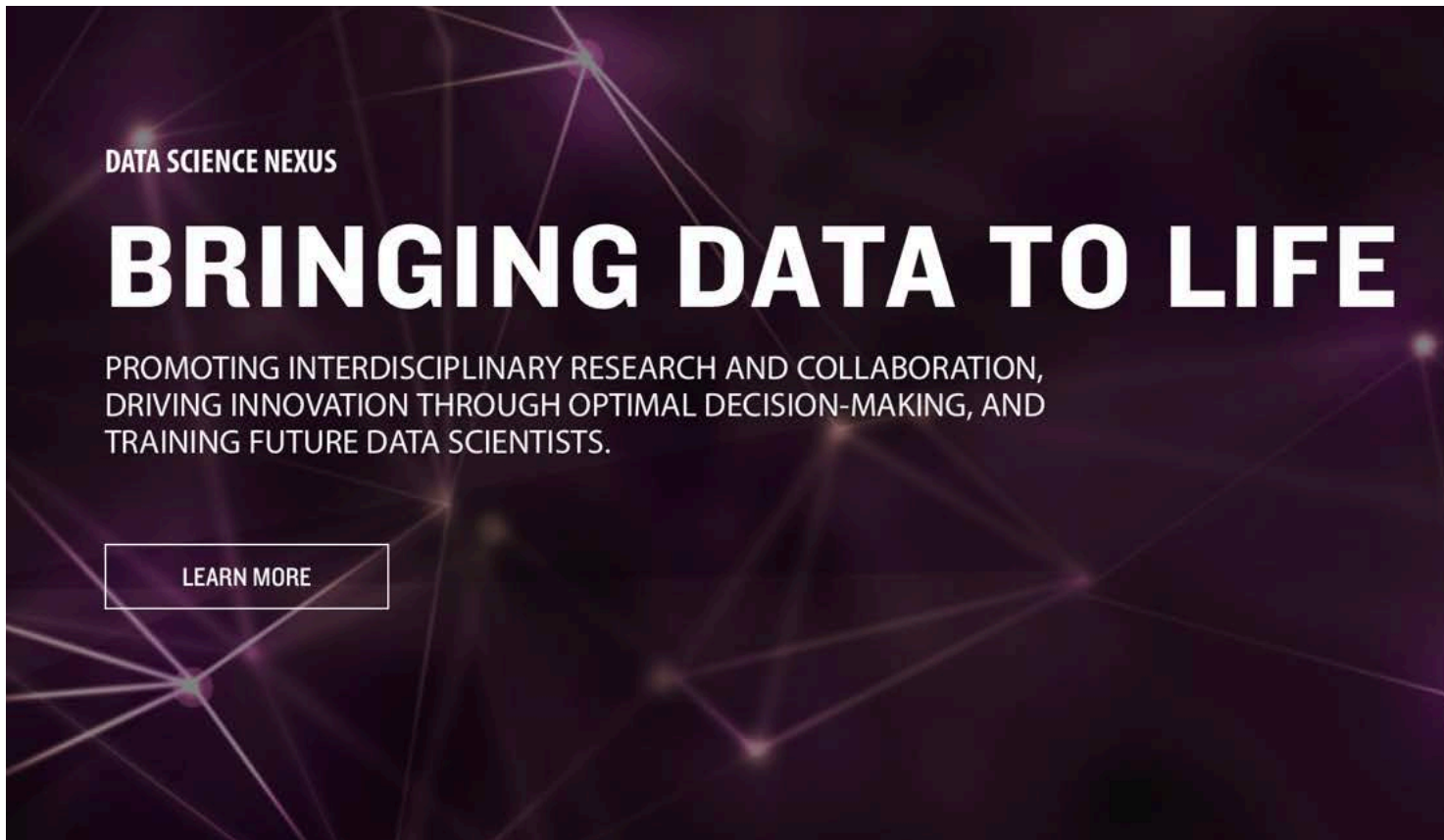
OPEN^{for}
BUSINESS

- Science has established partnerships and collaborations with sector councils, funders, industry associations
- Science has held Research Innovation & Commercialization Workshops and funded Research Innovation & Commercialization opportunities for faculty and students.

Annual Partners in Progress
Dean's Meet and Greet, (2018
start): industry-facing c-suite
event to engage business &
community leaders.

Over 1.5 years engaged 200+
local industry & government
partners, with strong
representation in
Insurance/Finance, Biotech,
Agriculture, Transportation +
Logistics, ICT/Tech,
Manufacturing.

CREATING HUBS - 1. NEXUS

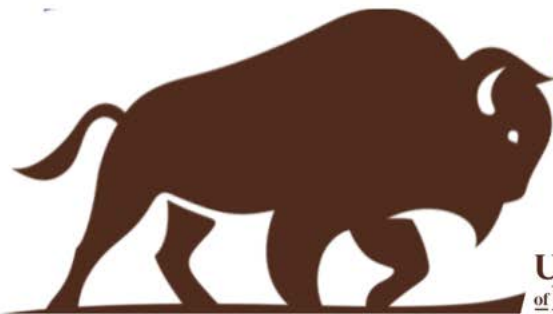


- Launched in 2019: interdisciplinary collaboration hub and connecting link to data science talent, training, and leading-edge research.
 - AI/machine learning, computation, visualization, prediction, data science
 - Domain expertise in digital agriculture, biotech, finance, transportation, etc.

CREATING HUB #2 - BioEx^M

BioEx^M

Exploration of Natural
& Synthetic Biology



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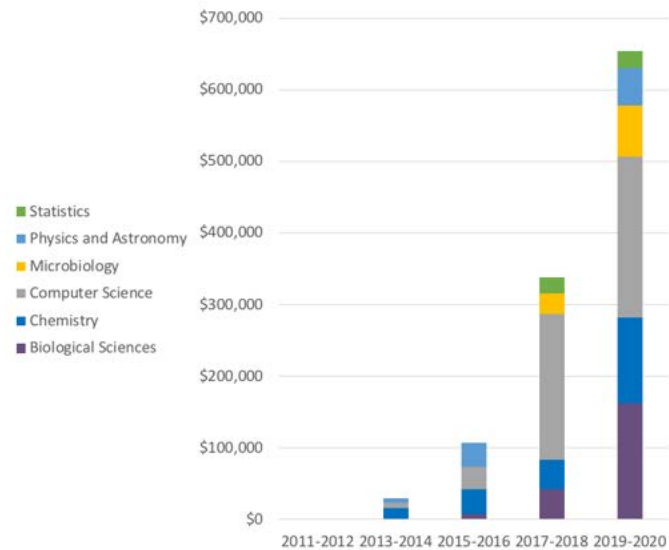


faculty of SCIENCE
discover the unknown + invent the future

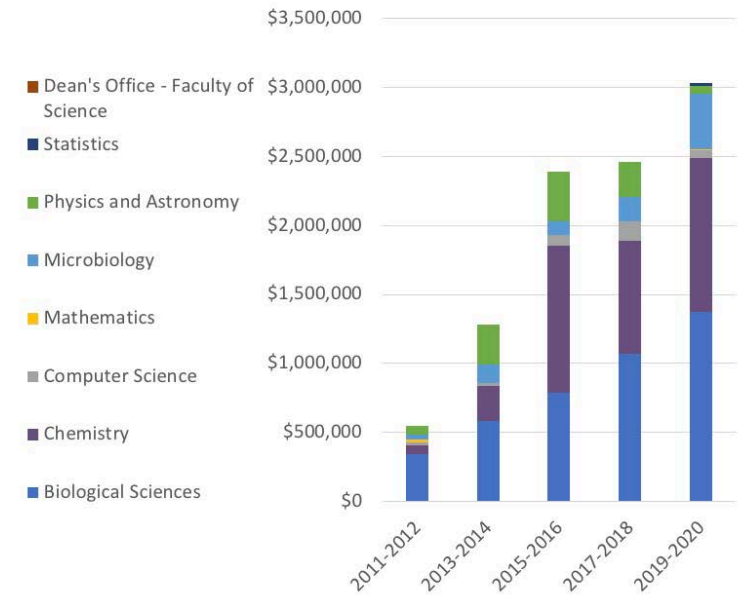
- **Launching June 2021**
- Structural, Synthetic, Digital Biology
- Goal: become premier education & research group in Canada, growing industry connections.
- Status: extraordinary current strength, 2 CRC1s, new hires, state of the art Cryo-EM (CFI)
- “Could we train HQP with the knowledge to produce the Pfizer vaccine and create future new technology vaccines on our campus?” - SynBioLab Yes we Can.

IT'S WORKING

Mitacs Funding by Department



Industry- academic contracts by Department



IT'S WORKING-

Research Manitoba Proof of Concept Grants

Protegra Design a better future through software-enabled solutions.

Adva Diagnostics – FoS/Micro w/ Engineering - ~300K

Point of care diagnostic device for rapid detection of COVID19

IoAirFlow – FoS/Stats and Red River College -~300K

Assessing environmental quality gaps in commercial buildings using wireless sensors and big data analysis

Protegra – FoS/Computer Science – 540K

Decentralized services and innovative protocol for sharing / searching user-generated data

KGS – Faculty of Science, Chemistry – 225K

Commercialization of bioactive natural products derived from plant-beneficial bacteria



IT'S WORKING – LEADING NATIONAL INITIATIVES



GEN-FISH

Genomic Network for Fish
Identification, Stress and Health

“We are certainly not the only ones doing this, but we are likely the first ones doing it on this scale”

-Margaret Docker, Faculty of Science

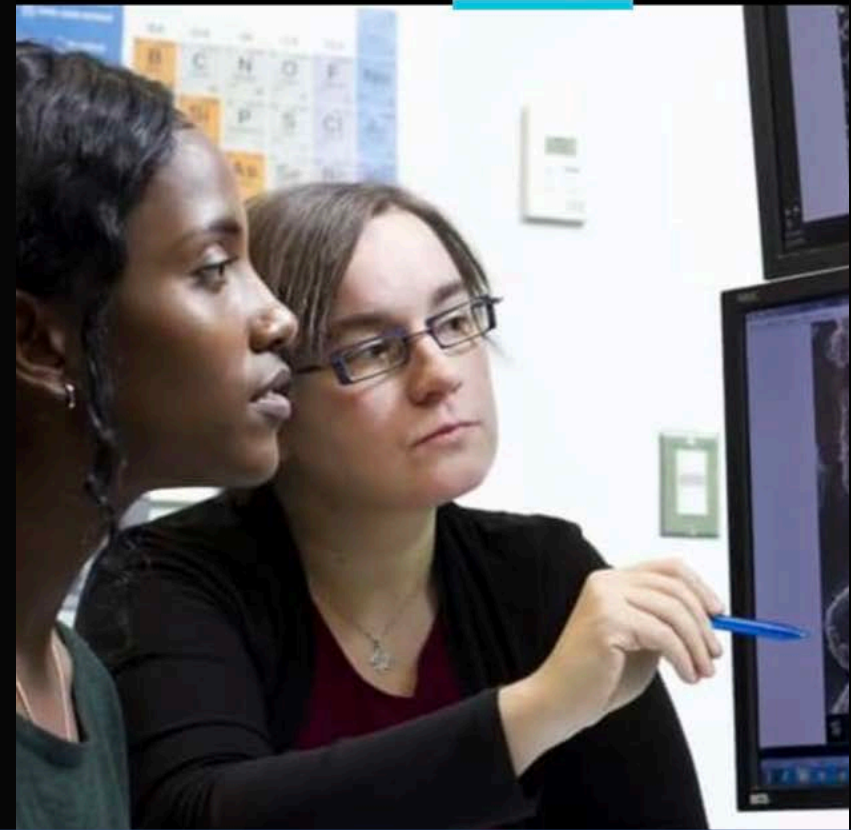
- GEN-FISH harnesses environmental DNA to manage Canada's freshwater fish

Canada is home to almost 200 species of freshwater fish spread out over more than two million lakes covering about 7.6 per cent of Canada's nearly 10 million square kilometres. Margaret Docker and her colleagues want to catalogue them all.

Docker is co-lead of a 25-member team comprising the Genomic Network for Fish Identification, Stress and Health.

Genome Canada is providing \$4 million to the \$9.1 million, four-year project, with the balance coming through Ontario Genomics, Genome Québec, plus university and industry partners.

Together we are making an impact, engaging community, and training the next generation who will lead the way in these nine CHALLENGE areas for the Future.



- **Explore Life on the Smallest Scales** * **Harness Microbial & Genetic Worlds**
- **Revolutionize Tomorrow's Materials & Devices**
- **Make Computers our Sixth Sense** * **Revolutionize Science & Math Literacy**
- **Grow the Innovation Ecosystem** * **Reconnect Nature's Networks**
- **Leverage the Origins of the Universe**
- **Cultivate Remote and Rural Communities**

**World changing
science happens here**

www.sci.umanitoba.ca



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