Global Water Futures Operations Team Meeting 2019

John Pomeroy

Director, Global Water Futures Program

2nd Annual Operations Team Meeting

- Review progress of the 39 Projects
  - Synergies
  - Contributions to GWF Mission
  - Contributions to UN Sustainable Development Goals
- Welcome and Introduce new co-led projects for Indigenous Communities Water Research
- Review progress of the 6 Core Teams
  - Link Core Teams together and to Projects
- Explore ideas for GWF International activities

Global Water Futures: Solutions to Water Threats in an Era of Global Change

University of Guelph

University of British Columbia

University of Northern British Columbia

University of Calgary

University of Laval

McGill University

University of Quebec at Montreal

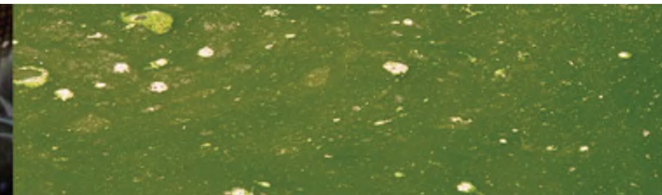**University of Alberta**

University de Montreal

University of Manitoba

University of Victoria

Brock University

Canadian Rivers Institute (University of New Brunswick & University of Prince Edward Island)

Yukon College

Canada's Water Crisis: Regional Examples

Conflicts between water and land users, typically arising over resource development pressures threatens our financial stability while transitioning to a low carbon economy.

Ecological collapse in significant freshwater systems through cumulative effects of water quality stressors on iconic and at-risk species is threatening food sources and livelihoods.

Extreme swings in water quantity between floods and droughts are fundamentally altering the ability to use our waterways and are threatening critical infrastructure and lives.

Inadequate source water for First Nations threatens our ability to provide all citizens of Canada with equitable access to safe and clean drinking water.

15/17 measures of environmental health in decline Wood Buffalo National Park

Fort McMurray Forest Fires 2016
$8.9M

Long-term water advisories for **84** First Nations[2]

Rocky Mountain Floods 2013 **$6B** and **100,000** Evacuated

>**$50M** already dedicated to restoring Lake Winnipeg

Ring of Fire Mining Protests over land and water rights

TransMountain Pipeline delays cost **$15B/year**

Ontario/Quebec Floods 2017 **$223M**

Nestle groundwater mining **90%** of Six Nations lacks drinking water

Record BC Floods & Fires 2017-2018

Prairie Droughts 1999-2004 **$6B**

Prairie Summer Floods 2014 **$1.5B**

Lake Erie Algae Blooms 2014 **$65M USD** in lost economic benefits

Toronto Floods 2013 **$1B**

St. John River Flood 2018 **$80M**

Map labels: Beaufort Sea, Amundsen Gulf, Lancaster Sound, Gulf of Boothia, Queen Maud Gulf, YUKON TERRITORY, Hudson Bay, James Bay, Wood Buffalo National Park, Fort McMurray, Lake Athabasca, ALBERTA, BRITISH COLUMBIA, Fraser, SASKATCHEWAN, Lake Winnipeg, MANITOBA, Grassy Narrows First Nation, ONTARIO, Ring of Fire Mine, QUEBEC, Gulf of St. Lawrence, Cabot Strait, PEI, NEW BRUNSWICK, Fredericton, NOVA SCOTIA, Ottawa, Toronto, L. Ontario, Six Nations Reserve, L. Erie

Global Water Futures: Solutions to Water Threats in an Era of Global Change

GWF aims:

a) to **place Canada as a global leader in water science for cold regions**,

b) to **address the strategic needs of the Canadian economy** in adapting to change and managing the risks of uncertain water futures and extreme events.
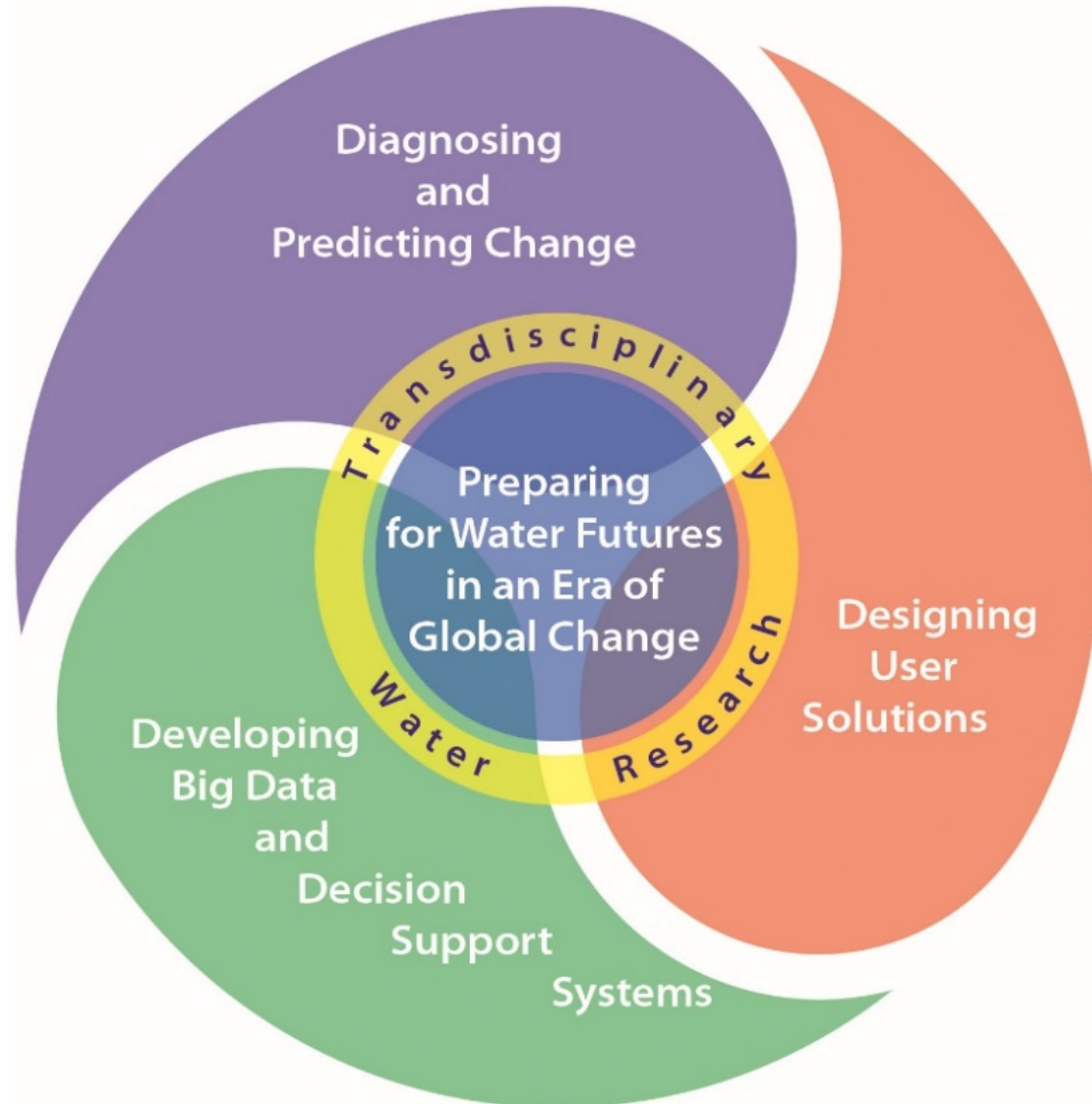
Global Water Futures - Mission

- **Improve disaster warning** – develop:

  - scientific knowledge, monitoring and modelling technologies,

  - national forecasting capacity to predict the risk and severity of extreme events

- **Predict water futures** –

  - use Big Data to make informed decisions,

  - Develop better models to assess change in human/natural land and water systems

- **Inform adaptation to change and risk management** – to reduce the risk of water threats, design adaptive strategies, and enhance economic opportunities, propose

  - governance mechanisms,

  - management strategies,

  - policy tools

Transdisciplinary Science Pillars

- **Pillar 1** - Diagnosing and Predicting Change in Cold Regions

- **Pillar 2** - Developing Big Data and Decision Support Systems

- **Pillar 3** - Designing User Solutions

GWF Today

Awarded
$ 77.84 M

over 7 years
2016 - 2023

from
CANADA FIRST | APOGÉE CANADA
RESEARCH EXCELLENCE FUND | FONDS D'EXCELLENCE EN RECHERCHE

GWF **supports**

3 Global Programs

UNESCO

WCRP
World Climate Research Programme

futurearth
research for global sustainability

39 projects
funded across Canada

15
universities

162
faculty investigators

335
partners

60
observatories

$292.6 M in GWF project & core team funding

$115.8 M
In-kind

$176.8 M
Cash

Role	Count
Undergrads	56
Grad Students	216
Post Docs	68
Scientists & Engineers	62
Technicians	48
Managers	34
Visiting Fellows	8
KM Specialists	4
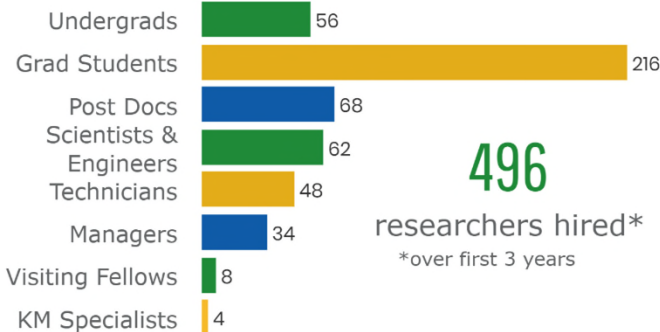
496
researchers hired*
*over first 3 years

Global Water Futures will position Canada as a:

- Global leader in water science
- Global partner of choice for water research
- Provider to Canada and the world of solutions to water threats

27 UNIVERSITIES, COLLEGES and ACADEMIC INSTITUTIONS

32 INDIGENOUS ORGANIZATIONS and INDIGENOUS COMMUNITIES

80 FEDERAL, PROVINCIAL and CIVIC AGENCIES

61 NON-GOVERNMENTAL ORGANIZATIONS

66 INDUSTY COLLABORATORS

86 INTERNATIONAL RESEARCH INSTITUTIONS

Our Global Team

388[*] CANADIAN RESEARCHERS

3[*] GLOBAL RESEARCH PROGRAMS | UNESCO WORLD CLIMATE RESEARCH PROGRAM FUTURE EARTH

More than 370 National and International Partners

[*] Research and progam collaborators

Transformative Science Projects

- 21 transformative research, big data and decision support tool projects funded for Pillars 1 & 2

Transformative Science Projects BY THE NUMBERS
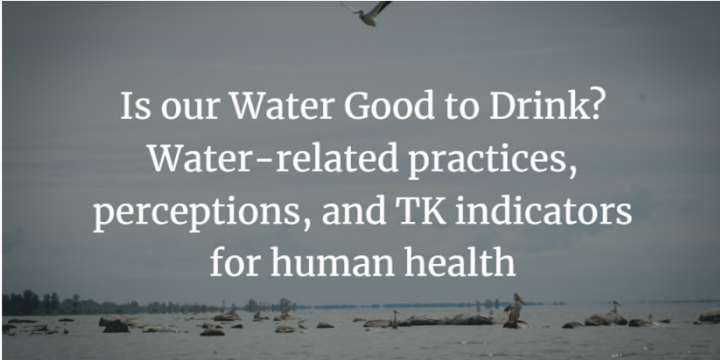
- 94 investigators
- 21 projects
- 100 HQP trained over 3 years
- 82 partners
- $10.2 M* total funding
- 10 Canadian universities

*$6.6 M in GWF grants, $423 K leveraged (cash), $3.2 M leveraged (in-kind support)
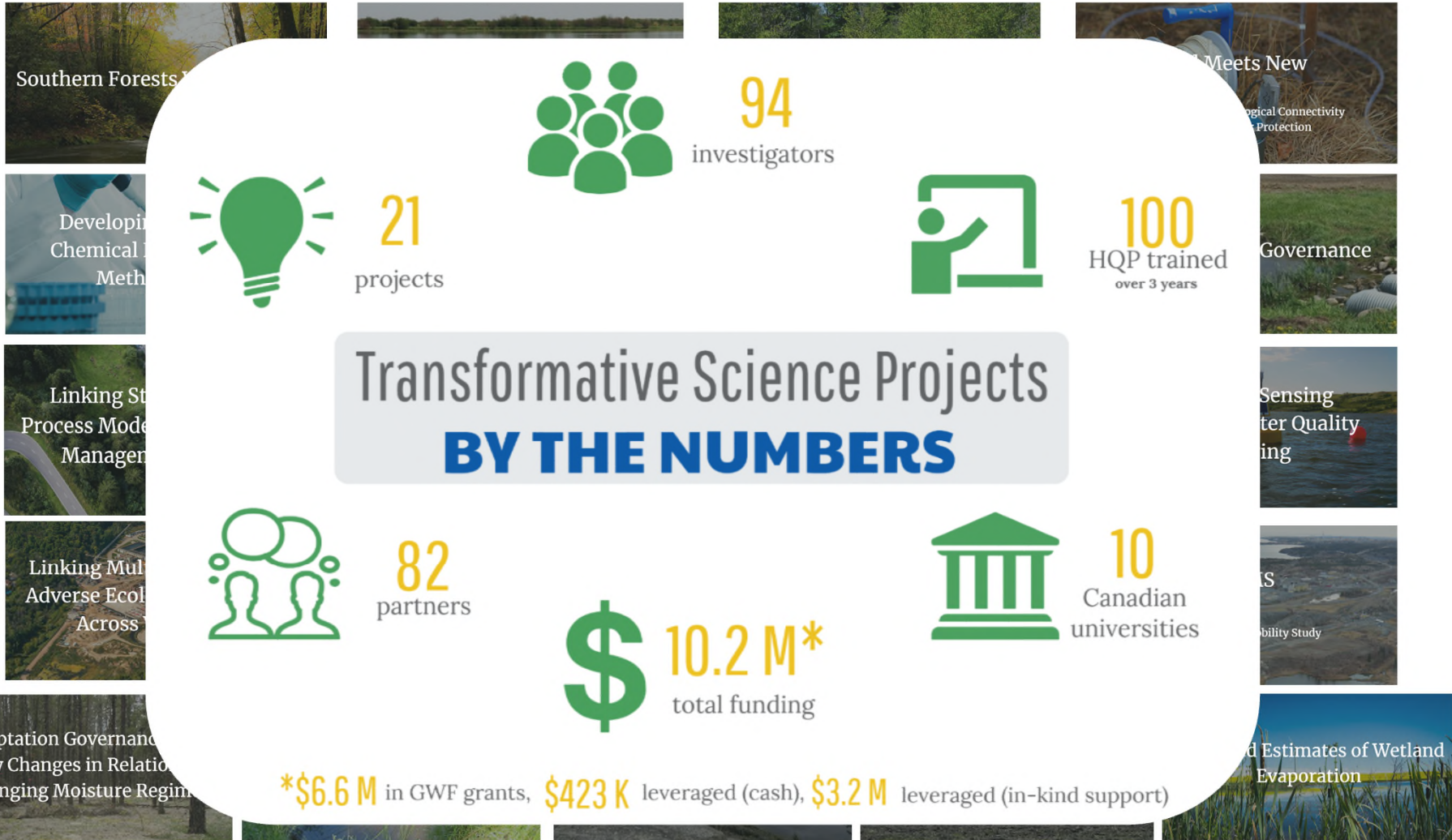
Designing Solutions for Users

- 12 user-question led projects funded for Pillar 3

Indigenous Community Water Research Projects

Is our Water Good to Drink? Water-related practices, perceptions, and TK indicators for human health
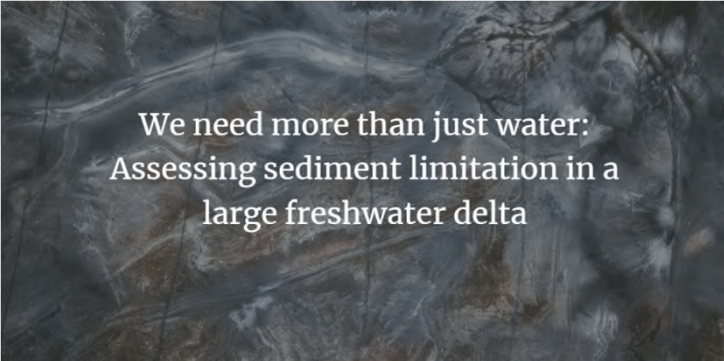
FIShNET (Fish & IndigenouS NorthErn healTh): Healthy Water, Healthy Fish, Healthy People

Ohneganos - Indigenous Ecological Knowledge, Training and co-creation of mixed method tools

Water Knowledge Camps: Building Capacity for Cross-Cultural Water Knowledge, Research, and Environmental Monitoring

We need more than just water: Assessing sediment limitation in a large freshwater delta
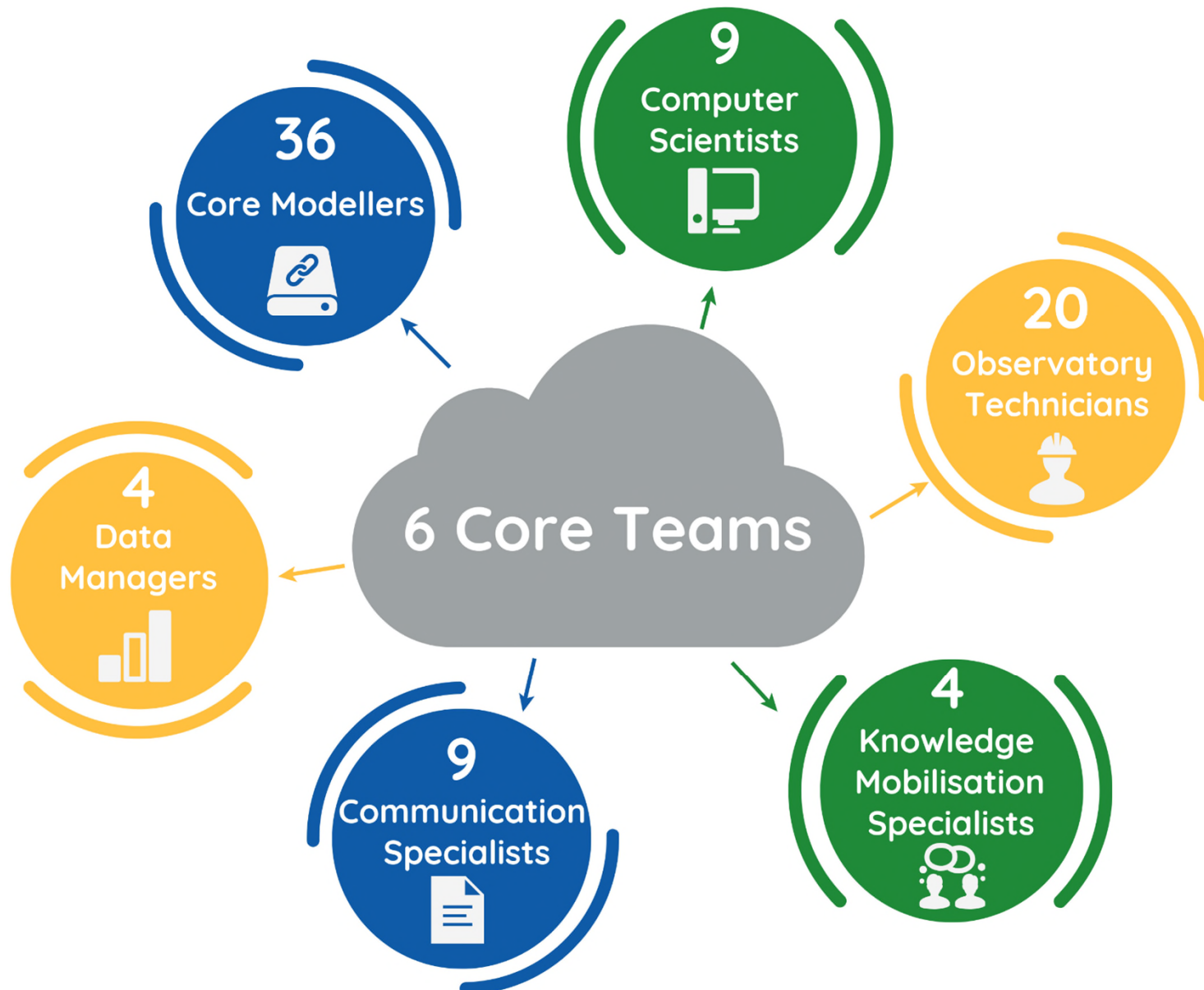
Matawa Water Futures: Developing an Indigenous-informed framework for Watershed Monitoring and Stewardship

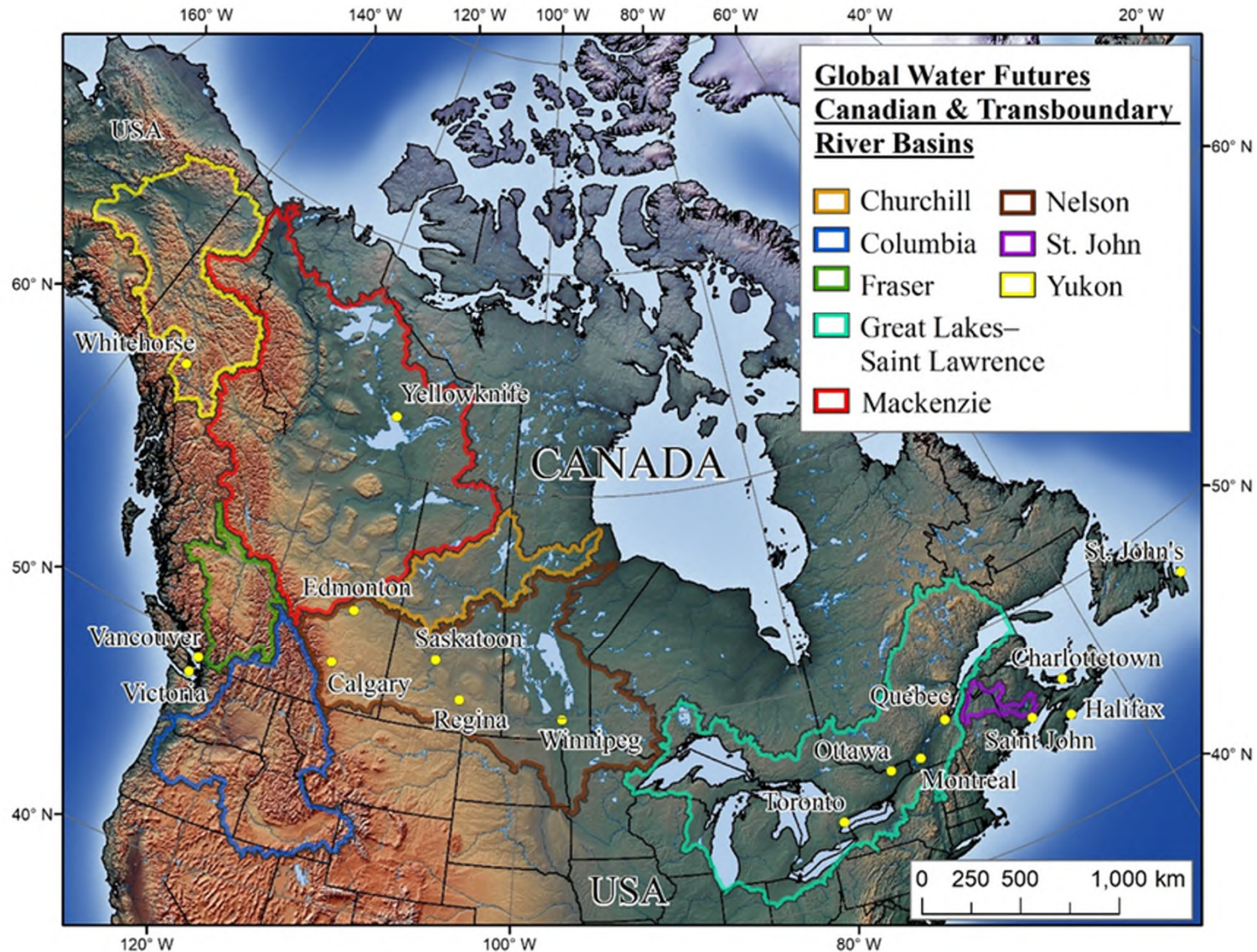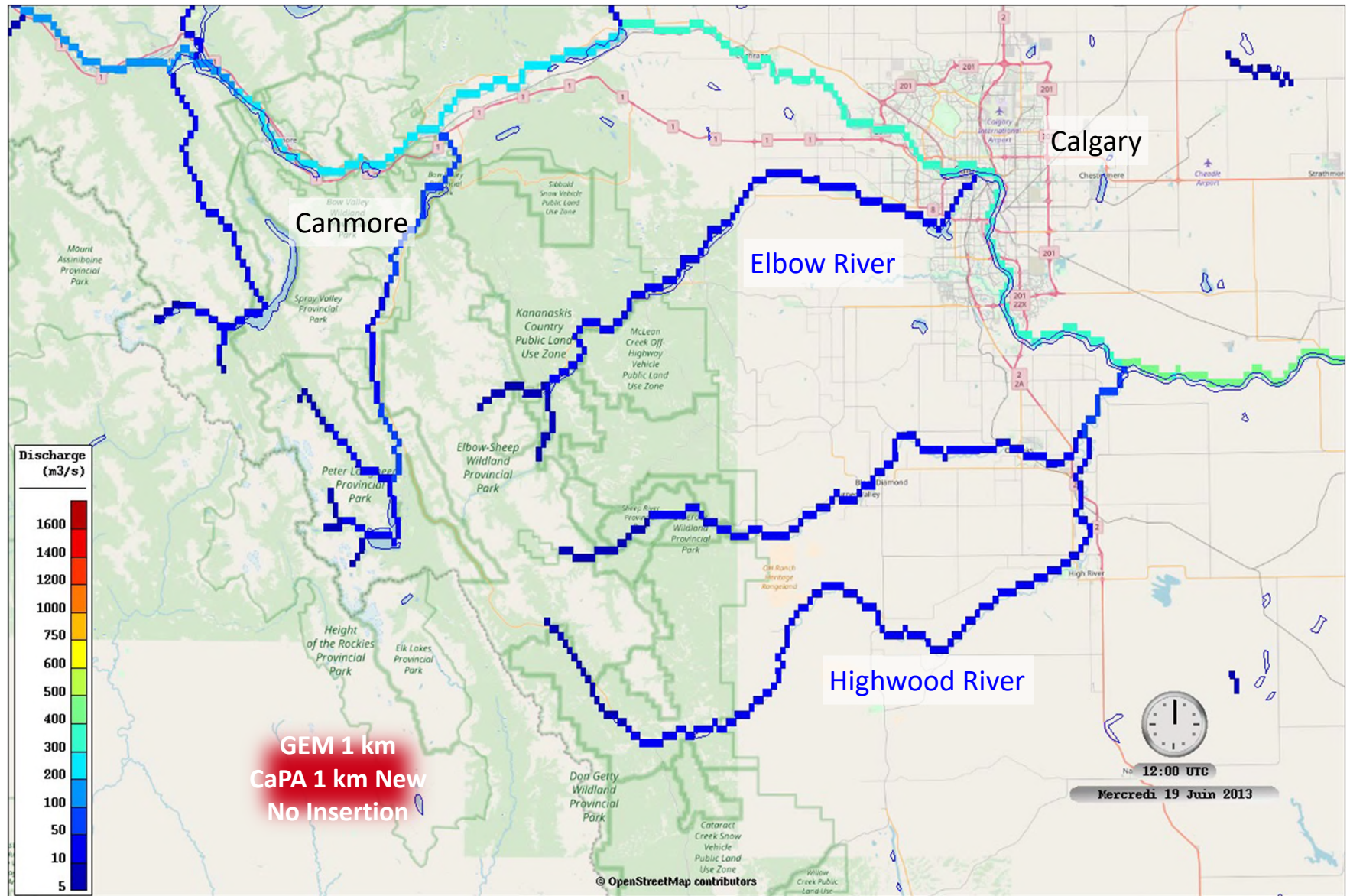# GWF Water Observation, Prediction and Knowledge Mobilization Strategy
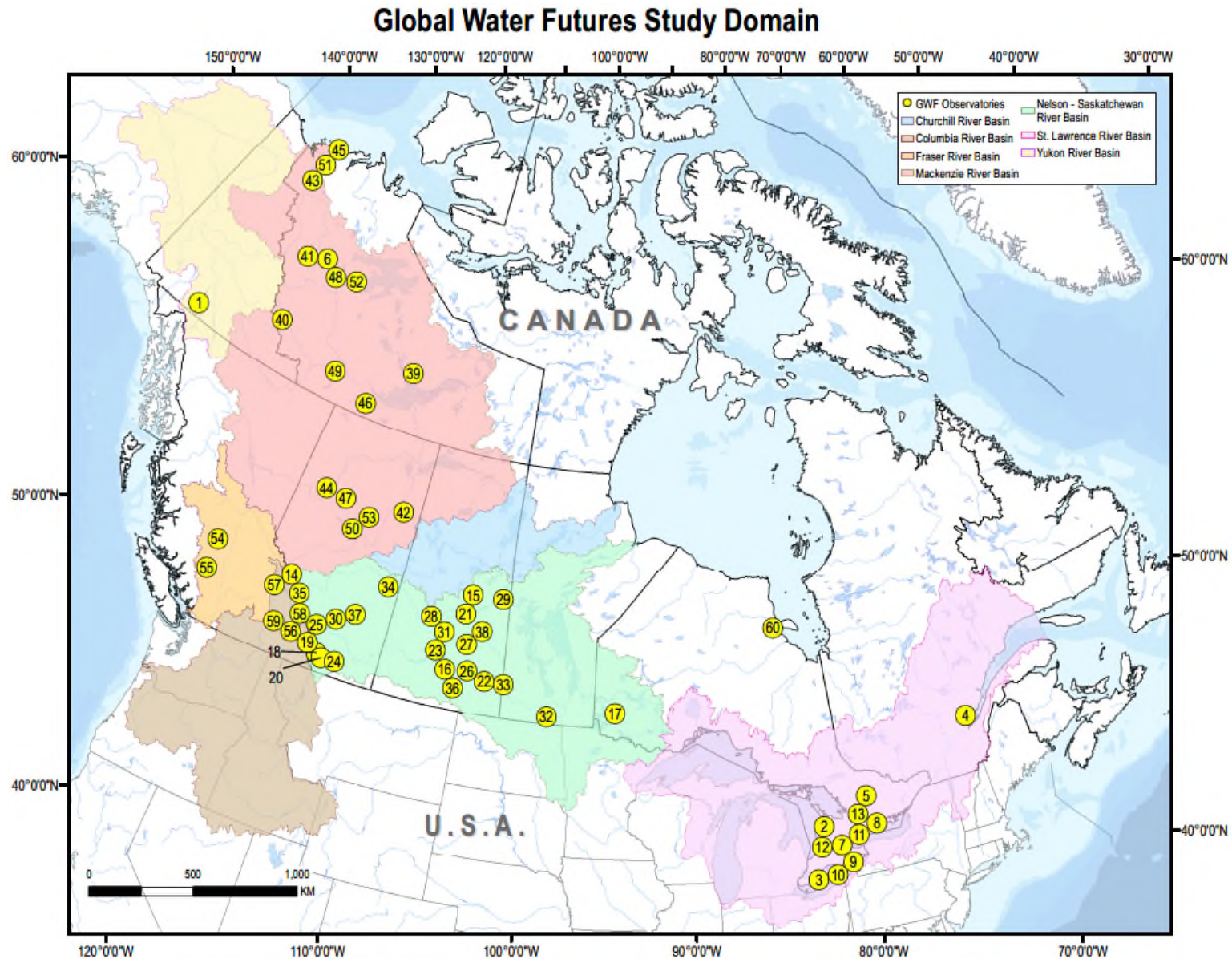
GWF Core Teams

University of Saskatchewan — Global Water Futures — GWF.USASK.CA

- 36 Core Modellers
- 9 Computer Scientists
- 20 Observatory Technicians
- 4 Knowledge Mobilisation Specialists
- 9 Communication Specialists
- 4 Data Managers
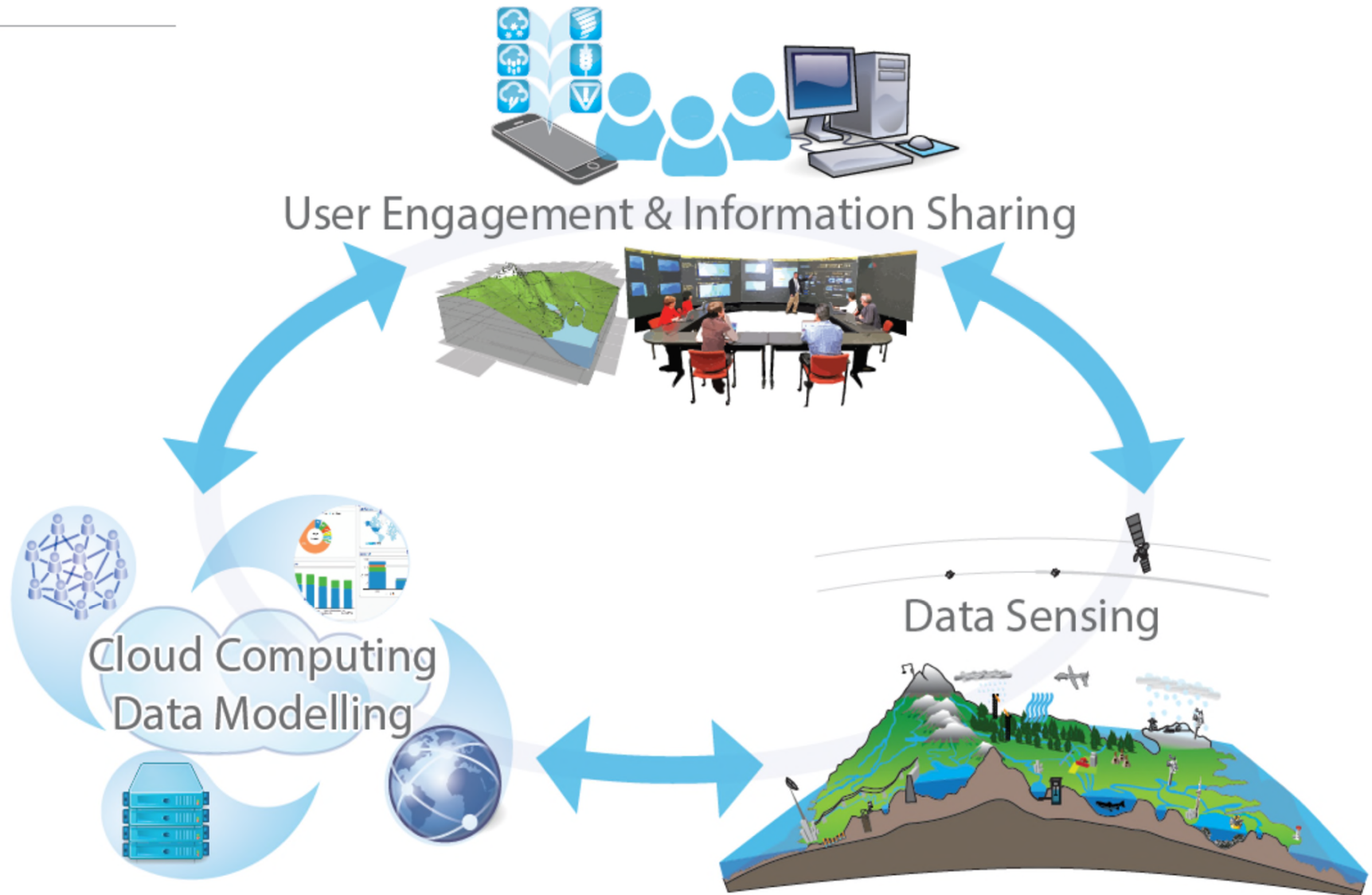
6 Core Teams

GWF's 8 River Basins

Global Water Futures
Canadian & Transboundary
River Basins

- Churchill
- Columbia
- Fraser
- Great Lakes–Saint Lawrence
- Mackenzie
- Nelson
- St. John
- Yukon

GWF GEM-Hydro Simulation of 2013 Flood
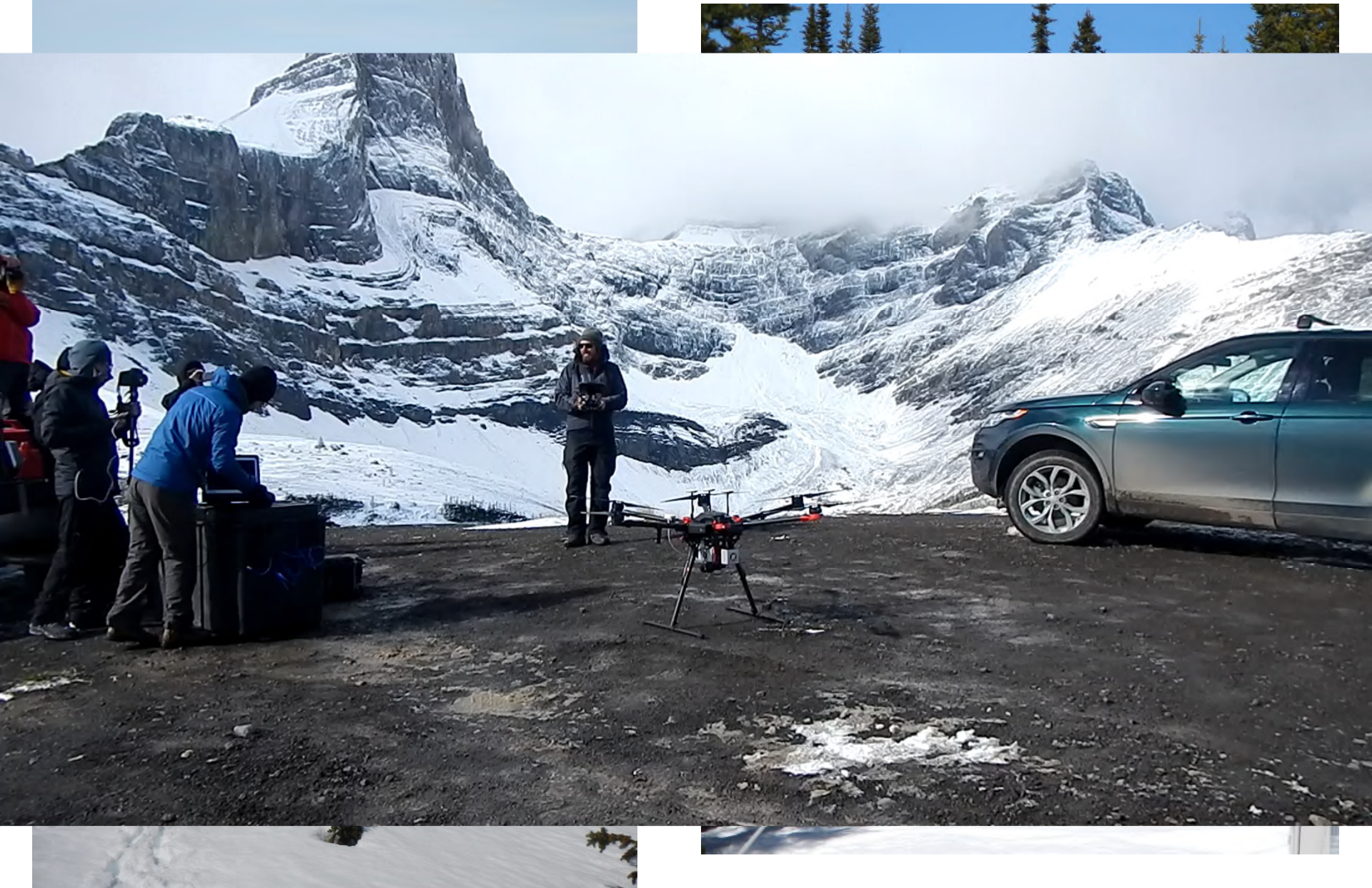
GWF's 60 Observatories

Global Water Futures Study Domain
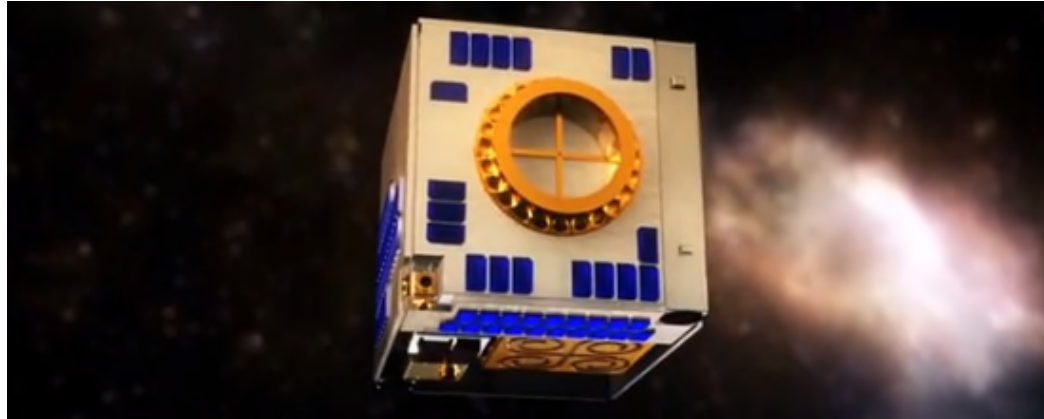
Smart Water Systems Laboratory

GWF Microsatellite Mission

Goals:

- **Design a microsatellite mission for freshwater monitoring**
- **Advance water research and support the research community**

HYPERSPECTRAL SENSOR

- High spatial resolution
- Spectral range from visible to near infrared
- More than 400 spectral bands

GNSS REFLECTOMETER

- 1.6 GHz L-band passive radar

TERRESTRIAL SENSOR NETWORK

- Two-way communication with terrestrial modems
- Data delivery up to two times per day

GWF Indigenous Community Water Research Strategy

- The GWF Indigenous Community Water Research Strategy was co-created with First Nations.

- The strategy comprises three components
    - Regional workshops.
    - Project and Core Team engagement with Indigenous communities
    - *GWF Indigenous Commmunity Water Research Projects*.

GLOBAL WATER FUTURES & MCMASTER UNIVERSITY PRESENT:

FIRST NATIONS WATER SECURITY & CLIMATE CHANGE SYMPOSIUM

June 3, 2018, Gathering Place, Six Nations Territory

KEYNOTES AND DISTINGUISHED GUESTS

- Haudenosaunee Sub-Chief, Leroy (Jock) Hill
- Dr. Carrie Bourassa, Scientific Director CIHR-IIPH
- Dr. Deborah McGregor, York University
- Chief Arvol Looking Horse, Sioux Nation
- Tina Ngata, (Aotearoa/New Zealand)
- Prof. Beverly Jacobs, uWindsor Law

Contact Stephanie Morningstar mornings@mcmaster.ca for registration and information

For more information, visit https://bit.ly/2IP1JmQ

GWF

NSERC CRSNG

McMaster University
INDIGENOUS RESEARCH INSTITUTE

GWF Canada and Policy Initiatives

- Increased engagement with ECCC – lead water department for Government of Canada
  - National Hydrological Service
  - Meteorological Service of Canada
  - Science and Technology
- MOU with NRCan – river basins, remote sensing, groundwater, climate change, glaciers, forestry
  - November 2018 science summit with NRCan in Ottawa
- Water, Peace and Security
- Canada Water Security Strategy
  - Climate change & extreme events, Indigenous water, Transboundary issues, Integrated River Basin Prediction and Assessment – FLOW, CIER, POLIS, UNU-INWEH

GWF International

- INARCH – mountain hydrometeorology
- GEWEX –
    - GWF Approved as a **Regional Hydroclimate Project**
    - Water for the Food Baskets of the World
- UN Water Action Decade
    - Collaboration with UN University
    - *Canada Water* - Strategy and Action Plan
- UNESCO
    - Global Environmental Facility - Central Asian Hydrology Project
    - GWF/UNESCO Joint Presentation to COP25, Santiago, Dec 2019
- Future Earth – Water Futures.
    - Sept. Conference, Bangalore
    - *Climate Impacts on Global Mountain Water Security Working Group*
- WMO – High Mountain Summit in Geneva, Oct 2019
- Modelling – Iran, India, Israel, Kazakhstan, Spain, Chile, Argentina, China
- Critical zone Observatory – China-Siberia
- Third/Three Pole Environment – Chinese Academy of Sciences

GWF Affiliated Projects

- Benefits
  - Access to core modelling outputs and will facilitate links to existing GWF-funded projects and core teams,
  - Access to some administrative and outreach support from the GWF Secretariat, and the opportunity to showcase their project on the GWF website and via social media
  - Can participate in GWF topical workshops and Annual Science Meetings
  - Participation in pursuing *future* funding opportunities with GWF members and projects

- Expectations
  - Contributing to GWF goals and objectives
  - Scientific excellence
  - Open data and open-source modelling
  - Diversity, equity, respect, inclusiveness

- Hosted by McMaster University and Six Nations of the Grand River

- Comprehensive water conference

  - +400 people from across Canada, from UN, WCRP, Future Earth.

  - 160 presentations from academics, students, researchers, Indigenous knowledge holders, policy makers, managers, communicators,
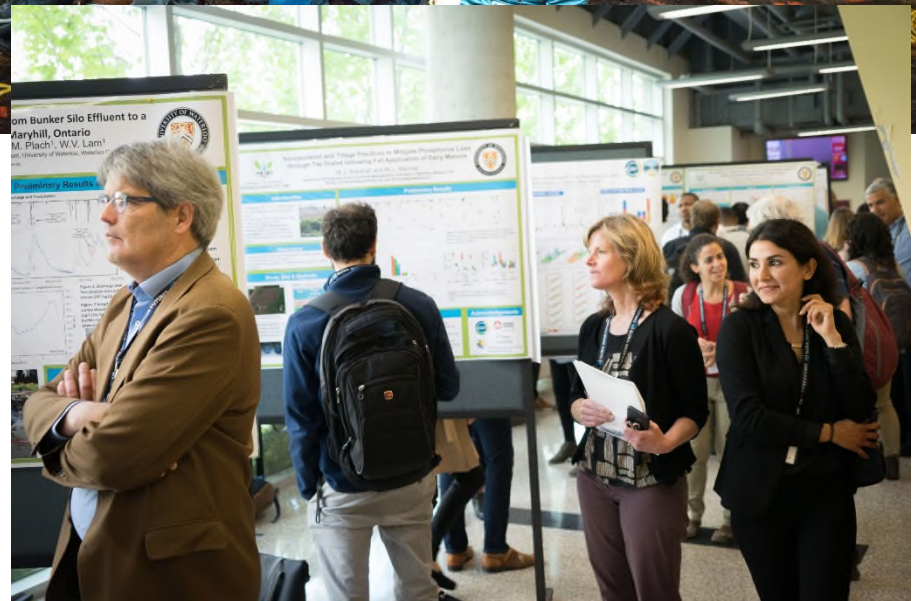
GWF Grand Challenge

- GWF has identified a *Grand Challenge*: **how can we best prepare for and manage water futures in the face of dramatically increasing risks from a changing climate, developing economy and changing society**?

By 2023, GWF will contribute to

- *Improved scientific foundations* for solving water problems.
- National *water forecasting and prediction* system
- *Predictions of water futures* around the world
- *Water solutions* for food security, energy security, infrastructure, economic development, safe communities, ecosystem conservation, governance.
- *Decolonialization* of Indigenous water management in Canada.
- *Water, peace and security* around the world
- Revitalized *water strategy for Canada*
- Making Canada known as the ***water solutions country***.

Today

- Plenaries from Core Teams
- Discussions on how to integrate with Core Teams

Tomorrow

- Introducing Indigenous Communities Water Research Projects
- Discussions on co-creating community led research
- Observations and Observatories
- International Activities

Global Water Futures

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