Government of
Northwest Territories

NWT Cumulative Impact Monitoring Program

2018/19 ANNUAL REPORT

PROGRAM AT A GLANCE

The Northwest Territories Cumulative Impact Monitoring Program (NWT CIMP) is an environmental monitoring and research program within the Government of the Northwest Territories' Department of Environment and Natural Resources. While many organizations monitor the NWT environment, NWT CIMP is mandated to understand cumulative impacts and environmental trends.

NWT CIMP is currently focused on cumulative impacts related to three valued components that decision-makers agree are of critical importance to the people of the NWT: caribou, water and fish.

The goal of the program is to provide information to NWT regulators and the public that contributes to wise resource management decisions.

Cumulative impacts are changes in the environment caused by human activities and natural processes that add up across the landscape over time. Monitoring cumulative impacts in the NWT is important because, over time, the results of many individual resource management decisions can lead to changes that may not have been expected.

Cumulative impact monitoring is a statutory requirement in the NWT, and a key feature of the Gwich'in, Sahtú and Tłı̨chǫ land claim agreements, as well as Part 6 of the *Mackenzie Valley Resource Management Act* (MVRMA).

Cover: Danny Masuzumi inspecting his catch after sampling for invertebrates in the wetlands of Ts'ude Niline Tu'eyeta. (Credit: Kirsty Gurney)

PROGRESS ON OUR ACTION PLAN

NWT CIMP is guided by a five-year (2016-2020) Action Plan that includes three key activity areas:

1. Working with partners to **understand key monitoring and research priorities**.
2. Coordinating, conducting and funding **environmental monitoring, research and analysis.**
3. **Communicating results** to decision-makers and the public.

In 2018/19, the program made progress on all main activities in the Action Plan. This work is described on pages 5 to 10.

2019/20 will be the last year under the program's current Action Plan. Planning has begun on the development of a new five-year (2021-2025) Action Plan.

For program information: www.nwtcimp.ca
For monitoring results: nwtdiscoveryportal.enr.gov.nt.ca

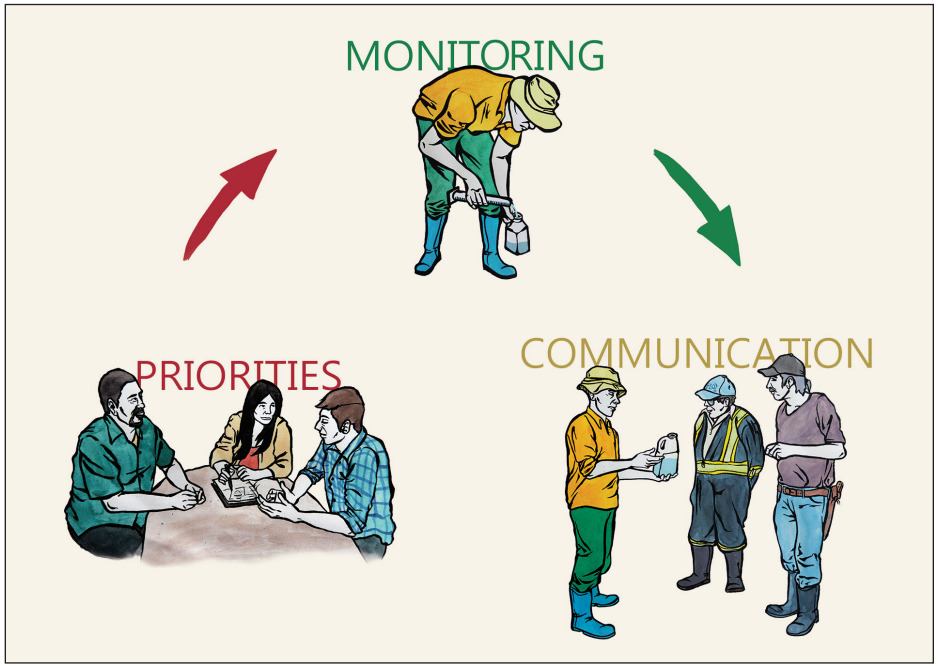


Illustration Credit: Trey Madsen

NWT CIMP Steering Committee at the NWT Environmental Research and Monitoring Results Workshop, December 2018.

1. WORKING WITH PARTNERS TO UNDERSTAND KEY MONITORING AND RESEARCH PRIORITIES

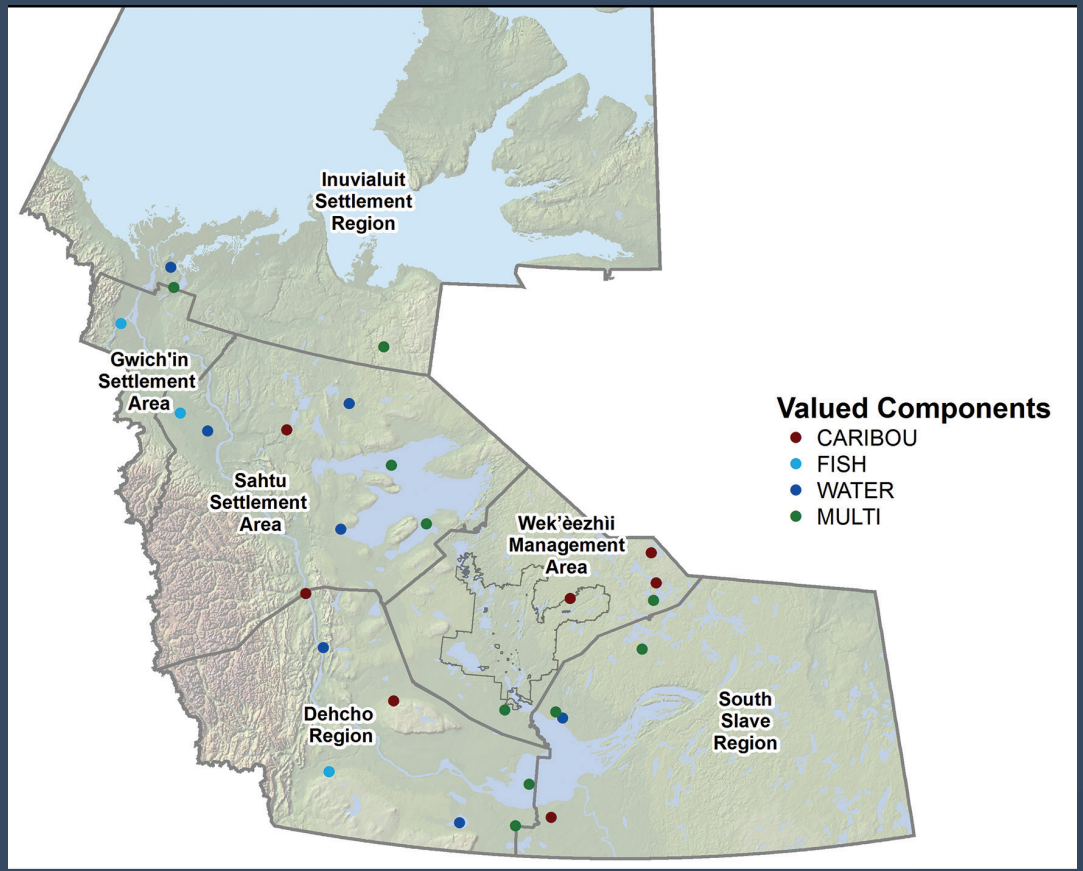
MONITORING PRIORITIES

In 2018/19, NWT CIMP continued to work with partners to confirm and refine its monitoring and research priorities for caribou, water and fish to ensure they continue to meet the needs of northern regulatory decision-makers. In particular, work was done to help identify information gaps and challenges related to key water monitoring data that regulators require to assess the cumulative impacts of developments. NWT CIMP also provided updates to regulatory boards on progress related to their research and monitoring priorities.

STEERING COMMITTEE

NWT CIMP continued to engage and support its Steering Committee, including representatives of eight regional Indigenous governments, the Government of the Northwest Territories, and several co-management boards. The Steering Committee met twice in 2018/19 to provide guidance on the overall program; the Committee also reviewed new project funding proposals and participated in the annual results workshop in Yellowknife.

Map of 2018/19 NWT CIMP projects



2. COORDINATING, CONDUCTING AND FUNDING MONITORING, RESEARCH AND ANALYSIS

In 2018/19, the program generated a significant amount of new knowledge about caribou, water and fish. In total, 27 projects were supported throughout all regions of the NWT with $1.7M in funding, supplemented by $3.3M in leveraged partner funding. Twenty-two of the projects were led by, or conducted in partnership with, a regional Indigenous, community or co-management organization. A complete list of NWT CIMP projects from 1999 to 2019 is available at www.nwtcimp.ca.

SUPPORTING INDIGENOUS COMMUNITIES

This year, six projects had a focus on traditional knowledge and 18 were developed directly in response to community concerns. Over 55 per cent of the projects included training or work experience for community members.

SUPPORTING DECISIONS ABOUT THE ENVIRONMENT

NWT CIMP is focused on providing information to regulators and the public that supports effective environmental decision-making. Project leads are required to contact local decision-makers as part of the funding application process to ensure projects meet their needs. Over 80 per cent of 2018/19 funded projects were identified as being able to contribute to a current or future decision-making process.

Participants listen at the NWT Environmental Research and Monitoring Results Workshop, co-hosted by NWT CIMP and the Yellowknives Dene First Nation (Yellowknife, NWT).

3. COMMUNICATING RESULTS TO DECISION-MAKERS AND THE PUBLIC

COMMUNICATION WITH COMMUNITIES

One of NWT CIMP's key activities is to encourage two-way communication of monitoring and research projects directly with communities. All NWT CIMP project leads are required to engage with local communities prior to and during their project and report their results directly to local communities. In 2018/19, NWT CIMP-funded researchers engaged with 23 NWT communities to discuss project results.

In addition, NWT CIMP hosts an annual results workshop. This workshop is an opportunity to bring together community members and researchers to discuss results and provide feedback, and encourages the development of constructive relationships. In December 2018, NWT CIMP and the Yellowknives Dene First Nation co-hosted a two-day workshop in Yellowknife. The workshop focused on 14 territory-wide research and monitoring projects. In addition to results presentations, break-out group discussions provided valuable input for planning the next five years of NWT CIMP. A workshop summary report is available at www.nwtcimp.ca.

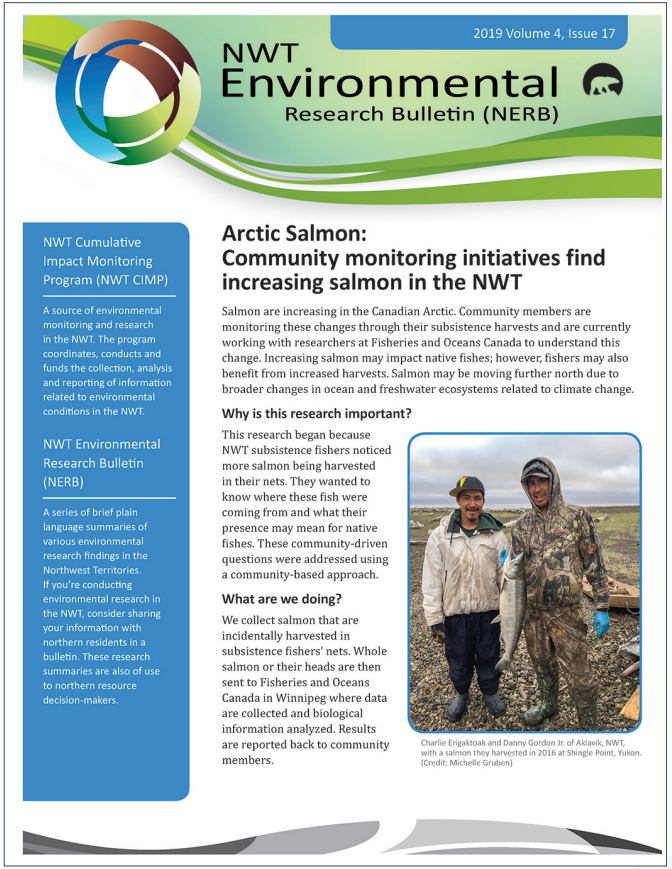
Participants engage in a break-out group discussion at the NWT Environmental Research and Monitoring Results Workshop (Yellowknife, NWT).

ONLINE INFORMATION

All NWT CIMP project results are available online at the NWT Discovery Portal (nwtdiscoveryportal.enr.gov.nt.ca). Comprehensive human and natural disturbance maps for the entire territory are available online through the Inventory of Landscape Change Web Viewer (www.nwtcimp.ca).

INNOVATIVE COMMUNICATION PRODUCTS

NWT CIMP encourages the publication of project results in both peer-reviewed journals and plain language summaries. In 2018/19, the program generated 10 peer-reviewed publications and 36 reports. Regional summary sheets highlighting local projects were developed and widely distributed. Program staff worked with project leads to develop and publish plain language summaries of current projects. These regional summary sheets and an archive of Northern Environmental Research Bulletins are available at www.nwtcimp.ca.



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NWT Environmental Research Bulletin (NERB)

NWT Cumulative Impact Monitoring Program (NWT CIMP)

A source of environmental monitoring and research in the NWT. The program coordinates, conducts and funds the collection, analysis and reporting of information related to environmental conditions in the NWT.

NWT Environmental Research Bulletin (NERB)

A series of brief plain language summaries of various environmental research findings in the Northwest Territories. If you're conducting environmental research in the NWT, consider sharing your information with northern residents in a bulletin. These research summaries are also of use to northern resource decision-makers.

Arctic Salmon: Community monitoring initiatives find increasing salmon in the NWT

Salmon are increasing in the Canadian Arctic. Community members are monitoring these changes through their subsistence harvests and are currently working with researchers at Fisheries and Oceans Canada to understand this change. Increasing salmon may impact native fishes; however, fishers may also benefit from increased harvests. Salmon may be moving further north due to broader changes in ocean and freshwater ecosystems related to climate change.

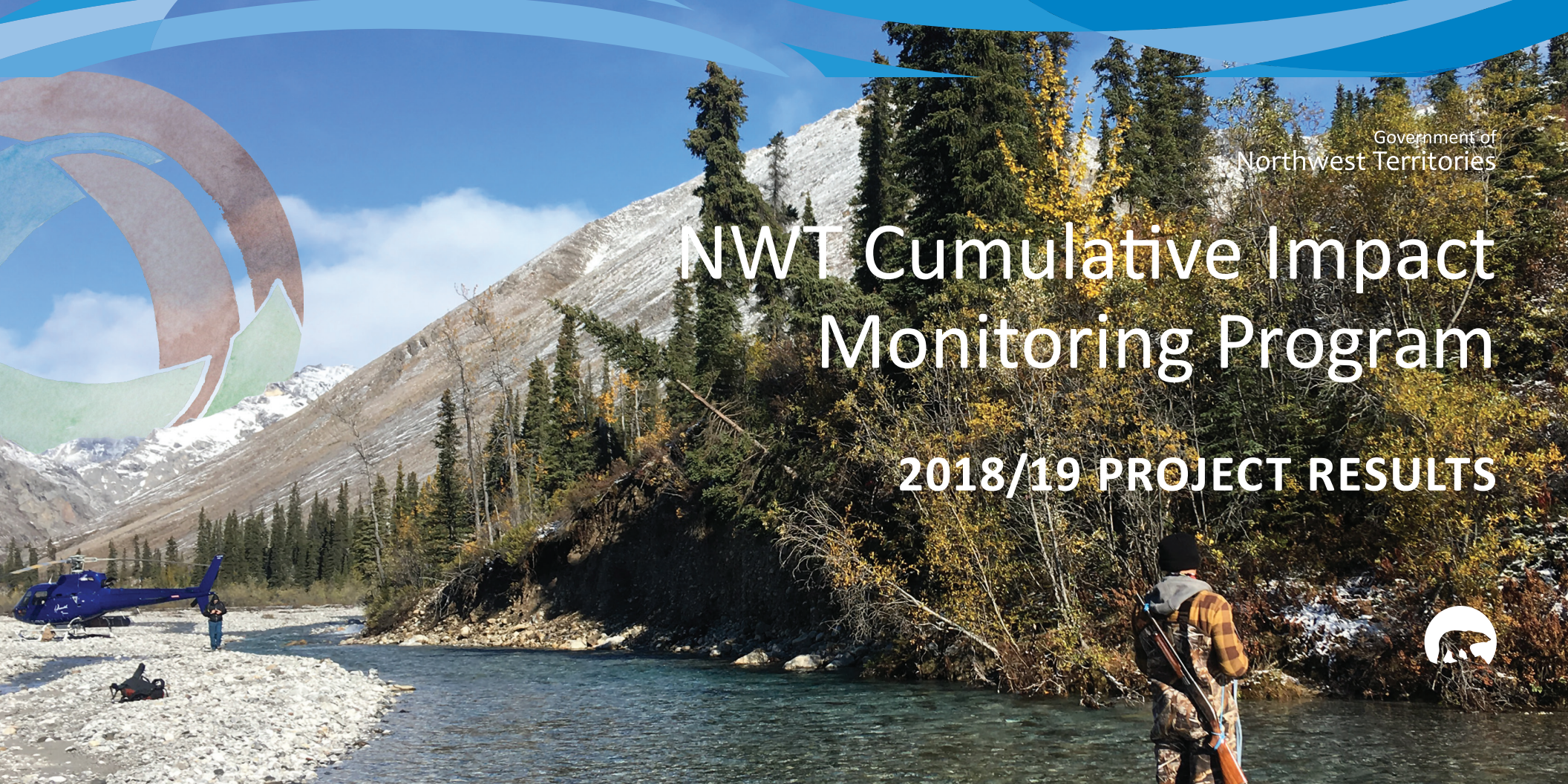
Why is this research important?

This research began because NWT subsistence fishers noticed more salmon being harvested in their nets. They wanted to know where these fish were coming from and what their presence may mean for native fishes. These community-driven questions were addressed using a community-based approach.

What are we doing?

We collect salmon that are incidentally harvested in subsistence fishers' nets. Whole salmon or their heads are then sent to Fisheries and Oceans Canada in Winnipeg where data are collected and biological information analyzed. Results are reported back to community members.

Charlie Erigaktoak and Danny Gordon Jr. of Aklavik, NWT, with a salmon they harvested in 2016 at Shingle Point, Yukon. (Credit: Michelle Gruben)



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2018/19 PROJECT RESULTS

One NWT CIMP-funded fish monitoring project was completed in 2018/19. Detailed project results can be found by searching for CIMP181 on the NWT Discovery Portal (nwtdiscoveryportal.enr.gov.nt.ca).

DEVELOPING ENVIRONMENTAL DNA AS A TOOL TO MONITOR FISH DISTRIBUTIONS IN THE NWT (CIMP181)

Robert Bajno, Department of Fisheries and Oceans (Robert.Bajno@dfo-mpo.gc.ca)
Karen Dunmall, Department of Fisheries and Oceans (Karen.Dunmall@dfo-mpo.gc.ca)

Fish presence and distribution data is a significant gap for NWT water bodies. This information would be useful for both developers and regulators. The purpose of this project was to develop an environmental DNA (eDNA) protocol to detect fish species such as salmon and Dolly Varden in remote northern areas using a community-based monitoring approach for data collection. Environmental DNA is genetic material shed from organisms into the aquatic environment. It can be collected and used to detect the presence of fish in a lake or stream without actually seeing them.

Samples were collected from rivers in the Gwich'in and Sahtú Settlement Areas, with help from community members from Norman Wells and Aklavik, and sent to a genetics lab where single-species and multi-species eDNA detection techniques were developed. Field protocols were developed to allow community-based monitors to successfully capture eDNA both in small streams and the Mackenzie River.

Preliminary results indicate that eDNA methods are effective for detecting the presence of fish such as Dolly Varden, pink salmon and chum salmon in northern streams. The use of eDNA is being expanded to detect different northern fish species.

Cover: Collecting samples from the Rat River, NWT, August 2018. (Credit: K. Dunmall)

Edward McLeod conducting environmental DNA sampling in the Rat River, NWT, August 2018. (Credit: K. Dunmall)

Two NWT CIMP-funded water monitoring projects were completed in 2018/19. Detailed project results can be found by searching for CIMP149 or CIMP176 on the NWT Discovery Portal (nwtdiscoveryportal.enr.gov.nt.ca).

INVESTIGATION OF CUMULATIVE IMPACTS IN THE TATHLINA WATERSHED THROUGH ANALYSES OF WATER QUALITY (CIMP149)

Melaine Simba, Ka'a'gee Tu First Nation (kaageetu_envcoord@northwestel.net)

This project has been conducted since 2012. The purpose of this project was to: (i) conduct community-based water quality monitoring in the Tathlina watershed and (ii) build environmental monitoring capacity in the community of Kakisa.

Community-based water quality monitoring was conducted downstream of the Cameron Hills, an area of former oil and gas activity. Water quality was tested twice a year at three sites in the Tathlina watershed. The water quality was found to be good and met federal water quality guidelines.

Throughout this work, multiple community members received environmental monitoring training. One community member, who also became proficient in project management, including coordinating logistics for field trips and the collection of field data, now works full-time as an environmental monitor.

Melaine Simba performing field work.

ASSESSING REGULATORS' INFORMATION NEEDS TO MAKE DECISIONS REGARDING CUMULATIVE EFFECTS UNDER THE *MACKENZIE VALLEY RESOURCE MANAGEMENT ACT* (CIMP176)

Bram Noble, University of Saskatchewan (b.noble@usask.ca)

This project's purpose was to determine: (i) the information needs of northern decision-makers to make decisions about cumulative effects on water quality in the Mackenzie Valley, and (ii) how information about cumulative effects is provided through existing monitoring programs.

Information was collected by reviewing water quality monitoring programs and interviewing decision-makers and practitioners. It was found that monitoring conducted under project water licences are context-specific and there are many differences between the monitoring programs being conducted by different companies, as well as those conducted by government agencies. As a result, the various data are often incompatible and insufficient to understand cumulative change.

Given these findings, it is recommended that: (i) monitoring efforts be better coordinated across industry and government, (ii) community input is required to interpret the significance of monitoring results, and (iii) an overarching framework is required to guide cumulative impact assessment, monitoring and interpretation. This will provide regulators with the necessary information for informed decision-making and will allow for better management of cumulative effects.

(Credit: L. Arnold)

Two NWT CIMP-funded caribou monitoring projects were completed in 2018/19. Detailed project results can be found by searching for CIMP170 or CIMP94 on the NWT Discovery Portal (nwtdiscoveryportal.enr.gov.nt.ca).

IMPACTS OF WILDFIRE EXTENT AND SEVERITY ON CARIBOU HABITAT: FROM WOODLAND TO BARREN-GROUND (CIMP170)

Jennifer Baltzer, Wilfrid Laurier University (jbaltzer@wlu.ca)

Projected increases in wildfire due to climate change are a significant issue for caribou. Fire reduces forage availability and habitat quality, and contributes to cumulative impacts on caribou. Interactions between fire, climate, soil and initial vegetation conditions determine vegetation recovery after fire in ways that are not fully understood, making future availability of caribou habitat hard to predict.

This project's purpose was to determine: (i) the short-term and long-term impacts of wildfire on caribou habitat, and (ii) the implications for future caribou habitat conditions.

A widespread network of permanent forest sampling plots was established in forests south of Great Bear Lake. Vegetation and soil samples were collected at each plot and analyzed to understand the responses of NWT forests to extreme wildfire events.

Results indicated that some forests were more vulnerable to changes to the dominant forest type than others following a wildfire. The majority of the ground vegetation was seen to recover by the re-sprouting of below-ground plant parts. This suggests that in most of the wildfire impact areas, burn severity was not sufficient to destroy below-ground plant parts. However, in very dry areas, where burn severity was greater, the vegetation recovered mainly from seed, making dry, well-drained areas the most vulnerable to change in dominant forest type.

Same age birch and spruce seedlings following a wildfire. (Credit: J. Baltzer)

Four years post-fire, aspen has replaced black spruceas the dominant tree. (Credit: J. Baltzer)

TŁĮCHǪ EKWO NÀOWO: "BOOTS ON THE GROUND" BATHURST CARIBOU MONITORING PROGRAM (CIMP94)

Petter Jacobsen, Dedats'eetsaa: Tłı̨chǫ Research and Training Institute, Tłı̨chǫ Government (petterfjacobsen@gmail.com)

This project began in the summer of 2016 and is ongoing. The purpose of the project is to monitor the conditions of the Bathurst caribou herd on its summer range using local and traditional knowledge, focusing on four key indicators: (i) habitat, (ii) caribou, (iii) predators, and (iv) industrial development.

For six weeks each summer, Tłı̨chǫ and Inuit elders and harvesters documented observations about Bathurst caribou at Kokètì (Contwoyto Lake) and the surrounding land. Observations over the first three seasons of this study include signs the caribou are healthy. Indications of climate change were observed, such as melting eskers, the disappearance of summer snow patches and the appearance bald eagles, a new predator of barren-ground caribou calves.

Monitors also observed herds engage in new types of behaviour such as moving in circles to minimize insect harassment and standing in water to reduce the heat. According to the monitors, these are "new habits to cope with climate change and the high insect harassment."

Results from this project have been incorporated into management processes of several caribou management agencies, including the Wek'èezhìı Renewable Resources Board and the Government of the Northwest Territories' Department of Environment and Natural Resources.

(Credit: P. Jacobsen)

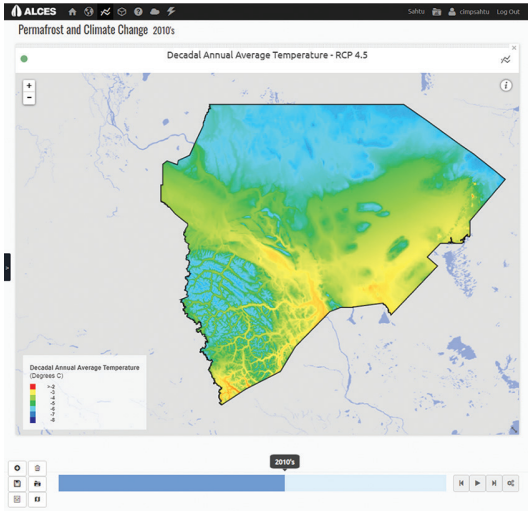
Two NWT CIMP-funded monitoring projects examining topics related to caribou, water or fish were completed in 2018/19. Detailed project results can be found by searching for CIMP178 or CIMP186 on the NWT Discovery Portal (nwtdiscoveryportal.enr.gov.nt.ca).

SAHTÚ REGIONAL ENVIRONMENTAL MONITORING AND DECISION SUPPORT TOOLSET (CIMP178)

Deborah Simmons, Sahtú Renewable Resources Board (SRRB) (director@srrb.nt.ca)

Landscapes and other valued environmental components change over time in response to land use, natural disturbance and climate. Identification of land-use strategies that balance social, economic and environmental objectives requires an understanding of how landscapes are likely to change in the future. This project integrated large datasets of monitoring information from the Sahtú region and traditional knowledge into a tool to support increased understanding and decision-making.

A Landscape Cumulative Effects Simulator (ALCES) modeling tool was used to simulate long-term (50 years) scenarios, including oil and gas development, other land uses, fire and climate change in the Sahtú region. The modeling tool identified climate change as the most important factor in determining the region's future environment, particularly with respect to caribou habitat and permafrost.



The ALCES tool allows decision-makers, including the Sahtú co-management boards, to explore the consequences of current and potential future land use on the landscape. Project results have been made available to community members through the SRRB.

BUILDING A CUMULATIVE IMPACT MONITORING NETWORK: STANDARDIZING PERMAFROST GROUND TEMPERATURE AND GEOHAZARD INFORMATION (CIMP186)

Steve Kokelj, NWT Geological Survey (NTGS) (steve_kokelj@gov.nt.ca)

Permafrost underlies much of the landscape across the entire NWT. It consists of frozen earth materials and can be thought of as the glue that holds northern landscapes together. Rapid warming throughout the NWT is causing permafrost to thaw. Permafrost thaw is affecting northern ecosystems and is the main driver of changes to northern aquatic ecosystems.

The purpose of this project was to establish a way to compile and organize information on permafrost temperatures, ground ice conditions and maps that track landscape change so they can be accessed and used by scientists, planners and decision-makers. The project developed a permafrost database by creating metadata templates and reporting protocols.

Permafrost data from historical, ongoing and future projects was compiled and formatted according to the developed metadata templates and reporting protocols. A total of 537 ground temperature datasets were acquired, which includes more than 22 million ground temperature data points. These datasets represent a wealth of knowledge on permafrost conditions that can be used to track change and inform decision-making.