



Responding to
Climate Change
in the NWT
ANNUAL REPORT

RAPPORT ANNUEL
La lutte contre
le changement
climatique aux TNO

2021-2022

Le présent document contient la
traduction française du sommaire

Government of Northwest Territories
Gouvernement des Territoires du Nord-Ouest



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English

Si vous voulez ces informations dans une autre langue officielle, contactez-nous.

French

Kīspin ki nitawihtīn ē nīhīyawihk ōma ācimōwin, tipwāsinān.

Cree

Tłjchq yatı k'èè. Dı wegodi newq dè, gots'ō gonede.

Tłjchq

ʔerihł'is Dēne Sųfıné yatı t'a huts'elkēr xa beyáyatı theʔá ʔat'e, nuwe ts'ēn yółtı.

Chipewyan

Edı gondı dehgáh got'je zhatié k'ée edat'éh enahddhę nıde naxets'é edahłı.

South Slavey

K'áhshó got'jne xədə k'é hederı ʔedjht'é yerınıwę nıde dúle.

North Slavey

Jii gwandak izhii ginjik vat'atr'ijahch'uu zhit yinothtan jı', diits'at ginohkhii.

Gwich'in

Uvanittuaq ilitchurisukupku Inuvialuktun, ququaqluta.

Inuvialuktun

Ċ'đċ ħħ'ḅḅΔĊ ĤĤĤĤĤĤĤ ΔḅḅĤĤĤĤĤĤĤ, ĐĤĤĤĤĤĤĤ ĐḅḅĤĤĤĤĤĤĤ.

Inuktitut

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Inuinnaqtun

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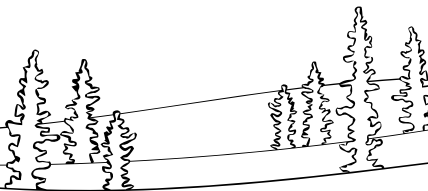
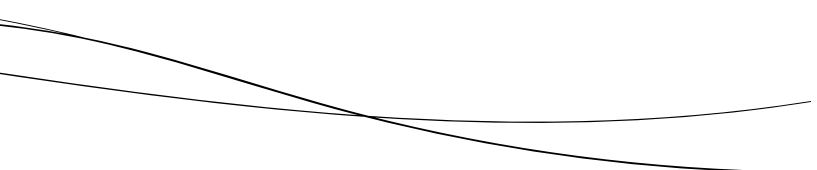


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Minister's Message



**The Honourable
Shane Thompson**
*Minister of Environment
and Natural Resources*

Climate change is the challenge of our time — and Northerners know that better than anyone.

We're experiencing climate warming up to four times faster than other places in the world, putting strain on our social, cultural, and economic well-being.

Our government takes these challenges seriously, and in response, has developed coordinated actions on climate change to support a strong, resilient territory for future generations.

This work is guided by the *2030 NWT Climate Change Strategic Framework* released in May 2018, the *2030 NWT Climate Change Strategic Framework 2019-2023 Action Plan* released in April 2019 and implemented in tandem with the *2030 Energy Strategy* and the NWT's carbon tax. Together, they are the pillars of our government's approach to bringing emissions down, improving our knowledge of climate change impacts and adapting to the changing climate.

I am pleased to say that we continue to make progress on the Action Items within the Climate Change Action Plan.

Of the 132 Action Items that comprise our Climate Change Action Plan, 64 Actions have been completed and the other 68 are on track.

Highlights from implementation this year include a further 19% reduction in the latest greenhouse gas emissions, a strengthened carbon pricing regime that is compliant with federal requirements, and completion or initiation of major adaptation-related projects like the Tłı̄chǫ Highway – a key example of the kinds of investments which will build more resilient communities in a changing climate.

As with many complex societal issues, the key to success is partnership.

Together, alongside Indigenous governments, Indigenous organizations, community leadership, co-management boards, academia, industry, non-governmental organizations, and the federal government, we are collectively delivering on a shared vision of a healthy and resilient territory in the face of this generational challenge. You will find examples of this spirit of collaboration and partnership throughout this report.

I look forward to continuing this work to build on our existing knowledge, take action to tackle this immense challenge, and build a sustainable future for all Northerners.

The Honourable Shane Thompson
Minister, Environment and Natural Resources



Carcajou Falls, Canol Trail, NWT (GNWT).

Executive Summary

The *Mandate of the Government of the Northwest Territories (2019-2023)* prioritizes a strengthened commitment to responding to climate change. This includes building greater leadership and authority on climate change, making climate change a consideration in government decisions, and developing more alternative and renewable energy solutions while stabilizing power costs.

The GNWT seeks to achieve these Mandate priorities with guidance from key GNWT policy frameworks, including the *2030 NWT Climate Change Strategic Framework*, which encompasses components of:

- o The *2030 Energy Strategy*, and
- o The NWT Carbon Tax

The implementation of these interconnected pieces is helping the NWT mitigate and adapt to the effects of climate change, reduce territorial greenhouse gas emissions, and transition to a lower carbon economy while prioritizing an affordable cost of living for residents.

While the Department of Environment and Natural Resources (ENR) is the lead department within the GNWT for addressing climate change, taking action is a responsibility shared by all GNWT departments and residents of the NWT. The GNWT partners with key stakeholders, including Indigenous governments, Indigenous organizations, the Government of Canada, community governments, co-management boards, non-governmental organizations, industry and academic institutions and researchers to implement our approach together.

This is the third Annual Report on the *Climate Change Strategic Framework – Action Plan 2019-2023*. This report provides progress updates on concrete actions the GNWT and its partners are working to complete to realize the vision outlined in the *2030 NWT Climate Change Strategic Framework*. This report highlights climate action achievements in our government-wide approach during the 2021-22 fiscal year.

Of the 132 Action Items that comprise the Climate Change Action Plan, 64 are complete and 68 are on track. To achieve the progress outlined in this report, the GNWT invested \$73 million dollars to respond to climate change between April 1, 2021 and March 31, 2022.



Sommaire

Dans son mandat pour 2019-2023, le gouvernement des Territoires du Nord-Ouest s'engage à faire de la lutte contre le changement climatique une priorité. Il compte notamment faire preuve d'un plus grand leadership et d'une plus grande autorité en matière de changement climatique, faire en sorte que le changement climatique soit pris en considération dans les décisions gouvernementales et favoriser davantage le recours aux énergies de remplacement et aux énergies renouvelables tout en stabilisant les coûts de l'électricité.

Pour répondre aux priorités du mandat, le GTNO s'oriente à l'aide de cadres stratégiques clés, dont le *Cadre stratégique sur le changement climatique des TNO pour 2030*, qui comprend les éléments suivants :

- o La Stratégie énergétique 2030;
- o La taxe sur le carbone des TNO.

La mise en œuvre de ces éléments, qui sont tous interreliés, permet aux TNO d'atténuer les effets du changement climatique et de s'y adapter, de réduire les émissions territoriales de gaz à effet de serre et d'assurer une transition vers une économie à faibles émissions de carbone tout en priorisant un coût de la vie abordable pour les résidents.

Bien que le ministère de l'Environnement et des Ressources naturelles (MERN) soit responsable de la lutte contre le changement climatique, il incombe à tous les ministères et aux résidents d'apporter leur contribution. Le GTNO collabore avec des partenaires clés, dont les gouvernements et les organisations autochtones, le gouvernement du Canada, les administrations communautaires, les conseils de cogestion, les organisations non gouvernementales, l'industrie, les établissements d'enseignement et les chercheurs pour mettre en œuvre une approche concertée.

Il s'agit du troisième rapport annuel lié au *Plan d'action pour 2019 à 2023 relatif au Cadre stratégique sur le changement climatique des TNO*. Ce rapport fait le point sur les progrès réalisés concernant les mesures concrètes mises en place par le GTNO et ses partenaires pour concrétiser la vision énoncée dans le *Cadre stratégique sur le changement climatique des TNO pour 2030*. Ce rapport souligne également les réalisations en lutte contre le changement climatique à l'échelle du GTNO durant l'exercice de 2021-2022.

Des 132 mesures à prendre énoncées dans le plan d'action sur le changement climatique, 64 ont été mises en place et 68 autres sont en voie de l'être. Pour accomplir les progrès énoncés dans ce rapport et lutter contre le changement climatique, le GTNO a investi près de 73 millions de dollars du 1^{er} avril 2021 au 31 mars 2022.



Barren-ground Caribou, NWT (GNWT).

Accomplishments in 2021-2022

Partnerships – Working Together

Collaborative efforts and partnerships are the key to achieving the vision and goals outlined in the NWT Climate Change Strategic Framework. While the GNWT recognizes its leadership in addressing climate change in the Northwest Territories, this work is a joint effort that is not possible without the important contributions of many partners. The collaborations between the GNWT and its partners ensures our response to climate change is coordinated and comprehensive.

Key highlights of these partnerships in 2021-22 included:

- o A partnership with Wilfrid Laurier University to host a virtual workshop to train Délı̄nę community members to use a Ground Penetrating Radar system. With training, the community was able to safely measure real-time ice thickness of winter roads near Délı̄nę during winter 2021.
- o A partnership with the NWT Association of Communities to host an interactive session in May 2021 to discuss communities' climate change concerns and needs. These discussions are now informing the GNWT's response to climate change.
- o Working with the Bathurst Caribou Advisory Committee (BCAC) to hold three workshops to strategize on important habitat conservation areas for the Bathurst Caribou herd. The BCAC is an on-going collaboration between the GNWT, nine Indigenous governments and Indigenous organizations across the NWT, Nunavut, and Saskatchewan, co-management boards, Hunters and Trappers Committees, and the Government of Nunavut.

- o Collaboration with the Arctic Research Institute and the Inuvialuit Land Administration to develop permafrost training courses for Inuvialuit partners. The training focuses on permafrost monitoring of the Inuvik-Tuktoyaktuk Highway.
- o A partnership with the University of Toronto to conduct a study on permafrost building design and performance enhancements for a school building foundation in the Sahtú region. The study findings and design results will be incorporated into ongoing building foundation management in the community.

Many more examples of these key partnerships on climate action can be found throughout Appendix A of this report.

Investments

From April 1, 2021, to March 31, 2022, the GNWT has invested approximately \$73 million dollars to carry out Year 3 of the 2019-2023 Climate Change Action Plan.

The \$73 million dollars includes:

- o Operations and management expenses to implement climate change policies and programs
- o Funding received and distributed by the GNWT for climate change knowledge, climate change adaptation, and lower carbon energy projects
- o Time spent developing and implementing climate change policies and programs, measured in employee salaries

These investments are a key component of the GNWT's work to address climate change and generate the results summarized in the following sections of this report.

Actions

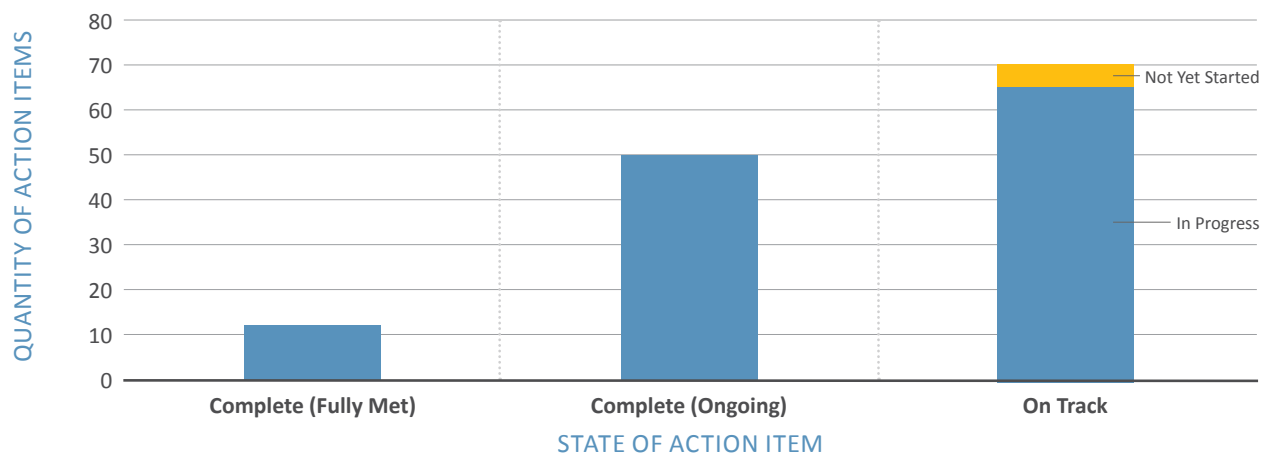
As a result of these investments, highlights of key climate actions taken by the GNWT and its partners from April 1, 2021 – March 31, 2022, include:

- o Facilitated four NWT Climate Change Council meetings to discuss climate change issues and solutions for the NWT
- o GHG emissions reductions to 2020 – the most recent year for which data is available across Canada – by 19% compared to 2005 levels
- o Completed a Climate Change Vulnerability Assessment for all 46 species-at-risk in the NWT, to support targeted wildlife management, conservation, and climate change adaptation strategies
- o Strengthened the carbon pricing regime to \$40/tonne in compliance with federal requirements
- o Grew the GNWT’s Permafrost Science Team to four positions
- o Developed an economic model to evaluate the territory-wide impacts and opportunities of a changing climate in the NWT
- o Completed the Tłıchǫ Highway to provide year-round road access to Whatì and adapt to the negative impacts of climate change on seasonal ice roads
- o Assessed an additional 40 archaeological sites that are vulnerable to climate change, to support mapping and conservation of heritage resources in the NWT
- o Reached key milestones in the development of clean energy infrastructure projects including the Inuvik Wind Turbine Project and transmission lines to replace diesel power with hydroelectric power in Fort Providence, Kakisa, and Whatì

There are 132 action items in the 2019-2023 Climate Change Action Plan. This year’s annual report uses updated status categories to describe progress more accurately than previous reports:

- o Complete (Fully Met)
- o Complete (On Going)
- o On Track
 - On Track (In Progress)
 - On Track (Not Yet Started)

ACTION PLAN IMPLEMENTATION PROGRESS AS OF MARCH 31, 2022



Progress details for all 132 Actions in the Climate Change Action Plan can be found in **Appendix A**.



Priorities for Next Year

Progress on the Climate Change Action Plan will continue to be reported annually. Updates on activities under the Energy Strategy and NWT Carbon Tax will also be summarized within each respective annual report, and the CCSF, Energy Strategy and NWT Carbon Tax will continue to be coordinated and reported on across government. Specific areas of focus for 2022-23 are summarized below.

- o Modelling the most effective ways to transform our energy systems and transition the NWT to a low carbon economy
- o Advocating nationally and internationally for the unique climate change needs of the North, including at COP27 in Sharm el-Sheikh, Egypt
- o Hosting quarterly meetings of the NWT Climate Change Council, and establishing the Climate Change Youth Advisory Group
- o Improving electric vehicle infrastructure networks in the territory
- o Initiating the territory-wide Climate Change Risks and Opportunities Assessment to prioritize NWT climate change adaptation priorities
- o Implementing the National Adaptation Strategy including the forthcoming, NWT-specific, bilateral action plan, with federal partners
- o Implementing the new Energy Action Plan 2022-25 that will guide the NWT's lower carbon energy transitions over the next three years

Appendix A:

Status of all Climate Change Actions

The table on the following pages provides progress updates for all actions identified in the *2030 Climate Change Strategic Framework Action Plan 2019-2023 as of March 31, 2022*.

Progress updates for all actions identified in the 2030 Energy Strategy Action Plan 2019-2022 and the NWT Carbon Tax are available in the Energy Initiatives Annual Report 2021-22 and the Carbon Tax Annual Report 2021-22.



Tuktoyaktuk, NWT (GNWT).

Appendix A

Goal 1: Transition to a Lower Carbon Economy

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
1.1 Transitioning to a lower carbon economy	A. Implement the actions and initiatives outlined in the 2030 Energy Strategy: Energy Action Plan 2019-2022	INF, AEA, NTPC, Housing NWT, Federal Departments, Indigenous governments, Indigenous organizations, Community governments, Industry, NGOs	Detailed reporting on the implementation of the actions and initiatives outlined in the 2030 Energy Strategy: Energy Action Plan 2019-2022 is provided in the 2021-2022 Energy Initiatives Report.	Completed (fully met)
	B. Implement NWT carbon pricing	FIN	Carbon tax implemented September 1, 2019 at \$20 per tonne; increased to \$30 a tonne on July 1, 2020 and \$40 a tonne on July 1, 2021 and will increase to \$50 a tonne on July 1, 2022.	Completed (ongoing)
1.2 Addressing climate change in environmental assessment and licensing / permitting of resource development and other projects	A. Collaborate on policy development, information requirements and tools to integrate climate change considerations	ENR, ITI, Lands, Regulatory Boards, Industry, NGOs	ENR led the development of draft guidelines to integrate climate change in environmental assessments in the Mackenzie Valley. ENR will work with co-management boards (MVEIRB) once the draft has been finalized. Finalizing the guidelines requires information contained in several federal guidelines which were to be published by March 31, 2021. As of March 31, 2022, these federal guidelines were not yet published. They include: 1. Quantification of net greenhouse gas (GHG) emissions, upstream GHG emissions, and carbon sinks. 2. GHG mitigation measures, Best Available Technologies / Best Environmental Practices (BAT/BEP) and plans to achieve net-zero emissions by 2050. 3. Climate change resilience.	On Track (In progress)
	B. Include climate change considerations in GNWT submissions to regulatory boards	ENR, GNWT	GNWT departmental representatives reviewed the draft Terms of Reference in 2021 for the Pine Point Project Environmental Assessment to ensure climate change considerations were scoped into the project's environmental assessment. ENR continues to develop guidelines to inform how the GNWT requests information from proponents with respect to integrating climate change in the environmental assessment process.	On Track (In progress)
1.3 Determining the potential value of natural carbon sinks	A. Undertake work to estimate carbon stored in NWT ecosystems	ENR, FIN, Academia, NRCan (CFS), NGOs	In 2021-22, ENR continued collaboration on a project with the Canadian Forest Service (CFS) to estimate the magnitude of regional carbon storage and its interannual variability in forests and peatlands in an area of interest within the NWT from 1990-2019. FMD is developing models for estimating carbon storage using existing CFS models adapted for use in the NWT. Canada represents 25% of the world's peatlands, a major store of carbon. ENR is part of the new CanPeat research network lead by the University of Waterloo to create a database of the amount and distribution of peatlands in Canada including the NWT.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
1.4 Improving GHG emissions tracking and reporting	A. Improve GNWT emissions tracking	ENR, INF, ECCC	In 2021-2022, a Standard Operating Procedure (SOP) for emissions data entry was developed in consultation with the Department of Finance. The SOP aims to help streamline and improve data entry of fuel purchases into the GNWT's System for Accountability and Management (SAM). To monitor improvements in data quality, the data are also checked for error rates using software to monitor improvements in tracking due to the new process implementations.	On Track (In progress)
	B. Refine GNWT and NWT reporting methods	ENR, INF, FIN, ECCC	Environment and Climate Change Canada (ECCC) reports on the NWT's annual greenhouse gas (GHG) emissions in the National Inventory Report. In 2021-22, as every year, the GNWT compared the reported data against their calculations to verify accuracy and alignment with ECCC data. Meetings between ECCC, Statistics Canada, and the GNWT identified tracking and reporting of natural gas data as worthy of investigation. Steps are being taken to further refine reporting accuracy (e.g. Statistics Canada agreed to use the GNWT's gross fuel data when calculating diesel and gasoline consumption). A MOU between ENR and the Department of Finance has been developed to further facilitate these improvements in GHG reporting and data sharing.	On Track (In progress)

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
6.1 Determining the potential value of natural carbon sinks <ul style="list-style-type: none"> Determine potential economic value of stored carbon in the ecosystem 	ENR, FIN, Academia, NRCan (CFS), NGOs	Progress is first being made on Action Item 1.3A (undertake work to estimate carbon stored in NWT ecosystems), which will be a required precursor to determining the economic value of the carbon stored in ecosystems. Completion of Action Area 6.1 will be possible once Action Item 1.3A is complete. In the interim, ENR continues to explore the opportunity for carbon offsets and determine next steps with its partners.	On Track (not yet started)
6.2 Implement composting in small to medium-sized communities to reduce greenhouse gas emissions from community landfills <ul style="list-style-type: none"> Undertake planning and feasibility work Provide support for projects 	ENR, Community governments	ENR drafted the NWT Compost Facility Standard, the associated Composting Best Practices, and the NWT Agriculture Composting Guidelines and is preparing for broad stakeholder engagement in 2022-2023. In 2021-2022, the Waste Reduction and Recycling Initiative (WRI) provided funding for composting programs with the following partners: Hamlet of Tulita, Ka'a'gee Tu First Nation, and Sambaa K'e First Nation. ENR's WRI also provided funding to 5 communities: the City of Yellowknife, Hamlet of Tulita, the Village of Fort Simpson, Ka'a'gee Tu First Nation, and Sambaa K'e First Nation to provide financial assistance for projects that support waste reduction.	On Track (In progress)

Appendix A

Goal 2: Improve Knowledge of Climate Change Impacts

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
2.1 Supporting the GNWT Knowledge Agenda – climate change research	A. Leverage existing research programs to incorporate community-based participation through the development of community and academic partnerships	GNWT, Indigenous governments, Indigenous organizations, Academia, Community governments, NGOs	ENR supports community capacity building through training, project participation, and employment with university partners. In 2021-22, this resulted in initiatives such as on the land camps, guardian training, a high school winter field course at the Scotty Creek Research Station, and the 'Great Bear Lake ice thickness and water quality observations under current and future climates' research project led by Wilfrid Laurier University. In 2021, to accommodate COVID-19 travel restrictions, the research team initiated a virtual workshop to train local community members to use a Ground Penetrating Radar (GPR) system. With training, the community was able to measure real-time ice thickness of winter roads in Délı̨ne during Winter 2021. Other research teams are also focusing on building community capacity to ensure there are trained local individuals who can collect data in the communities going forward.	Completed (ongoing)
	B. Support additional interdisciplinary research addressing economic, health, social and environmental change related to climate change	GNWT, Indigenous governments, Indigenous organizations, Academia, Community governments	ENR staff participate in several interdisciplinary research networks that continued conducting research in the NWT in 2021-22, including the Canadian Mountain Network which is focused on building partnerships between Indigenous governments and Indigenous organizations and communities, universities, governments, businesses, and the not-for-profit sector. Other interdisciplinary research networks include Arctic Net, Global Water Futures, and the NASA Arctic Boreal Vulnerability Experiment. Field programs were impacted by COVID-19 restrictions in 2021-2022 but are set to resume in 2022-23.	Completed (ongoing)
	C. Link traditional and local knowledge holders with researchers in discussions or research about climate change	ENR, Indigenous governments, Indigenous organizations, Academia, Community governments	ENR staff continued to connect Indigenous governments and Indigenous organizations with researchers to update them on research being undertaken in their areas and to identify opportunities to collaborate, or to address identified research needs which may benefit from external researcher involvement. ENR staff are part of the Nę K'ə Dene Ts'ı̨ Forum (formerly Sahtú Environmental Research and Monitoring Forum) that supports environmental research and monitoring by providing a venue for discussing plans and accommodating the priorities and traditional knowledge of Sahtú communities.	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	D. Work with other jurisdictions, industry and academia on climate change related research, development and best practices for public infrastructure	INF	<p>INF continued to participate on the National Research Council National Codes Commission Standing Committee for Energy Conservation in Buildings. INF work on Northern Transportation Adaptation Initiative (NTAI) projects continued and in 2021-22 these projects aimed to facilitate better and more integrated climate change adaptation measures in transportation planning.</p> <p>A multi-year partnership project established between the GNWT, BGC Engineering, the University of British Columbia, and Transport Canada began in 2022 and will broaden current permafrost monitoring and surveillance systems that focus on emerging stressors along highways. This project will allow for the development of mitigation strategies to improve resilience and safety of new and old highways.</p> <p>INF was engaged in research projects with Carleton University, University of Manitoba, the Royal Military College, University of British Columbia, and University of Waterloo to study climate change related impacts on horizontal infrastructure design and construction. This research will continue in 2022-2023.</p> <p>For vertical infrastructure, a study was undertaken with the University of Toronto assessing thermosyphon design and performance enhancements for a school foundation in the Sahtú region. The study findings and design results will be incorporated into ongoing foundation management.</p>	Completed (ongoing)
	E. Collaborate with the Transportation Association of Canada and the Canadian Permafrost Association on climate change related initiatives	INF, ITI (NTGS)	<p>GNWT INF team members attended the Transportation Association of Canada Technical Meeting and Conference. INF is applying this knowledge towards the preservation of permafrost and vegetation, as well as erosion and sediment control in the NWT. Work continues on the Tłı̄chq Highway Wildlife Effects Monitoring Program, with contract clauses in place to conserve and protect the environment.</p>	Completed (ongoing)
2.2 Supporting conservation network planning	A. Develop a renewed strategy for conservation network planning	ENR, Lands, EIA, Indigenous governments, Indigenous organizations, NGOs, Land Use Planning Boards	<p>ENR began developing the next 'Healthy Land, Healthy People: GNWT Priorities for Advancement of Conservation Network Planning' work plan for the 2022-2027 period. A public survey was completed, and a What We Heard document was created from public feedback. This feedback informed the creation of a first draft of Healthy Land, Healthy People 2022-2027 and was shared during a period of consultation with Indigenous governments and the public. Engagement on the draft workplan will continue, and publication of the finalized document is scheduled for 2022-23.</p> <p>ENR has been working with variety of partners to establish an NWT Biodiversity Monitoring Program (NWTBMP). The NWTBMP is a partnership between the K'ahsho Got'ı̄ne Foundation, Dehcho First Nations, Sambaa K'e First Nation, Łutsel K'e Dene First Nation, North Slave Métis Alliance, Tłı̄chq Government, GNWT, Canadian Wildlife Service, University of British Columbia, Wilfrid Laurier University, and University of Alberta/Alberta Biodiversity Monitoring Institute.</p> <p>ENR initiated work with researchers from Wilfrid Laurier University to develop and review a best practice analysis on how climate change is being integrated into protected areas management planning. This work included interviews with Indigenous government partners to determine how climate change considerations can/should be incorporated into protected areas planning. The report will be made publicly available to other researchers in the NWT and Canada in 2022-23.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
2.3 Enhancing the use of traditional and local knowledge	A. Build climate change education into the Take A Kid Trapping and hunter education programs	ENR, Indigenous governments, Indigenous organizations, MACA, HSS	Climate change is built into the Take a Kid Trapping program through experienced harvesters that share information about behaviour of animals and safety in the field related to climate change. The hunter education program has been updated to include a section on safe travel on the land which relates to climate change. The modified hunter education program for presentation in schools includes climate change considerations.	Completed (ongoing)
	B. Support the collection, analysis or synthesis of traditional knowledge through the NWT Cumulative Impact Monitoring Program to better understand environmental trends and cumulative impacts for use in decision-making	ENR, Indigenous governments, Indigenous organizations, Community governments, Co-management Boards, Academia	In 2021-2022, ENR's NWT Cumulative Impact Monitoring Program (CIMP) funded 4 projects with a traditional and Indigenous knowledge focus. There were 6 community presentations, 2 videos, and 5 NWT Environmental Research Bulletins delivered as a result of this funding. The 2021-2022 NWT CIMP Annual Report is in development and will be released in Fall 2022. NWT CIMP annually hosts a regional results workshop highlighting current and past environmental monitoring and research. A workshop for the Dehcho Region was planned but could not be held due to COVID-19 restrictions. Instead, researchers provided videos to share project results with Dehcho communities, northern decision-makers, and the general public. All deliverables to date for any projects funded by NWT CIMP are available on the NWT Discovery Portal.	Completed (ongoing)
2.4 Improving management and use of data / information	A. Inventory and evaluate NWT environmental data and data products to support climate change actions	ENR, ISSC, ITI (NTGS)	In 2021-22, GNWT participated in the Environment and Climate Change Canada Northern Climate Data Working Group that is inventorying and collecting metadata on northern climate data (including historical climate data, station data, climate maps, and climate projections). The Working Group released a draft report summarizing datasets and provided recommendations for data that is most useful for northern applications in 2021-22. This report is set to be released in 2022-2023. In 2021-22, GNWT also participated in the Arctic Climate Forum which reviews monthly and seasonal Arctic forecasts and discusses current and future products useful to improve Arctic forecasts. A 'data rescue' MOU was signed with the University of Saskatchewan, to access their climate station data.	Completed (ongoing)
	B. Develop and implement a central online resource to share climate change knowledge and information	ENR, ISSC	Development the Climate Change Knowledge Portal continued in 2021-22 by ENR. ENR is collaborating cross-departmentally on the establishment of the Portal. The Portal will act as a centralized online database for climate change knowledge and information that users can access to support research and decision-making. It will be available for public use.	On Track (In progress)
	C. Improve dissemination of climate change results and products	ENR	In 2021-22, ENR continued to respond to requests to provide climate change data and resources. The State of the Environment Report, for which 12 climate change indicators were developed, was completed in 2022. With the assistance of Environment and Climate Change Canada, a Climate Services Specialist position was created and will provide technical services to clients in industry, government, land and water boards, Indigenous governments and Indigenous organizations, and the general public. ENR provided a presentation in November 2021 on Climate Change Science at the NWT Climate Change Advisory Group Gathering. In March 2021, a presentation about climate impacts in the NWT was delivered to the Department of National Defense - Joint Task Force North.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
2.5 Climate and weather	A. Evaluate monitoring network requirements, potential monitoring redundancies and prioritize monitoring gaps	ENR, ECCC (Meteorological Service of Canada)	In 2021-22, ENR hosted an interdepartmental working group meeting to evaluate progress and strategies for this Action Item. Numerous departments and divisions from the GNWT were in attendance, including: CCAQ, FMD, NTGS, Conservation Planning, ITI, CIMP, INF, and Water Research and Monitoring. ENR continues to lead discussions on the types of climate monitoring stations and processes that currently exist in the NWT, what issues currently exist, and potential solutions. In 2021-22, ENR met with the Canadian Council for Weather and Climate Monitoring to discuss improving coordination and best practices for climate monitoring in Canada.	On Track (In progress)
	B. Continue, and develop options to enhance, climate monitoring at NWT monitoring sites	ENR, ECCC, PCA, Industry, Academia	In 2021-22, ENR met with the Canadian Council for Weather and Climate Monitoring to discuss climate monitoring strategies and objectives. ENR provided climate station equipment to Pine Point Mine and Golder Associates to enhance the weather and climate monitoring network in the NWT. Two technicians were hired to enhance fire weather monitoring network operation and maintenance. ENR continued the development of the forthcoming Climate Monitoring and Data Stewardship Plan.	On Track (In progress)
	C. Develop a plan for a northern climate hub to support delivery of climate services and products	ENR, ECCC (CCCS)	ENR worked with Environment and Climate Change Canada (ECCC) and the governments of Nunavut and Yukon to develop a proposal for the development of a Northern Climate Services Hub. However, the federal budget did not provide funding for this project in 2021-22. In the interim, ECCC has agreed to provide federal funding for a Climate Services Specialist in ENR for nearly two years.	On Track (In progress)
	D. Develop climate projections and climate indices	ENR, ECCC, NRCan (CFS), Academia	GNWT staff were updated on the Parameter-Elevation Regressions on Independent Slopes Model climate mapping technique (PRISM) which will be used for a climate mapping project to infer the climate at NWT locations that do not possess permanent weather data monitoring stations. The project is anticipated to be complete in 2024-25. A new contribution agreement was signed with the Pacific Climate Impacts Consortium to compile climate station data for the PRISM climate mapping project. This includes the development of an NWT Climate Station Data Portal.	On Track (In progress)
	E. Continue to monitor rates and dynamics of coastal erosion along the Beaufort Sea	NRCan (GSC), Community governments, Federal Departments, ECE (ARI)	NRCan, in collaboration with the GNWT and with coastal communities, is leading monitoring of the rates and dynamics of coastal erosion along the Beaufort Sea. CIRNAC and Polar Knowledge Canada have also provided support for this project. In previous years, much of the work by NRCan has involved fieldwork within and around the community of Tuktoyaktuk. However, due to COVID-19 pandemic restrictions, only minimal fieldwork was possible for 2021-22, which was used to maintain existing sensors installed in previous years. The focus of work in 2021-22 has been ongoing analysis of field data gathered to this point, and publication of five journal articles discussing the state of Arctic coasts around Pelly Island, Tuktoyaktuk Island, and Richards Island. Additionally, much data continues to be gathered through remote monitoring via existing instrumentation previously installed in the field.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
2.6 Permafrost	A. Collect existing ground temperature data along the Dempster and Inuvik-Tuktoyaktuk highways	ITI (NTGS), INF, NRCan (GSC)	<p>This action item was completed in 2020-21 as the ground temperature monitoring network along the Dempster and Inuvik-Tuktoyaktuk (ITH) Highways has been established. Ground temperature data were collected at 120 monitoring sites and made publicly available by the Northwest Territories Geological Survey (NTGS).</p> <p>Six NWT Open Data Reports have been published making accessible ground temperature data from the Dempster-ITH corridor. Several public presentations and training workshops to Indigenous partners have been provided. Permafrost monitoring and collection of ground temperature data along the Dempster-ITH corridor is ongoing.</p>	Completed (fully met)
	B. Develop a plan to undertake regional terrain sensitivity and geohazard mapping and monitoring	ITI (NTGS), ENR, ISSC, NRCan (GSC), Academia	<p>One overarching plan to map permafrost geohazards is being implemented through the NWT Thermokarst Collective project. The plan is complete and being published through a project overview paper and a series of Open Data Reports describing project methodologies. Two of the supporting Plans (Hydrological features; Organic Terrain Reports) are complete, and three others are in progress (Slopes and Mass wasting, Periglacial features, Oblique inventories). A plan to map geohazards at fine scales has been developed and published with collaborators at the Geological Survey of Canada.</p>	On Track (In progress)
	C. Compile ground temperature and geotechnical datasets for the NWT	ITI (NTGS), INF, ENR, NRCan (GSC), Academia	<p>12 existing ground temperature and geotechnical datasets for the NWT have been compiled and published in Open Data Reports. One paper was published this year reporting new permafrost geotechnical data (Paul et al., 2021) and another, describing a method for extracting information from Geotechnical reports is in peer review (Castagner et al., 2021 in review). The data from these reports will be available through the NWT Permafrost Database, which is currently being developed.</p>	Completed (fully met)
	D. Undertake community terrain mapping through a pilot study of two communities	ITI (NTGS), ENR, Academia	<p>Work has advanced to map permafrost geohazards for Tuktoyaktuk and Inuvik. The features where sensitive permafrost terrain is located have been mapped, in collaboration with Geological Survey of Canada, and modeling of the susceptibility of terrain to permafrost thaw is being refined.</p> <p>A newly funded permafrost geohazard scientist position illustrates GNWT's commitment to advancing this work.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	E. Undertake permafrost related research along the Dempster and Inuvik-Tuktoyaktuk highways	ITI (NTGS), INF, NRCan (GSC), Academia	<p>NTGS actively generates knowledge about permafrost and the impacts of permafrost thaw due to climate change. Six collaborative research projects have been initiated along the Dempster-Inuvik Tuktoyaktuk Highway (ITH) corridor, with various partners. Ongoing projects include assessing impacts of the highway on hydrology and permafrost, assessing and developing geohazard monitoring tools, investigating effects of snow compaction on ground temperatures, and assessing embankment thermal conditions.</p> <p>NTGS produced two technical reports for INF on the Dempster-ITH corridor.</p> <p>NTGS has also collaborated with the Arctic Research Institute and the Inuvialuit Land Administration to develop permafrost training courses for Inuvialuit partners. The training focuses on ITH permafrost monitoring.</p>	Completed (fully met)
	F. Collaborate and advise on academic permafrost research in NWT	ITI (NTGS), Academia	All NTGS research projects are collaborations or advisory partnerships. NTGS has ongoing collaborations with 12 universities and serves as an advisory committee member for five graduate students.	Completed (fully met)
	G. Work to increase human resource capacity to enable progress on permafrost-related actions	ITI (NTGS), INF, ENR, NRCan (GSC)	NTGS has grown its permafrost science team from one to four positions. In addition, permafrost capacity in partner organizations includes the Department of Lands (1 full-time position), the Department of Finance - Geomatics (1 part-time position), Aurora Research Institute (1 full-time position), and Wilfrid Laurier University (1 full-time position).	Completed (fully met)
2.7 Water and wetlands	A. Continue NWT water quality and water quantity monitoring which can contribute to the assessment of climate-related changes in quality and flow over time (including Community Based Water Monitoring Programs)	ENR, ECCC, Indigenous governments, Indigenous organizations	<p>The GNWT currently maintains monitoring programs across the NWT to assess water quality and quantity. These programs are a necessary part of water management and assist in the development of water policy and decision making. The information collected is critical to inform climate change knowledge, assessments, and related decisions. All core monitoring programs were carried out in 2021-22. GNWT staff also performed monitoring for southern researchers and federal partners when required. The focus on this Action Item in 2021-22 was maintaining established water monitoring and research programs throughout the COVID-19 pandemic travel restrictions.</p> <p>The NWT Community Based Monitoring Program (CBM) and Transboundary Rivers Monitoring programs were developed and continue to be delivered with Indigenous partners in many NWT communities. Data management improvements for the CBM are in progress. Annual spring breakup reporting and partnerships involve and support numerous at-risk NWT communities. All reports and data collected are publicly available.</p>	Completed (ongoing)
	B. Continue to support the snow survey network to contribute to a better understanding of climate-related change in winter precipitation	ENR	<p>The GNWT maintains a number of water and abiotic long-term monitoring programs across the territory that are necessary for effective water management and assist in the development of water policy and decision making. The information collected is critical to carrying out climate change assessments. Baseline programs were carried out by ENR in 2021-22, including water monitoring and snow surveys across the territory.</p> <p>The annual Spring Outlook Report for Snow Survey results and Spring Water Level was completed.</p>	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	C. Undertake NWT Wetland Inventory Mapping	Ducks Unlimited Canada, Indigenous governments, Indigenous organizations	Several wetland inventory projects were completed in 2021-22 by Ducks Unlimited Canada (DUC) in the NWT. The results are being used for habitat modelling, climate change alterations to waterfowl habitat, land use planning and other conservation efforts. The results can be found in the Canadian Wetland Inventory status viewer. Since then, DUC has been working on several other ongoing projects in the NWT, including fish habitat mapping in the Slave Taltson River Delta, detailed wetland mapping of the Tlicho region, and the development of a boreal wetland flooding frequency tool funded through the NASA Arctic Boreal Wetland Vulnerability (ABoVE) experiment.	Completed (ongoing)
	D. Assess cumulative impacts to water, including climate change, as reflected in the NWT Cumulative Impact Monitoring Program Water Blueprint	ENR, Academia, ECCC, Indigenous governments, Indigenous organizations, Community governments	In 2021-2022, ENR's NWT Cumulative Impact Monitoring Program (CIMP) funded 9 research projects with a focus on water. Two of these projects are complete and their final reports are accessible on the NWT Discovery Portal by searching their project numbers: <ul style="list-style-type: none"> • How will climate warming and permafrost thaw affect fish, bugs, and water fleas living in Arctic lakes? (CIMP 197) • Impacts of peatland permafrost thaw on water (CIMP 199) There were 13 community presentations, 10 scientific presentations, 2 peer reviewed publications, and one video produced from research with a water focus funded by the Program. The initiative 'Monitoring Cumulative Effects to Water Quality' aims to develop, test, and implement an approach to monitoring water quality that is informed by cumulative effects. The project's pilot study (2020-2023) is based in the Upper Coppermine River basin. Monitoring campaigns in 2021-2022 collected water quality information from lakes that span a range of predicted cumulative effects risks. ENR is using these data to test and revise a predictive tool which will ultimately be used to direct impact monitoring at specific at-risk locations and inform management decisions.	Completed (ongoing)
2.8 Forests and vegetation	A. Monitor changes to forest growth, productivity, health and regeneration after natural and human-caused disturbances in the context of the changing climate	ENR, NRCan (CFS), Academia	A post-fire regeneration assessment and subsequent data analysis and reporting were completed for three fire complexes: the 1995-96 Fort Providence complex, the 1995 Horn Plateau fire, and the 1994-95 Sambaa K'e complex. The results suggest: (1) all three fire complexes had high proportions of regeneration (78%-100%); and (2) the forest regeneration success was significantly higher in drier sites compared to moist sites. A more in-depth analysis is planned for the Horn Plateau fire using unique, pre-fire forest inventory data. The results of this study will provide insight on forest succession pathways after large scale fires and will serve as valuable baseline information to compare with current trends. A separate monitoring program to sample tree volume continued in the South Slave region in 2021-22. Approximately 150 plots were measured, though productivity was affected by flooding.	Completed (ongoing)
	B. Conduct vulnerability assessments for forest landscape areas of interest	ENR, NRCan (CFS)	The Vulnerability Assessment, developed in partnership with the Canadian Forest Service, was completed for forest landscape Areas of Interest. ENR plans to follow up this project by creating public engagement materials such as story maps.	Completed (fully met)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	C. Improve understanding of changing wildfire regimes	ENR, NRCan (CFS), Academia	In 2021-22, ENR's partnership with the Canadian Forest Service on this project continued and the final year of work is expected to be completed in 2022-2023. In 2021-22, this work involved conducting field sampling for tree ring analyses over a 270-kilometre transect from Fort Smith to Hay River. Data will reconstruct fire history across the transect to determine how the fire regimes have varied over the last 200 years. Upon completion of the project, an academic paper will be published.	On Track (In progress)
	D. Produce baseline NWT-wide vegetation classifications	ENR, ISSC, NRCan (CFS)	Work on the Multi-Source Vegetation Inventory project continued in 2021-22. Permanent sample plots were established and measured, LiDAR was flown over permanent sample plots, and field data was collected to calibrate LiDAR data. The land cover classification is in progress and is expected to be complete by March 2023. Models to impute forest inventory attributes to forested areas of the Taiga Plains Ecozone are being built and will produce mapped results by March 2024. A report, "The Multisource Vegetation Inventory (MVI): A Satellite-Based Forestry Inventory for the Northwest Territories Taiga Plains" was produced.	On Track (In progress)
	E. Complete forest health surveys and reporting	ENR, NRCan (CFS)	The 2021 Forest Health Survey was completed. Approximately 14 million hectares of forested land in the NWT were surveyed. The 2021 Forest Health Report and 2021 Forest Health Newsletter were completed and will be made available in 2022-23.	Completed (ongoing)
2.9 Wildlife	A. Conduct wildlife climate change vulnerability assessments	ENR, Indigenous governments, Indigenous organizations, Resource Management Boards, ECCC, Academia	A climate change vulnerability assessment was completed for all 46 species-at-risk in the NWT designated under either the Species at Risk (NWT) Act or the federal Species at Risk Act. Vulnerability assessments will continue and take a phased approach for the inclusion of additional wildlife species, including keystone species, harvested species, and species of cultural and spiritual significance. Further, climate change recommendations are included in species status assessments (completed by the NWT Species at Risk Committee) and in NWT management plans and recovery strategies for species at risk (completed by the Conference of Management Authorities).	Completed (ongoing)
	B. Continue monitoring invasive and non-indigenous species and assess impacts from range shifts on wildlife	ENR, Resource Management Boards, Indigenous governments, Indigenous organizations, ECCC, Academia	Invasive and non-indigenous species are tracked by the NWT General Status Program and NWT Council on Invasive Species, Pests and Pathogens. An updated list of alien species was published in the NWT Species 2021-2025 Report. In addition, annual surveys for small mammals and the deployment of remote wildlife cameras across the NWT provided ongoing opportunities for detecting and monitoring invasive and non-indigenous species. ENR established a partnership with Bishop's University in 2021-22 for app-based tick monitoring through eTick available throughout the NWT. An NWT Wild Pig Surveillance and Response Plan was developed given potential for a range expansion of this invasive species and is currently undergoing review.	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	C. Establish the NWT Pests, Pathogens and Invasive Species Council	ENR , NWT PPISC, Indigenous governments, Indigenous organizations, Resource Management Boards	The Northwest Territories Council on Invasive Species, Pests, and Pathogens was formally established in 2021. The Council's Bylaws were adopted at the first Annual General Meeting in 2021.	Completed (fully met)
	D. Utilize the NWT Pests, Pathogens and Invasive Species Council to support rapid response programs and educational materials on future pests, pathogens and invasive species issues due to the changing climate	ENR , NWT PPISC	The Northwest Territories Council on Invasive Species, Pests, and Pathogens was formally established in 2021. Following its establishment, a website was created to host educational resources. Website updates and educational materials continue to be developed and delivered.	On Track (In progress)
	E. Disseminate current and new information on the health and distribution of wildlife, including diseases and parasites	ENR	ENR monitors the health of wildlife in the NWT, including potential changes in the type, prevalence and distribution of diseases and parasites associated with climate change. Information was shared with the public in 2021-22 on existing diseases, parasites and other wildlife health issues in the NWT through the ENR website and social media platforms. Public information and media interviews were provided on COVID-19 in wildlife, rabies, vector-borne diseases, avian influenza, mosquito abundance, ticks and climate change. ENR submitted data and analysis on wildlife health for the NWT State of the Environment Report 2022. This included an overview of wildlife health, disease, potential risks to people and domestic livestock, and contaminants in wildlife and potential implications for food safety and security.	Completed (ongoing)
	F. Continue using remote sensing techniques to assess wildlife habitat and impacts due to climate change	ENR , ECCC (CWS)	Remotely sensed environmental data products are continually being developed, updated, and made available by scientists around the world. These products are used on an ongoing basis to understand and monitor current and future drivers of the distributions and abundance of NWT wildlife. This includes a project led by a researcher from Queen's University (funded through NWT CIMP) that is currently assessing habitat changes on the Bathurst caribou range using satellite imagery to identify hotspots of change. On the ground assessment of vegetation is on-going. An Interim Report has been produced. Climate data from NASA and seasonal Resource Selection Function (RSF) models (which used remote sensing datasets) are being used in a cumulative effects assessment on the ranges of Cape Bathurst, Tuktoyaktuk Peninsula, Bluenose West, Bluenose East, and Bathurst barren-ground caribou herds. The data enable the examination of trends in climate variables and habitat selection and how they might be related to caribou population dynamics. Interim reports will be made available in the future.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	G. Enhance the knowledge of species presence, distribution and status to determine future needs based on a changing climate	ENR , Resource Management Boards, Indigenous governments, Indigenous organizations, ECCC, DFO	Every 5 years, a report on the general status ranks of wild species in the NWT is published. The NWT Species 2021-2025 report was completed and published online and in print in 2022. Additionally, a field guide on NWT Amphibians and Reptiles was published in April 2021.	Completed (ongoing)
	H. Assess cumulative impacts to caribou, including from climate change, as reflected in the NWT Cumulative Impact Monitoring Program Caribou Blueprint	ENR , Academia, Indigenous governments, Indigenous organizations, Community governments	In 2021-2022, the ENR - NWT Cumulative Impact Monitoring Program (CIMP) funded 7 projects with a focus on caribou. NWT CIMP also released NWT Environmental Research Bulletins on caribou in 2021-2022, all with linkages to climate change: 1. Remote Sensing of Vegetation on the Bathurst Caribou Herd Range (CIMP187) 2. Habitat Selection by Boreal Caribou in the NWT (CIMP202) In addition, there were 4 community presentations, 7 scientific presentations, 3 peer reviewed publications, and 4 videos produced from caribou research funded by the Program.	Completed (ongoing)
2.10 Fish and marine mammals	A. Continue to improve baseline monitoring of species health and distribution with an emphasis on priority species of marine, anadromous and freshwater fishes, and marine mammals	DFO , ECCC, NRCan, Indigenous governments, Indigenous organizations, Resource Management Boards	In 2021-22, DFO continued to contribute to the improvement in the collection of baseline conditions and ecosystem monitoring through a series of Western Arctic sampling programs, community-based monitoring throughout the Inuvialuit Settlement Region, and monitoring of fisheries and ecosystem conditions in Great Slave Lake. Although field work was impacted due to COVID-19, communities were able to help this monitoring to continue. Examples of these programs include: 1. Ring seal monitoring program – a long term community-based monitoring program conducted in collaboration with the Fisheries Joint Management Committee, examining ringed seal population health near Ulukhaktok, NT 2. Great Slave Lake stock assessment monitoring program examines changes in population dynamics of lake trout, whitefish, and inconnu in Great Slave Lake 3. The Arctic Salmon program works with communities throughout the NWT to report the occurrence of Pacific salmon captured during subsistence fishing	On Track (In progress)
	B. Continue monitoring temperature-dependent contaminants in subsistence species	DFO , ECCC, Indigenous governments, Indigenous organizations, Health Canada (guidelines)	DFO leads a community-based monitoring program for mercury and persistent organic pollutants (POPs) in Beluga whales at Hendrickson Island (Beaufort Sea/Amundsen Gulf). The program is conducted collaboratively with Inuit, the Fisheries Joint Management Committee and the Northern Contaminants Program (Crown Indigenous Relations and Northern Affairs Canada). Results are reported through the Arctic Monitoring and Assessment Program (AMAP), which has produced scientific assessments of mercury in the Arctic since 1998. The latest assessment was finalized and published in December 2021 and includes information on mercury, POPs, and human health in the Arctic. It was found that warmer temperatures may enhance methylmercury production in thawed permafrost and marine or lake sediments.	On Track (In progress)
	C. Continue to monitor impacts of diseases and parasites on species	DFO , Health Canada, Indigenous governments, Indigenous organizations	DFO continues to monitor impacts of diseases and parasites on species. In 2021-22, DFO coordinated a community-based annual monitoring program of viruses and other diseases in Beluga whales at Hendrickson Island (Beaufort Sea/Amundsen Gulf). The program is conducted collaboratively with Inuit and the Fisheries Joint Management Committee (FJMC). Results are published in the primary scientific literature. Additional research publications in 2021-22 related to this Action Item covered topics including the study of viruses in North American wildlife, harbor porpoises, dolphins, and harbor seals.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	D. Assess cumulative impacts to fish, including climate change, as reflected in the NWT Cumulative Impact Monitoring Program Fish Blueprint	ENR, Academia, DFO, Indigenous governments, Indigenous organizations, Community governments	<p>In 2021-2022, the ENR - NWT Cumulative Impact Monitoring Program (CIMP) funded 7 climate change related research projects with a focus on fish.</p> <p>In addition, 12 community presentations, 5 scientific presentations, 7 peer reviewed publications, and 3 videos were produced from fish research funded by the Program. NWT CIMP annually hosts a regional results workshop highlighting current and past environmental monitoring and research. For 2021-22, a workshop for the Dehcho Region was intended, but could not be held due to COVID-19 pandemic restrictions. Instead, ENR-funded project researchers, and researchers working in the Dehcho, provided videos to share project results with Dehcho communities, northern decision-makers and the general public. All deliverables for any projects funded by NWT CIMP are available on the NWT Discovery Portal. The 2021-2022 NWT CIMP Annual Report is in development and will be released in 2022.</p>	Completed (ongoing)
2.11 Human health and well-being	A. Communicate alerts and develop advisories related to extreme weather, natural disasters impacting health, zoonotic diseases and poor outdoor air quality	HSS, ENR, MACA	Four boil water advisories were issued in 2021-22, and it is expected that with changing water levels and increases in extreme weather events due to climate change, the need for boil water advisories may increase. The 2021 fire season required one air quality alert due to smoke, air quality and fire related alerts and advisories are also expected to increase with climate change. Due to constraints on travel related to the COVID-19 pandemic, no community engagement was completed. The protocol for weather related health alerts was revised this year, with changes made this year to streamline the process.	Completed (ongoing)
2.12 Public safety	A. Ensure residents, first responders, communities and the GNWT are better prepared to deal with the impacts of climate-related hazards	MACA, Community governments, Indigenous governments; Indigenous organizations, NWTAC, PSC, NRCan (GSC)	Distribution of GNWT Emergency Management Organization preparedness brochures continued in 2021-22. Pre-spring ice breakup meetings were held with all nine flood prone communities in the NWT. Community emergency plans were updated, and evacuation procedures/plans were reviewed. A flood preparation package (checklist, request for assistance form, TTX, evacuee registration, public alerting information) was developed and distributed to the flood prone communities in March/April 2022. During Emergency Preparedness Week (May 2-8, 2021), materials were distributed publicly via print, social media, and radio. MACA's School of Community Government continued offering the three pre-recorded webinars: Climate Change for Councillors, Mainstreaming Climate Change for Community Planning, and Climate Change, along with the online course "Integrating Climate Change Measures into Municipal Planning and Decision Making".	Completed (ongoing)
	B. Update community emergency plans and incorporate methods for identifying and monitoring climate change related hazards and adapting to the increase in frequency and severity of such hazards	MACA, Community governments, Indigenous governments, Indigenous organizations, GNWT	<p>An update to the NWT Hazard Identification Risk Assessment (HIRA) and an after-action review of the 2021-22 flood season are in progress.</p> <p>In 2021-22, MACA worked with all nine flood-prone communities in the NWT to update their emergency plans.</p> <p>High water marks and flood level surveys were completed in 2021 for Jean Marie River and Fort Simpson. This data will be used by ENR's Hydrology unit to update NWT flood maps over the next several years.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
2.13 Culture and heritage	A. Continue research to assess impacts to heritage resources from climate-driven landscape disturbances	ECE, Indigenous governments, Indigenous organizations	Several new coastal erosion risk assessments have been completed using the Long-Term Change Detection (LTCDC) product and high-resolution satellite imagery. Furthermore, work is now underway to conduct a quantitative comparison of the LTCDC results alongside historical models of shoreline change developed by the Cultural Places Program, to verify the utility of LTCDC data in detecting coastal erosion at known archaeological sites. ECE's projects associated with this Action Item are all conducted in collaboration with Indigenous governments and Indigenous organizations, but no fieldwork or community engagement sessions were conducted in 2021-22 due to COVID-19 pandemic restrictions.	On Track (In progress)
2.14 Public and community infrastructure	A. Complete community infrastructure risk assessments and high-level adaptation options	MACA, ENR, NWTAC, Community governments, Indigenous governments, Indigenous organizations	MACA led a high-level climate change vulnerability assessment of impacts on public and community infrastructure within the boundaries of the 33 communities of the NWT. Risk maps were provided for every community to illustrate the spatial extent of hazards and the locations of infrastructure at risk, as well as a list of medium/high risks identified, proposed adaptation measures, and recommendations for future work to address identified data gaps. The findings of this assessment will support communities in making informed decisions about their existing and future infrastructure. The report: "Assessment of Climate Change Impacts on Infrastructure in all NWT Communities" was made available online in December 2021. A webinar, for Community government staff and elected officials, summarizing the results and recommendations of the Report and discussing action implementation is planned for 2022-23.	Completed (ongoing)
	B. Seek funding to fill community infrastructure gaps	MACA, INF Canada, NWTAC, Community governments, Indigenous governments, Indigenous organizations	MACA supports Community governments while they plan their infrastructure priorities through the capital planning process, as well as with project implementation and applications for funding. Community governments continued to develop land use plans and strategic plans that consider climate-related risks and priorities, which influence the priorities that are represented on community government capital plans. In 2021-22, the GNWT approved \$740 thousand in Community Government Funding to support the reduction in the funding gap to meet municipal core needs. It is anticipated that some of this funding will be put towards infrastructure impacted by climate change. The federal Investing in Canada Infrastructure Fund for Community governments continues to target community roads and solid waste sites.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	C. Improve documentation of GNWT infrastructure stability via more rigorous asset management activities on both vertical (i.e. buildings) and horizontal (i.e. highways and runways) infrastructure	INF	<p>Snow load and foundation systems inspection and management is scheduled and tracked via INF's internal computerized maintenance management software, which then informs supplemental maintenance activities and produces quarterly reports. Building maintenance inspections also account for climate change impacts associated with movement and resulting signs of stress in buildings.</p> <p>Annual inspections and resulting reports were produced for INF's Bridge Management Systems. Inspections were conducted at airports in accordance with the Airport Pavement Management System, producing reports that inform maintenance and project planning. All these internal reports track potential effects of climate change and inform resulting infrastructure management requirements.</p> <p>INF is in the design stage for an improved Highway Surface Management system, that translates vehicle telemetry data from the GNWT fleet to surface deviation data. This can be used to track trends and identify focus locations for further investigation, which may highlight areas affected by climate change. This would contribute to informing highway maintenance and design adaptation.</p>	Completed (ongoing)
	D. Update climate change risk assessments for both vertical and horizontal GNWT infrastructure	INF	INF continued to conduct asset inspections across the NWT infrastructure for safety and regulatory compliance as part of standard asset management, including inspections of buildings, runways, roads, highways, culverts, Oil Handling Facilities, and bridges. These inspections capture effects associated with climate change.	Completed (ongoing)
	E. Collect and analyze ground temperature data to support the general knowledge base for GNWT infrastructure planning, design, construction and climate change impact monitoring	INF	Data from INF's extensive network of thermistors in highway infrastructure (including Highways 1, 3, 4 and the Inuvik-Tuktoyaktuk Highway) and building foundation systems was collected and analyzed, included in annual internal database reports, and used to inform ongoing asset maintenance and management. Upgrades to the thermistor networks' hardware are ongoing to maximize data coverage. While this monitoring and the resulting reports are used to manage infrastructure, they are inherently tracking the effects of climate change.	Completed (ongoing)
	F. Continue to explore the potential for remote sensing and other technology to acquire data to allow monitoring and analysis of settlement and movement of GNWT infrastructure	INF, ISSC	Continuing to build on the remote sensing and other technology put in place in 2019-20, satellite information has been obtained and continues to be processed for select infrastructure, including select Oil Handling Facilities, highways (Dempster & Inuvik-Tuktoyaktuk), and airports (Inuvik, Norman Wells, Yellowknife, Hay River) to monitor vertical displacement. This technology is an additional tool to help with early identification of impacts to infrastructure and to enable proactive maintenance, in response to climate change impacts. Development of the data output is ongoing. Outputs are informing actions for the Dempster Highway slope stability, while outputs and analysis for other infrastructure are being refined.	Completed (ongoing)

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
<p>7.1 Enhancing the use of traditional and local knowledge</p> <ul style="list-style-type: none"> Document, use and transfer climate change related knowledge as prioritized by Indigenous governments to support decision-making pertaining to action areas 	<p>Indigenous governments, Indigenous organizations, GNWT, NGOs</p>	<p>In 2021-22, ENR established the NWT Climate Change Council which is comprised primarily of members from 13 Indigenous governments and Indigenous organizations. The Council informs work and priorities to support this Action Item.</p> <p>Two traditional knowledge pilot projects were completed with the community of Fort Good Hope:</p> <ol style="list-style-type: none"> Elders Traditional Knowledge Oral History Project This project gathered and interviewed Elders in Fort Good Hope to identify, record, and map the areas of deep traditional significance to the K'ahsho Got'ine people. With these areas mapped and recorded, Fort Good Hope anticipates that areas of significance can be marked for future conservation. Traditional Knowledge Bush Camp This project funded a bush camp with the purpose of bringing Elders and youth together into the bush to camp and allow the Elders to teach the youth basic bush skills and pass on Traditional knowledge, including knowledge of how the land has changed. This project provided a large group of youth from the community of Fort Good Hope the opportunity to learn traditional skills and knowledge from Elders. 	<p>Completed (ongoing)</p>
<p>7.2 Climate and weather</p> <ul style="list-style-type: none"> Undertake further climate modeling to predict future landscape change Implement a northern climate services hub 	<p>ENR, ECCC (ECCC), Academia, NRCan (CFS)</p>	<p>Federal budgets have not yet provided funding for the Northern Climate Services Hub. In the interim, Environment and Climate Change Canada has provided the GNWT funding for a Climate Services Specialist for two years. The Climate Services Specialist will provide support to technical decision makers needing to include climate information in their decision making. Further climate modelling is linked to new climate scientist positions that will be staffed in 2022-23.</p>	<p>On Track (In progress)</p>
<p>7.3 Permafrost</p> <ul style="list-style-type: none"> Establish a permafrost monitoring network for the NWT Establish a permafrost data management system Analyze collected ground temperature data Assess sensitive permafrost terrain and inventory permafrost-related geohazards Interpret future permafrost behaviour across natural and built environments 	<p>ITI (NTGS), Lands, ENR, INF, ECE, Federal Departments, Regulatory Boards, Industry, Indigenous governments, Indigenous organizations, Community governments, NRCan (GSC, CCMEQ), Academia</p>	<p>Permafrost monitoring network along the ITH-Dempster corridor has been implemented and it is now being maintained through collaboration with ARI, INF, academic, and Indigenous partners. Tools are being developed to help ensure its sustainability. Over 20 media and outreach-related activities occurred this fiscal year ranging from invited presentations at the Global Water Futures forum, to CBC interviews on Permafrost field activities, to training activities with Indigenous environmental monitors. NTGS has produced a 'story map' Rivers of Change highlighting the impacts of permafrost thaw on northern rivers. NTGS also published 12 scientific publications and reports related to baseline information on permafrost and climate change that are now accessible to the public. The team also worked on several other documents that support decision making and adaptation including Canada Standards and a Permafrost Glossary. Further, NTGS initiated the scoping of a permafrost data management system. The permafrost database has been constructed through collaboration with ISSS and the first phase of user testing was completed in 2021-22 for uploading of ground temperature and geotechnical data.</p>	<p>On Track (In progress)</p>

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
<p>7.4 Water and wetlands</p> <ul style="list-style-type: none"> Review monitoring networks to assess appropriateness for determining trends and/or impacts related to climate change Prioritize and enhance water monitoring networks to improve assessments of climate change impacts Undertake climate change vulnerability assessments on priority surface waterbodies to inform management decisions Identify and assess use of innovative technology for the remote assessment of water, snowpack and ice to assess changes including those related to a changing climate 	<p>ENR, ECCC, ISSC, NRCan (CCMEO), Indigenous governments, Indigenous organizations</p>	<p>ENR maintains water and abiotic long-term monitoring programs across the territory that are necessary for effective water management and to assist in the development of water policy and decision making. The information collected is critical to carry out any climate change assessments. High water flood potential reports were shared regularly with impacted communities during the 2021-22 spring melt through MACA's Emergency Management Organization (EMO). A vulnerability assessment is planned for Great Slave Lake in 2023.</p> <p>Reports and data are publicly available. Monitoring program results and reviews are also discussed annually at Water Stewardship workshops, and meetings with water partners. ENR hosted its 12th Annual Water Stewardship Workshop in Fall 2021 and a report, 12th Annual NWT Water Stewardship Strategy Implementation & Climate Change Advisory Gathering Workshop Report was completed and published in 2022. These reviews include assessments of areas of improvement including new partnerships and new information to assist with climate change knowledge.</p>	<p>On Track (In progress)</p>
<p>7.5 Forests and vegetation</p> <ul style="list-style-type: none"> Explore the use of remote sensing tools for inventory and update of vegetation cover Produce baseline NWT-wide vegetation classifications for remaining regions Update baseline vegetation land cover inventory (2001-2010 base) for fires, land use and other climate-related changes 	<p>ENR, NRCan (CFS), Academia</p>	<p>The Earth Observation for Sustainable Development of Forests (EOSD)-based land cover classification project is in progress for NWT mainland Ecozones. This will update the existing land cover classification from year 2000 imagery to year 2021 imagery. Burn severity mapping was also updated (an annual project), done in conjunction with the NWT Centre for Geomatics.</p> <p>Baseline data collected under this Action Item will enable future analysis of change over time related to regeneration after disturbance and climate change.</p> <p>Field work for remote sensing for mapping landscape changes to forests was completed in September 2021, followed by an analytical project to determine feasibility of trend mapping using aerial survey data with landscape change data.</p> <p>Portions of this Action Area were delayed due to COVID-19 pandemic restrictions, including a pilot LiDAR-based forest vegetation inventory and the incorporation of land use data into inventory updates.</p>	<p>On Track (In progress)</p>
<p>7.6 Wildlife</p> <ul style="list-style-type: none"> Assess indirect effects of climate change (such as parasites, diseases and pathogens) on species at risk Conduct monitoring, including community-based monitoring, to track species as they extend their ranges and become established in the NWT and assess resulting long-term impacts Develop surveillance systems to support predictions of species distribution changes Enhance monitoring of invasive and non-indigenous species for ongoing assessment of impacts from range shifts on wildlife 	<p>ENR, ECCC, Resource Management Boards, Indigenous governments, Indigenous organizations</p>	<p>The NWT Council on Invasive Species, Pests and Pathogens and General Status Ranking Program contribute to tracking and monitoring invasive and non-indigenous species in the NWT. Additionally, ENR in close collaboration with multiple external partners, is expanding the use of remote, passive sensors (primarily wildlife cameras and acoustic recording units) to monitor wildlife populations in the NWT. In 2021-22, remote sensors were deployed in Thaidene Nëné and Edézhzié, and retrieved from Ts'udé Niljné Tuyeta. Data from these monitoring activities will contribute further information towards this Action Area.</p>	<p>On Track (In progress)</p>

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
<p>7.7 Human health and well-being</p> <ul style="list-style-type: none"> Support health vulnerability assessment(s) by external parties (e.g. consultants, researchers, etc.) to evaluate the impact of climate change on the physical and mental health and social well-being of northern communities Work with partners and the public to establish the requirements for a baseline surveillance and monitoring system for health-related climate change indicators such as mental health and social well-being, injuries, food and water security, environmental contaminants, extreme weather events and natural disasters, zoonotic diseases, chronic diseases and infectious disease 	HSS, ENR, MACA	<p>The Climate Change Health and Vulnerability Assessment for the NWT (HVA) was completed in 2021. The HVA analyzed data to summarize extreme temperature and precipitation projections for the NWT and make projections to 2100.</p> <p>The Report provides a baseline for the current availability of essential health services and provides next steps for assessing the resilience of these services during extreme weather and climate-related events. The Report and plain language summary are currently under review and will be made available to the public in the coming months. An Engagement Plan related to the results of the HVA is being developed in conjunction with ENR's forthcoming Climate Change Risks and Opportunities Assessment.</p>	On Track (In progress)
<p>7.8 Public safety</p> <ul style="list-style-type: none"> Update the NWT Hazard Identification Risk Assessment to better predict which hazards could occur more frequently or become more extreme in the future Develop disaster mitigation plans for communities potentially impacted by the adverse effects of climate change Evaluate approaches to improve flow monitoring, flood prediction and emergency planning Monitor the condition of community trails 	MACA, ENR, SmartICE, ECCC, Community governments, Indigenous governments, Indigenous organizations, GNWT, Academia	<p>The NWT Hazard Identification Risk Assessment identifies risks, including climate change driven risk, that pose the greatest threat to the people, property, environment, and economy of the NWT.</p> <p>An update to the NWT Hazard Identification Risk Assessment (HIRA) was in progress in 2021-22. As part of this work, engagement with communities to inform the HIRA update was undertaken.</p>	On Track (In progress)
<p>7.9 Culture and heritage</p> <ul style="list-style-type: none"> Conduct vulnerability mapping for heritage resources at risk of destruction from coastal erosion in the Beaufort Sea Region 	ECE, Academia, Indigenous governments; Indigenous organizations	<p>Though archaeological fieldwork involving Indigenous governments and Indigenous organizations was cancelled due to COVID 19-related restrictions, an additional 40 archaeological sites were assessed for climate change vulnerabilities, yielding a complete accounting of all known archaeological sites on Banks Island (outside of federal jurisdiction) to support the Vulnerability Assessment. In addition, a conference paper was presented at the annual Canadian Archaeological Association Conference in May 2021 detailing the joint efforts of the GNWT Cultural Places Program and the NWT Centre for Geomatics in applying remote sensing methods to the detection of threatened archaeological sites. Heritage management efforts in response to climate change impacts were also discussed in a presentation delivered at the "On the Front Line: Arctic Museums and Climate Change" symposium and the "Virtual Speaker Series" hosted by the Aurora Research Institute (both in November 2021). A poster was co-authored for display at the International Co-Sponsored Meeting on Culture Heritage and Climate Change in December 2021.</p>	On Track (In progress)
<p>7.10 Community infrastructure</p> <ul style="list-style-type: none"> Prioritize community infrastructure gaps to mitigate the impacts of climate change 	MACA, Community governments	<p>In 2021-22 MACA shared their Operations and Maintenance Plan Template for community drainage systems with community governments for their use. MACA makes itself available to support communities interested in developing a community specific drainage and operations plan.</p>	On Track (In progress)

Appendix A

Goal 3: Build Resilience and Adapt to a Changing Climate

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
3.1 Implementing the GNWT Land Use Sustainability Framework	A. Integrate climate change adaptation and mitigation factors into GNWT decision processes affecting land, water and natural resources	Lands, ENR, GNWT	In 2021-22, Lands finalized Guidelines for Completing a Land Use and Sustainability Appraisal. These Guidelines articulate how to integrate the Land Use and Sustainability Framework (LUSF) objectives into GNWT decision-making processes and support implementation of the LUSF. The Guidelines help GNWT departments ensure their decisions consider a broad variety of sustainability objectives, one of which is climate change adaptation and mitigation. Further, ENR ensured the GNWT's Cabinet Decision Paper and Financial Management Board Submission templates now have sections to outline climate change considerations, which further supports the action of integrating climate change adaptation and mitigation factors into GNWT decision-making processes.	Completed (ongoing)
	B. Develop climate change indicators	ENR, GNWT	ENR's Climate Change and Air Quality Unit developed climate change indicators to inform the 2022 State of the Environment Report. These indicators include: <ul style="list-style-type: none"> trends in global population numbers trends in global CO2 concentrations global environmental changes trends in global climate teleconnections trends in observed temperature and precipitation in the NWT trends in lightning events projected trends in temperature and precipitation in the NWT trends in Arctic sea ice and sea surface temperature trends in ocean acidification in the Beaufort Sea trends in projected sea level in the Beaufort Sea There are also several indicators related to water, wildlife, vegetation, permafrost, species at risk, landscape change, harvesting, country food use, protected areas and human activities that link to climate change that were developed. These indicators will be reviewed for potential inclusion in a larger set of climate change indicators.	Completed (ongoing)
3.2 Completing / reviewing regional land use plans	A. Work collaboratively within regional planning processes to incorporate climate change considerations into land use plans	Lands, ENR, ITI, ECE, EIA, Indigenous governments, Indigenous organizations, Federal government, Land Use Planning Boards and Committees	Lands led GNWT's participation in Planning Board engagement for amendment processes for the Sahtú (5-year plan review, establishment of Ts'udé Niljné Tuyeta protected area) and Gwich'in (plan review) Land Use Plans. Lands attended meetings with the Boards and other stakeholders to discuss the amendment processes. Lands also coordinates whole of GNWT input into Land Use Plan reviews and amendments, including ensuring that GNWT's interests related to climate change considerations are incorporated. In 2021-22, Lands participated in a meeting with the Sahtú Land Use Planning Board to discuss the Board's draft amendment to the Land Use Plan following the establishment of the Ts'udé Niljné Tuyeta Protected Area. The meeting notes are available on the Board's public registry.	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
3.3 Implementing the conservation network	A. Establish Thaidene Nënë candidate protected area	ENR, Indigenous governments, Indigenous organizations, PCA, Lands, ITI, EIA, DOJ	<p>The GNWT established the Thaidene Nënë Protected Area in August 2019. The Thaidene Nënë Operational Management Board was formed. Develop of a Management Plan continues to progress.</p> <p>In 2021-22, ENR CPIU facilitated the development of a climate change story map entitled “Present Lands, Future Climate” (PLFC). The story map, reported in 2020-21 as being designed for Tuyeta and Thaidene Nënë protected area Management Boards, was revised to be a primer for climate change-informed conservation network and landscape-level planning in the NWT. It introduces future climate shifts, the vulnerability of landscapes to rapid climate shifts and identifies climate refugia. The story map will be published once complete.</p> <p>A biodiversity monitoring program was initiated in the Thaidene Nënë Protected Area in Summer 2021. GNWT and community staff were trained to undertake this work with program operations to continue in 2022-23 and could contribute to future climate change research.</p>	Completed (ongoing)
	B. Establish Dinàgà Wek’èhodi candidate protected area	ENR, Indigenous governments, Indigenous organizations, Lands, EIA, ITI, ECCC (CWS)	<p>Work toward the establishment of Dinàgà Wek’èhodi candidate protected area continued in 2021-22 and is ongoing.</p> <p>Biodiversity monitoring in the Dinàgà Wek’èhodi candidate protected area is ongoing and could contribute to future climate change research.</p>	On Track (In progress)
	C. Establish Ts’udé Niljné Tuyeta candidate protected area	ENR, Indigenous governments, Indigenous organizations, Lands, EIA, ITI, ECCC (CWS)	<p>The GNWT signed an Establishment Agreement with the K’ahsho Got’jñę in September 2019 to formally establish the Ts’udé Niljné Tuyeta Protected Area. The Ts’udé Niljné Tuyeta Management Board was formed. Develop of a Management Plan continues to progress.</p> <p>In 2021-22, ENR CPIU facilitated the development of a climate change story map entitled “Present Lands, Future Climate” (PLFC). The story map, reported in 2020-21 as being designed for Tuyeta and Thaidene Nënë protected area Management Boards, was revised to be a primer for climate change-informed conservation network and landscape-level planning in the NWT. It introduces future climate shifts, the vulnerability of landscapes to rapid climate shifts and identifies climate refugia. The story map will be published once complete.</p> <p>Biodiversity monitoring in the Tuyeta Indigenous and territorial protected area is ongoing and could contribute to future climate change research.</p>	Completed (ongoing)
	D. Conclude planning and decisions for remaining candidate areas	ENR, Indigenous governments, Indigenous organizations, Lands, EIA, ECCC (CWS)	<p>The GNWT has been focused over the past several years on the establishment of Ts’udé Niljné Tuyeta Indigenous and Territorial Protected Area, Thaidene Nene, and discussions towards the establishment of Dinàgà Wek’èhodi. In 2022-23, the GNWT and Dehcho First Nations communities with candidate areas are planning meetings to discuss next steps for remaining candidate areas.</p>	On Track (Not yet started)
3.4 Applying permafrost expertise	A. Provide permafrost expertise for NWT projects and initiatives	ITI (NTGS)	<p>The NTGS’s Permafrost team fields multiple technical client requests per week that range from provision of general technical advice, technical documents, participation in working groups, data, and publications, as well as requests for collaboration, research advice, reporting, and presentations. NTGS developed a tracking system for these requests, to be implemented in 2022-23.</p> <p>In 2021-22, the Permafrost team was involved in 20 media and outreach presentations.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
3.5 Implementing wildlife plans / strategies (key species, species at risk, invasive species)	A. Finalize and implement the Bathurst Caribou Range Plan, including the conservation of key habitats where climate change impacts are expected to be pronounced	ENR, Resource Management Boards, Indigenous governments, Indigenous organizations, Industry, NGOs	<p>The Bathurst Caribou Range Plan was finalized in August 2019 and implementation of the Plan is underway. Maps and outputs of modelling undertaken during development of the Bathurst Caribou Range Plan are available on the ENR website and the Species and Habitat Viewer.</p> <p>Three workshops were held with the Bathurst Caribou Advisory Committee (BCAC) to discuss areas of important habitat to be considered for conservation. A new analysis was completed and shared with the BCAC on identifying water crossing hotspots using satellite collar data and cross-referenced with areas identified by the Tlicho Government. One workshop was held to further develop the Caribou Guardians Coalition, with funding support from Polar Knowledge Canada, to develop a network of community monitoring programs.</p> <p>A Framework and Operational Guidance Document were developed for implementing Mobile Caribou Conservation Measures. Work is ongoing in partnership with an industry partner to test the operational guidance onsite.</p> <p>A Species and Habitat Viewer website was published online to share information with the public on Species at Risk, including boreal and barren-ground caribou. The viewer allows users to see distribution, core seasonal ranges and disturbance levels on caribou ranges.</p>	Completed (ongoing)
	B. Finalize the Boreal Caribou Range Plans, including management of climate change impacts on the ecosystem	ENR, ECCC, Resource Management Boards, Indigenous governments, Indigenous organizations, Industry, NGOs	<p>The Northwest Territories Framework for Boreal Caribou Range Planning was finalized in August 2019. Per the Framework, five regional range plans are being developed. Range planning that occurred this year included:</p> <ol style="list-style-type: none"> 1. Southern NWT – Working Group meeting held in Hay River in December, 2021 2. Wek'èezhii - Working Group meetings in April and May 2021, Interim Range Plan: public review in August 2021; Approved by WRRB in December 2021; final Boreal Caribou in the Wek'èezhii interim range plan posted on ENR website in March 2022. 3. Sahtú – worked with Sahtú Renewable Resources Board and Sahtú Secretariat Inc. on process for regional range planning. Presentation to Nę K'á Dene Ts'ı́łı Forum December 2021. 4. Gwich'in – Worked with Gwich'in Tribal Council and Gwich'in Renewable Resources Board on initiating further Traditional Knowledge studies and mapping for boreal caribou. Information Sessions in Aklavik and Inuvik – December 2021. <p>Community members from Deh Gáh Got'ı̄ê First Nation assisted with black bear capture and collar deployment work associated with a collaborative research project involving ENR and Laval University which will evaluate the implications of climate change on boreal caribou food webs and food security.</p> <p>ENR contributed to two publications that are part of a broad-scale collaborative landscape forecasting project titled the Western Boreal Initiative, which is a collaboration between provinces, territories, and Indigenous governments, including the Dene Nation, to evaluate the cumulative effects of wildfire, predation, key pests, human disturbances, and climate change on the Western Boreal Forests of Canada.</p> <p>ENR staff and research contributed to four published journal articles on caribou research and conservation, published the Climate Vulnerability Assessments for Species at Risk, finalized the interim Wek'èezhii Boreal Caribou Range Plan, created an educational infographic outlining the boreal caribou range planning process, and updated the Species Status Report for Boreal Caribou.</p>	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
3.6 Capturing carbon in forests	A. Increase forest carbon sequestration by silvicultural practices including planting in areas that have not returned to forest after natural disturbances, and thinning in areas that are overly dense	ENR, INF, ECCC	<p>Tree planting under the Low Carbon Economy Leadership Fund (LCELFF) program occurred in Summer 2021. Over 14 hectares were planted in the Cameron Hills. Monitoring plots were established in the planted sites to track carbon sequestration. A Planting Report for the Cameron Hills project was completed.</p> <p>The first round of tree thinning in a post-fire pine regeneration was completed at Sandy Lake. Over 11 hectares were thinned, and monitoring plots were established to track carbon sequestration. The thinning project is continuing in 2022-23 and 2023-24 with more treed areas to be thinned at the Sandy Lake site.</p> <p>A report on the Tree Thinning Project near Sandy Lake was completed.</p>	Completed (ongoing)
3.7 Responding to human health risks	A. Promote and support health and wellness activities to build community resiliency to climate change impacts	HSS, ENR, Community governments, Indigenous governments, Indigenous organizations	Due to COVID-19 related travel constraints, no in-person community outreach was possible in 2021-2022. HSS is working on an adjusted engagement plan.	On Track (In progress)
	B. Work with communities to identify potential cleaner air shelters, and modifications required to reduce impacts of wildfire smoke on human health	HSS, Community governments, Indigenous governments, Indigenous organizations	The Cleaner Air Sheltering in the NWT report was completed in 2021-22. HSS will collaborate with MACA to assist NWT communities in implementing suggested actions from the report, e.g., building retrofits to improve indoor air quality. This work links to HSS' Climate Change and Health Vulnerability Assessment. HSS also collaborated with the Government of Canada's healthADAPT group to plan for a climate change and health monitoring program for the NWT.	On Track (In progress)
3.8 Increasing local food security and production	A. Support country food-related research, including climate change impacts to community food security	ENR, HSS, ITI, Indigenous governments, Indigenous organizations	<p>The research project 'Indigenous Knowledge of Berries in the Northwest Territories' continued to determine local knowledge about NWT berries, changes that are being seen in berries, potential cause(s) of these changes, and identify what further information needs to be collected. Harvesting berries is an important part of the culture and diet of northern Indigenous communities.</p> <p>The Berry Research Project is implemented through collaborative knowledge gathering to improve understanding of the NWT's environment, inform environmental stewardship actions, and contribute to an increase in Indigenous knowledge-led research in the territory.</p>	Completed (ongoing)
	B. Implement a sustainable livelihoods action plan to support country food research and programs	ENR, HSS, ITI, Indigenous governments, Indigenous organizations	<p>Numerous actions of the Sustainable Livelihoods Action Plan 2019-2023 were advanced in 2021-2022. Climate change is one of the Plan's guiding principles.</p> <p>A Food Security Placemat is being developed with the GNWT's Food Security Interdepartmental Working Group.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	C. Implement the NWT Agriculture Strategy to increase local food production	ITI, Indigenous governments, Indigenous organizations, Community governments	2021-22 was the final fiscal year of the NWT Agriculture Strategy (2017-2022). A baseline dataset for NWT commercial food production was established in 2017-2018, to collect various sector metrics across the NWT and finalize the implementation and impact of the NWT Agriculture Strategy. Since the initiation of the NWT Agriculture Strategy, there has been steady year-over-year growth of reported volumes of food produced in the NWT. Final reporting on the strategy's performance measurement plan will be released in June 2023. There are 10 farms operating at a commercial scale in the NWT, directly employing Northern residents either full time or seasonally. Commercial farms are operating in each region of the NWT, with the largest concentration of farms in the South Slave region. Draft NWT Environmental Farm Plan Guidelines were developed in 2021-22 and will be implemented in 2022-23.	Completed (ongoing)
3.9 Improving capacity and resilience of health and social services	A. Assess if essential services can be provided during extreme weather and climate-related events	HSS	The Climate Change Health and Vulnerability Assessment for the NWT was completed in 2021. The final report is forthcoming and provides a baseline assessment of the current availability of essential health services and provides next steps for assessing the resilience of these services during extreme weather and climate-related events.	On Track (In progress)
3.10 Updating community emergency plans and operations and maintenance procedures	A. Address climate-related hazards and adaptation measures in updated community emergency plans and operations and maintenance procedures (e.g., floods, blizzards, wildfires, permafrost thaw, coastal erosion)	Community governments, MACA, Indigenous governments, Indigenous organizations, ENR, NRCan	In 2021-22, MACA worked with nine NWT communities to review and update their emergency plans to reflect flood hazards and risks. Information provided in the Hazard Identification Risk Assessment update and Potential Flood/High Water Reports will inform future updates to community emergency plans including climate change related hazards.	On Track (In progress)
3.11 Enhancing wildfire disaster mitigation	A. Update and implement community wildfire protection plans	Community governments, ENR, MACA	All 29 forested communities in the NWT have updated their community wildland fire protection plans, and recommendations are being implemented in communities as part of the ENR's standard business operations.	Completed (ongoing)
	B. Support the implementation of FireSmart principles and consider the use of FireSmart programs for all communities	ENR, MACA, Community governments	In 2021-2022, FireSmart promotion was done through social media and regionally hosted events. A FireSmart contest was held for residents on the Ingraham Trail. A FireSmart and Fuel Management Conference was planned for this fiscal year (2021-2022) but was postponed due to COVID-19 gathering restrictions. In 2021-22, ENR continued to support the implementation of wildfire fuel breaks in four communities. Fort Simpson, Hay River, Tsiigehtchic and Behchoko completed work on identified fuel breaks as part of FireSmart Initiatives.	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
3.12 Community hazard mapping	A. Design a hazard mapping program, including permafrost, flooding, wildfire, erosion and other climate-related impacts	ENR, MACA, Lands, ITI, NWTAC, Community governments, NRCan, Academia	<p>NRCan has developed a series of guidelines to help advance flood mapping activities across Canada. ENR and the Centre for Geomatics secured funding to assess how applicable these guidelines are to NWT communities, with a focus on ice jams and how to address the limited available data on NWT communities. This will facilitate the development of NWT-specific guidelines, with planned completion of this project in 2022-23.</p> <p>ENR completed a wildfire landscape analysis. This community-centric landscape analysis provided information on the likelihood of a fire to occur in the medium term, and how it will impact the communities.</p> <p>The GNWT advanced surficial mapping (a key component needed for hazard mapping) in communities across the NWT. This project builds on the deliverables produced in the community geotechnical and geospatial libraries project. The project will provide fine-scale surficial maps for NWT communities.</p> <p>In 2021, MACA began the update of the NWT Hazard Identification Risk Assessment (HIRA). The HIRA provides assessment of natural hazard risks to people, property, environment, and economy in the NWT. MACA hired a consultant in Spring 2021 to complete this work. Engagement with community governments was conducted in Winter 2022 and included an online survey and targeted interviews. The HIRA will help inform the development local adaptation plans and territorial emergency management and preparedness.</p> <p>ENR continued to gather data on flooding and water levels across the territory and provided related updates/alerts to residents and communities.</p> <p>NTGS completed a permafrost thaw sensitivity analysis in the surrounding areas of all NWT communities. Results will be disseminated in 2022-23.</p> <p>NTGS also led a community geotechnical and geospatial libraries project that supported the compilation of geotechnical, permafrost and spatial datasets for seven communities in the NWT: Inuvik, Fort McPherson, Norman Wells, Tulita, Whati, Behchoko and Yellowknife/Dettah.</p>	On Track (In progress)
3.13 Safely accessing land, water and ice	A. Pilot community focused ice information products to support on-ice travel and travel in ice filled waters	ECCC (CIS and CCCS), ENR	<p>Work on the development of community ice products for Sachs Harbour, Tuktoyaktuk and Ulukhaktok (initiated in 2019-2020) has been delayed due to restrictions associated with the COVID-19 pandemic. This project is expected to be completed by March 2023.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	B. Implement the SmartICE monitoring and information service in select NWT communities to facilitate safe passage over ice	SmartICE, Indigenous governments, Indigenous organizations, Community governments	SmartICE is a climate change adaptation program that integrates traditional knowledge of ice travel with advanced data acquisition and remote monitoring technology. In 2021-22, in partnership with the Inuvialuit Game Council and Tuktoyaktuk Community Council, SmartICE completed delivery of ice-monitoring equipment for the Inuvialuit communities of Paulatuk, Ulukhaktok, Sach's Harbour and Tuktoyaktuk. This equipment is operated by trained Munaqsiyit monitors and Tuktoyaktuk climate monitors. As part of the training, monitors learned how their ice monitoring data and associated maps are instantly viewable in their communities through SIKU, an Indigenous knowledge social network.	Completed (ongoing)
	C. Incorporate extreme weather warnings into public alerting system	MACA, ECCC	The public alerting system, NWT Alert, was publicly launched in 2021-2022. It warns residents about public safety, weather risks, major emergencies, air and water quality, evacuations, and other threats.	Completed (fully met)
3.14 Supporting the Northern Infrastructure Standardization Initiative (NISI)	A. Continue active participation in the development of additional standards for northern infrastructure (NISI Phase II)	INF, MACA, SCC, ENR, NWT Housing, NWTAC	INF continues to contribute to the development of Standards Council of Canada's (SCC) Northern Infrastructure Standardization Initiative (NISI) Standards, which focuses on protecting infrastructure under a changing climate. INF serves as a member of the Northern Advisory Committee (NAC) and on working committees for NISI standards. Since 2011, 14 new standards and a series of guidebooks have been created, which INF and other departments reference in infrastructure contracts for planning, design, construction, risk management, maintenance and decommissioning of assets, as applicable. Phase III of NISI was approved and is underway, with the GNWT represented by INF, MACA and NWT Housing. This will include the development of new standards and the update of existing ones.	Completed (ongoing)
3.15 Adapting infrastructure to a changing climate	A. Construct the Tłı̄chq̄ All Season Road	INF	The Tłı̄chq̄ Highway (Hwy 9) was substantially completed and opened to the public on Nov. 30, 2021. This replaced a winter road that previously connected Whatì to the southern highway system for only a few months each year. This new, all-season connection to the rest of Canada brings opportunities for tourism, employment, and economic development for the local communities. The new road is designed to help NWT communities adapt to the negative effects of climate change on seasonal ice roads.	On Track (In progress)
	B. Construct the Great Bear River Bridge	INF	The purpose of this project is to construct a 487 metre long, 2 lane, 6-span bridge over the Great Bear River near the community of Tulita. Construction of the Great Bear River Bridge would eliminate a major bottleneck along the existing Mackenzie Valley Winter Road. Technical design of the bridge and roadway was 90% complete as of the 2021-22 fiscal year. Stakeholder review, submission to the Sahtú Land and Water Board, and permitting are expected to be completed next fiscal year.	On Track (In progress)
	C. Complete permitting and construct the Mount Gaudet All Season Road	INF	Regulatory approvals for construction of the Mount Gaudet Access Road project have been submitted, review has been paused. Stakeholder engagement on the project continues. Regulatory approvals for construction of the Prohibition Creek Access Road have been obtained. Construction of the Prohibition Creek Access Road, Phase 1, is anticipated to begin Winter 2023.	On Track (In progress)

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
8.1 Habitat management, biodiversity and restoration <ul style="list-style-type: none"> Undertake a gap analysis for the NWT Biodiversity Action Plan Develop strategies to prevent, as well as adapt to, invasive and non-indigenous wildlife, fish, marine mammal, insect and plant species 	ENR , NWT PPISC, ECCC, NGOs, Indigenous governments, Indigenous organizations	A report card on the Biodiversity Action Plan Gap Analysis will be complete in 2022. A new biodiversity action plan for the NWT may follow the development and publication of a new national level biodiversity action plan. Activities related to preventing and adapting to invasive and non-indigenous species are led by the NWT Council on Invasive Species, Pests, and Pathogens.	On Track (In progress)
8.2 Supporting regional priorities <ul style="list-style-type: none"> Support communities experiencing impacts through focused resilience and adaptation initiatives 	GNWT , Indigenous governments, Indigenous organizations	<p>ENR continues to serve on the Climate Change Adaptation Committee (CCAC) to represent the GNWT as an advisory member. Along with representatives from Indigenous governments and Indigenous organizations and the NWT Association of Communities (NWTAC), the Committee provides guidance and assessment on climate change adaptation project applications from Indigenous governments and Indigenous organizations and NWTAC.</p> <p>A total of 14 projects led by Indigenous Governments, Indigenous Organizations, and Community Organizations were approved for funding by the CCAC in 2021-22. Projects spanned across all regions of the NWT. In 2021-22, ENR also partnered with NWTAC to award the Climate Change Resilience Award to the Hamlet of Tuktoyaktuk for its work on monitoring and addressing coastal erosion.</p> <p>The GNWT has also provided funding to the following research projects that centered around communities:</p> <ul style="list-style-type: none"> In Fall 2021, ECE hired a Climate Change Archaeologist to conduct a climate change vulnerability assessment for cultural places in the NWT. ENR continued its work to develop an NWT Wildlife Adaptation Plan. Activities conducted included interview-based research with community participants from the Gwich'in Settlement Area and the Sahtú Settlement Area. A report was produced in June 2021 summarizing the findings from these interviews. Development of a community geotechnical and geospatial libraries project that supported the compilation of geotechnical, permafrost and spatial datasets for seven communities in the NWT: Inuvik, Fort McPherson, Norman Wells, Tulita, Whati, Behchoko and Yellowknife/Dettah. 	On Track (In progress)
8.3 Applying geohazard expertise <ul style="list-style-type: none"> Increase technical capacity for addressing climate change related geohazards in development applications and public and community infrastructure 	Lands , ITI (NTGS)	In 2021-22, Lands continued to research and understand geohazards in the NWT and how they may impact tenure instruments or other permitted activities on public land. The development of a workplan for how this information can be incorporated into daily decision-making within Lands Administration is underway.	On Track (In progress)
8.4 Permafrost research coordination and application <ul style="list-style-type: none"> Ensure permafrost research conducted by Canadian and international agencies is coordinated and communicated to inform NWT decision-making 	ITI (NTGS)	NTGS completed their Permafrost Strategic Plan outlining vision, values, and goals including those related to coordination and leadership. NTGS staff serve in leadership roles on the Canadian Permafrost Association. Participation in these national organizations helps inform permafrost research being undertaken in the NWT.	Completed (fully met)

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
<p>8.5 Implementing wildlife plans / strategies (key species, species at risk, invasive species)</p> <ul style="list-style-type: none"> • Work with wildlife co-management partners to consider and address climate change impacts on habitat for all barren-ground caribou herds within the NWT • Implement an overall climate change adaptation strategy for wildlife management • Consider regulatory amendments (seasons, conditions and areas) to the Wildlife Act depending on changes in species distribution 	<p>ENR, ECCC, Resource Management Boards, Indigenous governments, Indigenous organizations, Industry, NGOs</p>	<p>ENR drafted a discussion paper outlining ideas and approaches for adapting wildlife conservation and management to climate change in the NWT. The discussion paper is currently undergoing internal review. It is envisioned that the discussion paper will form the basis of a wildlife climate change adaptation strategy in close consultation with wildlife co-management partners.</p>	<p>On Track (In progress)</p>
<p>8.6 Responding to human health risks</p> <ul style="list-style-type: none"> • Develop and deliver educational and outreach materials to support communities in building resiliency and adapting to human health concerns 	<p>HSS, ENR, NWTAC</p>	<p>Resources on Flooding, Air Quality and Mental health, and a climate change and health landing page on the HSS website are being created in partnership with other GNWT departments.</p>	<p>On Track (In progress)</p>
<p>8.7 Increasing local food security</p> <ul style="list-style-type: none"> • Building on the priorities to be identified in a sustainable livelihoods action plan, work collaboratively with partners to identify and secure funding to support projects • Invest strategically in food production opportunities that address climate change risk mitigation through the implementation of the NWT Agriculture Strategy and Canadian Agriculture Partnership between the GNWT and the federal government. 	<p>ENR, ITI, HSS, EIA, Indigenous governments, Indigenous organizations, Community governments, Academia</p>	<p>The Canadian Agricultural Partnership is a suite of programs and funding designed to help support agriculture, specifically to increase production of local agricultural products in the North. It is funded by both the Government of Canada and the GNWT until 2023, by which time \$5.6 million will have been invested in the NWT agriculture sector. Funding allocated under the partnership is reported annually by ITI in the GNWT Grants and Contributions Results Report. The most recent figures available report that \$1.8 million was distributed to NWT food producers in 2020-21 through the Canadian Agricultural Partnership and the Northern Food Development Program.</p> <p>In 2021-2022, ENR continued funding the Take a Family on the Land program to support land-based activities and food security.</p> <p>The Berry Research Project is implemented through collaborative knowledge gathering to improve understanding of the NWT's environment, inform environmental stewardship actions, and contribute to an increase in Indigenous knowledge-led research in the territory.</p> <p>A Food Security Placemat is being developed with the GNWT's Food Security Interdepartmental Working Group. Sustainable Livelihoods Action Plan implementation continued.</p>	<p>Completed (ongoing)</p>
<p>8.8 Enhancing wildfire disaster mitigation</p> <ul style="list-style-type: none"> • Establish modified community fuel breaks based on a risk-management approach 	<p>ENR, Infrastructure Canada</p>	<p>Although ENR did not receive the Federal Disaster Funding it applied for to support this Action Area, the Department still addressed wildfire disaster mitigation by (1) performing the first round of thinning in a post-fire pine regeneration project at Sandy Lake. Over 11 hectares were thinned, and monitoring plots were established; and (2) implementing the FireSmart program once again to help residents reduce their risk exposure to wildfires.</p>	<p>On Track (In progress)</p>

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
<p>8.9 Community hazard mapping</p> <ul style="list-style-type: none"> Develop outstanding components of the hazard mapping program, including permafrost, flooding, wildfire, erosion and other climate-related impacts. Provide information and training to communities to use hazard maps 	<p>ENR, MACA, Lands, ITI, NWTAC, Community governments, Academia</p>	<p>As severe weather events and climate change hazards (flooding, wildfire, permafrost thaw, coastal erosion, premature ice road melt, etc.) continue to worsen in the NWT, there is an amplified need for Community Hazard Maps to support sound economic, social, and environmental decision-making in the face of a changing climate. Numerous GNWT departments continued to conduct hazard mapping activities in 2021-22 including ENR (Waters and Forest Management), Lands, ITI (Northwest Territories Geological Survey [NTGS]), and the NWT Centre for Geomatics. See Action Item 3.12 for more information.</p>	<p>On Track (In progress)</p>
<p>8.10 Protecting threatened heritage resources</p> <ul style="list-style-type: none"> Conduct detailed studies/ excavations of significant heritage resources at threat of destruction from climate-driven processes Develop remote sensing based monitoring protocols for heritage resources at risk of impact 	<p>ECE, Academia, Indigenous governments, Indigenous organizations</p>	<p>A field campaign under the Shútagot'ine Cultural Landscape Project was completed in 2021, which included detailed drone mapping of caribou and sheep fences at risk of destruction from forest fires. Coastal erosion models continue to be developed (and improved) using high-resolution satellite imagery, providing a baseline understanding of landscape changes taking place in the vicinity of archaeological sites and promoting an informed approach to site monitoring efforts.</p>	<p>On Track (In progress)</p>
<p>8.11 Upgrading public and community infrastructure</p> <ul style="list-style-type: none"> Prepare and submit federal funding application for planning and environmental studies for the Slave Geological Province Road Development of a collaborative GNWT and Yukon Government climate research network using existing and additional monitoring instrumentation and coordinating new research and development projects along the Inuvik-Tuktoyaktuk and Dempster highways Undertake improvements, as needed, to respond to specific climate change related impacts to infrastructure 	<p>INF, Yukon Government, Community governments, MACA</p>	<p>Improvements are undertaken, as needed, to respond to specific climate change related impacts on NWT infrastructure. A monitoring program to install instruments at KM 28.5 of the Dempster Highway to monitor thaw slumps as a result of climate change was implemented in 2021-22. Community engagement consultation was done to inform communities about the purpose of the project. Portions of the Dempster Highways 8 shoulders that had failed due to climate change were repaired. The all-season Tłı̄chǫ Highway was opened to the public in November 2021 to reduce dependence on seasonal ice roads. INF continues to monitor the impacts of climate change on territorial infrastructure.</p>	<p>Completed (ongoing)</p>
<p>8.12 Responding to risks to private infrastructure</p> <ul style="list-style-type: none"> Provide guidance and information to the public regarding risks and management options for privately owned infrastructure affected by climate change 	<p>ENR, Community governments, GNWT</p>	<p>A number of GNWT projects were underway in 2021-2022 to support the provision of guidance and information to the public regarding risks and management options for private infrastructure that could be impacted by climate change. These projects include community hazard mapping, the Climate Change Outreach Plan, and climate change risk assessments. Further, FireSmart is an ongoing program that provides homeowners with information and guidance on protecting their home infrastructure from wildfire.</p>	<p>On Track (In progress)</p>

Appendix A

Cross-Cutting: Leadership, Communication, and Capacity-Building

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
4.1 Reflecting climate change in governance and policy tools	A. Establish internal GNWT guidance mechanisms: <ul style="list-style-type: none"> • Director-level Climate Change Working Group • Assistant Deputy Ministers Climate Change Committee • Deputy Ministers Energy and Climate Change Committee • Energy and Climate Change Committee-of-Cabinet 	GNWT	This action item was completed in 2019-2020 when all committees were established. The committees continued to meet in 2021-2022 (frequencies as follows: monthly Director's Working Group, monthly Deputy Minister's Energy and Climate Change, monthly Committee-of-Cabinet, and as needed Assistant Deputy Minister Energy and Climate Change). Climate change is a mandate priority for the 19th Legislative Assembly and of importance at all levels within the GNWT, hence the need to continue to use these committees to ensure an integrated response to climate change.	Completed (ongoing)
	B. Coordinate GNWT climate change related project work	ENR, GNWT	<p>In 2021-22, ENR tracked and coordinated the compilation of progress on all 132 Climate Change Strategic Framework Action Items in the second Annual Report 2020-21 of the NWT Climate Change Action Plan. It was released concurrently with the Energy Initiatives Report 2020-2021, the NWT Carbon Tax Annual Report 2020-21, and a Plain Language Overview of the three annual reports.</p> <p>In 2021-22, ENR also coordinated progress reporting for the Pan-Canadian Framework, the Under2 GHG reduction Coalition, as well as GNWT input into numerous federal requests linked to the new federal Strengthened Climate Plan and associated initiatives.</p>	Completed (ongoing)
	C. Add climate change considerations to new / revised territorial legislation and policies	ENR	ENR developed the policy instrument 'Guide to Integrating Climate Change Considerations into GNWT Decision-Making Instruments' in Winter 2020. As of 2021, all Decision Papers, Financial Management Board submissions and Legislative Proposals need to consider climate change factors. These climate change factors include GHG mitigation and climate change impacts, knowledge, and adaptation. Further, ENR's active participation in the Pan-Territorial Adaptation Planning committee allowed for continued knowledge exchange on policy tools that support action on climate change knowledge and adaptation in the North.	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
	D. Complete a jurisdictional scan of effective policy tools to support the Action Plan's implementation	ENR, GNWT	<p>A high-level jurisdictional scan of climate change policy tools in other jurisdictions was completed, which informed the implementation of the Climate Change Strategic Framework Action Plan and the development of A Guide to Integrating Climate Change Considerations into GNWT Decision-Making Instruments.</p> <p>ENR continued to participate in Canadian Council of Ministers of the Environment committees, particularly the Climate Change Committee, and regularly provided input into work planning and the development of nationally relevant guidance.</p>	Completed (fully met)
	E. Include climate change content in existing community and Indigenous government training resources, and expand online governance training to include climate change	MACA, ENR, NGO	<p>Since 2019-2020, MACA has been offering a climate change course (Integrating Climate Change Measures into Municipal Planning and Decision Making) through the School of Community Government. The course was attended by three participants in 2021-22 and is currently under review.</p> <p>Additionally, the following webinars are available to watch online:</p> <ul style="list-style-type: none"> • Climate Change for Councillors • Mainstreaming Climate Change for Community Planning • Climate Change <p>Views of these informative webinars increased 250% in the 2021-22 fiscal year.</p>	Completed (ongoing)
4.2 Pursuing funding sources for climate change initiatives	A. Develop funding requests to address climate change priorities	ENR, GNWT, Indigenous governments, Indigenous organizations	All Departments of the GNWT regularly develop funding requests for projects that address, either directly or indirectly, climate change action priorities. This work was on-going in 2021-22. Several GNWT climate change positions, resulting from a successful funding request in 2020, were staffed in 2021-22. Available climate change funding was tracked and shared within the GNWT and with the NWT Climate Change Council. Meetings between GNWT departments and key federal departments took place throughout 2021-22 to voice concerns and request funding to continue to progress on climate change mitigation, knowledge, and adaptation actions.	On Track (In progress)
4.3 Establishing external guidance mechanisms to foster collaboration	A. Develop options for the establishment of a NWT climate change council or advisory body	GNWT, Indigenous governments, Indigenous organizations, NWTAC, NGOs, Industry	In Spring 2021, ENR formally established the NWT Climate Change Council, following planning meetings throughout 2020-2021 and 2021-2022. Membership of the Council includes representatives from 13 Indigenous governments and Indigenous organizations, the Northwest Territories Association of Communities, and the GNWT Departments of Environment and Natural Resources and Infrastructure. The Council met four times in 2021-22 (quarterly). ENR provides capacity funding to members that are eligible.	Completed (fully met)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
4.4 Information sharing and education initiatives	A. Develop and implement a climate change outreach and communication plan	ENR	<p>The Climate Change Outreach Plan and Climate Change Communications Plans have been drafted and are currently under review. In addition to these overarching Plans, ENR undertook the following information-sharing and education initiatives in 2021-22:</p> <p>ENR Climate Change staff hosted a climate change educational table at the 2021 Rivers to Oceans Day event in Yellowknife;</p> <p>ENR presented at the NWT Association of Communities virtual Annual General Meeting in May 2021, providing an update to NWTAC members on GNWT's response to climate change; ENR, in partnership with the NWTAC, also hosted an interactive session focused on communities' climate change-related concerns and needs.</p> <p>Through the support of GNWT, the Young Leaders Climate Change Summit was held in Summer 2021 by Ecology North.</p> <p>Through the support of GNWT, in Spring 2022, Ecology North attended the Polar Pond Hockey Tournament in Hay River to support the 'Climate and Sport Initiative' which addresses climate change. Ecology North provided information about the impact of climate change and how to take action. A short film on climate change developed jointly by the NWTAC and the GNWT was also presented.</p> <p>The Climate Change Resilience Award, funded by the GNWT, was awarded to the Hamlet of Tuktoyaktuk for its work on monitoring and addressing coastal erosion.</p> <p>In September 2021, ENR partnered with Ecology North to hold a virtual engagement session on climate change with NWT Youth. In January 2022, three more virtual engagement sessions were held (through Ecology North and PlanIt North) where a Terms of Reference was developed for a NWT Climate Change Youth Advisory Group.</p> <p>ENR also coordinated the first meeting of the Climate Change Advisory Group (CCAG) in Nov. 2021 in collaboration with the 12th Annual Water Stewardship Implementation Workshop. Approximately 100 participants including Indigenous government and Indigenous organizations, GNWT staff, federal staff, academia, community organizations and non-profits attended. The purpose of the workshop was to introduce the new Climate Change Advisory Group and identify how to increase collaboration to address climate change in the NWT. The workshop included presentations on the state of climate change in the Northwest Territories and an introduction to climate change adaptation planning. Discussions were held on identifying adaptation actions, priorities, and barriers to address water-related climate change risks. A joint report was completed and published in 2022: 12th Annual NWT Water Stewardship Strategy Implementation & Climate Change Advisory Gathering Workshop Report.</p> <p>Lastly, the GNWT sent a delegation to the United Nations' Annual Climate Change Conference, COP26, in Glasgow, Scotland to advocate for Northern climate change issues and exchange information with participants from around the world.</p>	On Track (In progress)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
4.5 Supporting community-based monitoring efforts	A. Continue community-based monitoring and implement additional community-based monitoring sites on a priority basis	ENR, MACA, Indigenous governments, Indigenous organizations, Community governments, SmartICE	<p>The GNWT purchased ice thickness measuring equipment through a professor at WLU and loaned it to Łíídlıı Kúę First Nation so that they may monitor ice thickness in areas around their community. This research is being done as a response to concerns in the community of Lutsel K'e over thinning ice conditions as the climate warms. These thin ice conditions are extremely dangerous for land users, as ice that has traditionally been fine to traverse over may now be too thin.</p> <p>The GNWT supported the 'Building local capacity for community-based micrometeorological monitoring' project led by the University of Montreal. This project is providing training to members of local NWT communities so they may effectively assist with the micrometeorological monitoring project. There are currently 8 locals undergoing training for this project – 3 from Inuvik, 1 from Wrigley, 1 from Yellowknife, and 3 guardians from the Dehcho region. Training will allow for local measurements of meteorological data that will improve understanding of how permafrost thaw may affect greenhouse gas emissions across the NWT.</p>	Completed (ongoing)
4.6 Training for Indigenous and Community governments	A. Ensure residents, first responders, communities and the GNWT are trained to be better prepared to deal with the impacts of all hazards, ranging from low through to very high risks	MACA, Community governments, NWTAC, Indigenous governments, Indigenous organizations, ECCC	Due to spring flooding emergencies and the COVID-19 pandemic, in-person training on climate change related-hazards was postponed. In the future, training will be updated to include climate change considerations, when and where appropriate.	On Track (In progress)
	B. Deliver workshops on adaptation, mitigation and best practices	MACA, Community governments, Indigenous governments, Indigenous organizations	<p>Since 2019-2020, MACA has been offering a climate change course (Integrating Climate Change Measures into Municipal Planning and Decision Making) through the School of Community Government. The course was attended by three participants in 2021-22 and is currently under review.</p> <p>Additionally, the following webinars are available to watch online:</p> <ul style="list-style-type: none"> • Climate Change for Councillors • Mainstreaming Climate Change for Community Planning • Climate Change <p>Views of these informative webinars increased 250% in the 2021-22 fiscal year.</p>	On Track (In progress)
	C. Deliver climate change training through School of Community Government programming and workshops	MACA, ENR, NWTAC, LGANT, Indigenous governments, Indigenous organizations, Community governments	<p>Since 2019-2020, MACA has been offering a climate change course (Integrating Climate Change Measures into Municipal Planning and Decision Making) through the School of Community Government. The course was attended by three participants in 2021-22 and is currently under review.</p> <p>Additionally, the following webinars are available to watch online:</p> <ul style="list-style-type: none"> • Climate Change for Councillors • Mainstreaming Climate Change for Community Planning • Climate Change <p>Views of these informative webinars increased 250% in the 2021-22 fiscal year.</p>	Completed (ongoing)

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
4.7 Adaptation planning and support (regional and local level)	A. Integrate adaptation planning into emergency management, community plan and strategic plan workshop content	MACA, ENR, NWTAC, Community governments	<p>Strategic and Community Plans are led by Community governments. MACA provides support with these Plans upon request.</p> <p>24 communities in the NWT have emergency plans in place that are less than five years old. In 2021-22, MACA provided the nine flood prone communities with a Community Flood Preparedness Package and reviewed flood hazard-specific elements in their Community Emergency Plans. MACA also worked with six community governments to review their Strategic Plans and discuss the incorporation of climate change considerations in these planning documents.</p> <p>Additionally, three Hamlet Councils (Tsiigehtchic, Ulukhaktok, Sachs Harbour) and the Town of Norman Wells worked on the development of their community plans, including climate change considerations and resilience objectives in this work. Lastly, MACA has worked on updating the Hazard Identification and Risks Assessment, a document which helps NWT communities understand the risks they face and adaptation measures to develop. These risks include climate related risks. The HIRA will be made public once fully updated.</p>	On Track (In progress)
	B. Support regional or community adaptation planning and implementation of adaptation initiatives	ENR, MACA, NWTAC, Indigenous governments, Indigenous organizations, Community governments, Federal Departments	<p>ENR continues to serve on the Climate Change Adaptation Committee (CCAC) to represent the GNWT as an advisory member. Along with representatives from Indigenous governments, Indigenous organizations, and the NWT Association of Communities (NWTAC), the Committee provides guidance and assessment on climate change adaptation project applications from Indigenous governments and Indigenous organizations and the NWTAC.</p> <p>A total of 14 projects led by Indigenous Governments, Indigenous Organizations, and Community Organizations were approved for funding by the CCAC in 2021-22. Projects spanned across all regions of the NWT.</p> <p>In 2021-22, ENR partnered with NWTAC to award the Climate Change Resilience Award to the Hamlet of Tuktoyaktuk its work on monitoring and addressing coastal erosion.</p> <p>ENR is developing a territory-wide Climate Change Risks and Opportunities Assessment to develop a common understanding across the NWT on climate change adaptation priorities. Identification of these shared priorities will enable the GNWT and its partners to more effectively seek and secure climate change adaptation funding/resources and will inform the development of the GNWT's next Climate Change Action Plan (2025-2029).</p> <p>Further, ENR continued to be an active member of the Pan-Territorial Adaptation Partnership, a collaboration between the governments of Yukon, NWT, and Nunavut to identify and implement tangible climate change adaptation outcomes in the North.</p> <p>In addition, through the Climate Change Preparedness in the North funding program provided by CIRNAC to the GNWT, ENR has funded the following research projects that involve communities:</p> <ol style="list-style-type: none"> 1. Developing permafrost and geohazard mapping data products relevant to communities in the Beaufort Delta region. 2. Advancing surficial mapping (a key component needed for hazard mapping) in communities across the NWT. 3. In Fall 2021, ECE hired a Climate Change Archaeologist to conduct a climate change vulnerability assessment for cultural places in the NWT. The overall goal is to create accurate maps and spatial data of cultural places which will facilitate climate change management planning by establishing the anticipated rate of impact on cultural landscape features, to assist in prioritizing future mitigation efforts. 	On Track (In progress)

Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status
<p>9.1 Climate change information sharing and education initiatives</p> <ul style="list-style-type: none"> • Develop education resources focused on different audiences • Deliver regular workshops • Strengthen traditional knowledge based initiatives to include a climate change component 	<p>ENR, NWTAC, ECE, HSS, ITI, MACA, Indigenous governments, Indigenous organizations, Federal Departments</p>	<p>Climate Change staff hosted a climate change educational table at the 2021 Rivers to Oceans Day event.</p> <p>ENR presented at the NWT Association of Communities virtual Annual General Meeting in May 2021, providing an update to NWTAC members on GNWT’s response to climate change and on-going work. ENR, in partnership with NWTAC, also hosted an interactive session where discussions focused on communities’ climate change-related concerns and needs.</p> <p>The Climate Change Resilience Award, funded by the GNWT, was awarded to the Hamlet of Tuktoyaktuk for its work on monitoring and addressing coastal erosion.</p> <p>The Young Leaders Climate Change Summit was held in summer 2021 by Ecology North thanks to the support of GNWT.</p> <p>In September 2021, ENR partnered with Ecology North and held a virtual engagement with NWT Youth. In January 2022, three more virtual engagement sessions were held (through Ecology North and PlanIt North) where a Terms of Reference was developed for a Climate Change Youth Advisory Group.</p> <p>In Fall 2021, ECE hired a Climate Change Archaeologist to conduct a vulnerability assessment for cultural places in the Kugmallit Bay region of the Beaufort Sea Coast. The overall goal is to create accurate maps and spatial data of cultural places which will facilitate climate change management planning by establishing the anticipated rate of impact on cultural landscape features, to assist in prioritizing future mitigation efforts.</p>	<p>On Track (In progress)</p>
<p>9.2 Training for Indigenous governments and organizations to support climate change monitoring</p> <ul style="list-style-type: none"> • Support Indigenous Guardians Programs led by Indigenous governments in the NWT to monitor climate change using traditional, local and scientific knowledge where requested 	<p>Indigenous governments, Indigenous organizations, ENR, Federal Departments</p>	<p>ENR supports Indigenous-led Guardian initiatives in the NWT to help monitor wildlife, habitat and cultural areas, support conservation, and create employment opportunities.</p> <p>ENR CPIU held two Small Vessel Operator Proficiency (SVOP) training courses in Yellowknife Bay and Frank Channel in Spring 2021. Registration was open to Yellowknives Dene First Nation, North Slave Métis Alliance, and Tłı̨chǫ Government, as well as ENR staff from the region.</p> <p>ENR CPIU is working with the Alberta Biodiversity Monitoring Institute at the University of Alberta to lead a project with multiple collaborators on developing a training course on the use of environmental sensors (remote cameras, audio recording units, climate sensors) to collect baseline biodiversity information and contribute to wildlife monitoring changes with climate change. The project aims to have an accredited course available in 2-3 years. Further, in 2021-22, GNWT supported the ‘Building local capacity for community-based micrometeorological monitoring’ project which is a research project based out of University of Montreal. This project is providing training to members of local NWT communities so they may effectively assist with the micrometeorological monitoring project. There are currently 8 locals undergoing training for this project - 3 from Inuvik, 1 from Wrigley, 1 from Yellowknife, and 3 guardians from the Dehcho region. Training will allow for local measurements of meteorological data that will improve understanding of how permafrost thaw may affect greenhouse gas emissions across the NWT.</p>	<p>On Track (In progress)</p>

Appendix A

Cross-Cutting: Economic Impacts and Opportunities

Action Areas	Action Items	Lead, Partners	Summary of Progress in 2021-2022	Status
5.1 Estimating the overall economic cost implications of the combined impacts that may occur in the NWT due to climate change	A. Undertake a study focusing on: <ul style="list-style-type: none"> • Impacts on infrastructure • Impacts on quality of life • Impacts on economic activities • Cost-benefit analysis of adaptation measures 	ENR, FIN, HSS, ITI, NWTAC	The Cost of Climate Change Report and a plain language summary are currently in progress and under review. As the main partner, the NWT Association of Communities (NWTAC) will publish the Report in 2022-23.	On Track (In progress)
Action Areas	Lead, Partners	Summary of Progress in 2021-2022	Status	
10.1 Undertaking sectoral assessments and adaptation planning <ul style="list-style-type: none"> • Scope key sectors including, but not limited to, transportation, ice roads, mining, agriculture, forestry, tourism and fisheries to determine economic impacts and opportunities • Explore opportunities to collaborate with think-tanks, academics and international stakeholders regarding the costs and benefits of climate-related changes in the NWT 	ITI, ENR, Industry, NGOs	ITI's Economic Analysis Unit completed the development of a Computable General Equilibrium Model which can evaluate the economy-wide impact of climate change in the NWT. This includes the impacts of climate change and related policy changes on specific economic sectors. ITI staff have received additional training on how to further improve and update the model and presented the Model to other GNWT departments. ITI also collaborated on a research paper outlining the impact of carbon pricing on the NWT economy and how the economy is negatively impacted by climate change. Preliminary results indicated that climate change variables are significant determinants of economic performance in the NWT and highlighted the extent to which the territorial economy is impacted by climate change. Further analysis and results from this research will inform development of environmental policy in the NWT.	Completed (ongoing)	
10.2 Regional forest harvest that substitutes low biomass for imported fossil fuels <ul style="list-style-type: none"> • Assessment and implementation of community led harvesting for fuelwood for personal dwellings and district heating systems 	ENR, INF, Community governments	Action Area 10.2 has not yet been initiated.	On track (Not yet started)	

